YELLOWSTONE COUNTY BOARD OF PLANNING

City of Billings and
Yellowstone County, Montana

AGENDA

JUNE 9, 2026 MEETING TIME: 4:30 p.m.
City Council Chambers, 5th Floor
316 N 26th St, Billings MT

NOTICE TO THE PUBLIC

Citizens are invited to:

- Review the Agenda Packet on the City's website at: Agendas and Minutes
- Public comment will be taken only during the Public Comment periods as indicated on the agenda and during the Public Hearings, if any are scheduled, under the Regular agenda. Comments may be sent to the Board via email before 12:00 pm on the meeting date. All emails received prior to this time will be entered into the record for the public hearing. Comments may be submitted by:
- Mail: City/County Planning Division PO Box 1178, Billings MT 59103
- Email: plnonline@billingsmt.gov
- NOTICE: All meetings and official activities of the MPO are held in buildings and locations that comply with accessibility standards according to the Americans with Disabilities Act (ADA). Special arrangements for participation in public hearings by individuals with hearing, speech, or vision impairment may be made upon request at least three days prior to the hearing. Please notify the Planning Division at 406-657-8247.

1. **CALL TO ORDER - Planning Board President:** Welcome and Introduction of Board Members and Staff.

2. **APPROVAL OF AGENDA* -** including any additions or deletions to agenda. The agenda for a regular meeting will be closed at 5:00 p.m. three (3) working days prior to the date of the meeting.

3. **APPROVAL OF MEETING MINUTES**: May 27, 2026

   Attachments
   Minutes of May 27, 2026

4. **PUBLIC COMMENT PERIOD** – As required (3 minute maximum per person). *Any member of the public may be heard on any subject that is not on the agenda. The Planning Board 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.*
   4a) Comments on items not on agenda and requests to add items to future agendas
   4b) Comments on items on the non-public hearing agenda items

5. **DISCLOSURE OF CONFLICT OF INTEREST**:

6. **DISCLOSURE OF EX PARTE COMMUNICATION**:

7. **OLD BUSINESS** (Agenda items that were not discussed or not completed in a previous meeting or items requiring action).

   a. **PUBLIC HEARINGS/PUBLIC HEARING PARTICIPATION GUIDELINES**. The County Planning Board welcomes public input on matters brought before the Board. To ensure a fair and effective public comment process, we ask that you consider the following guidelines when presenting your comments: Address the Planning Board directly. You must state your name and address before commenting. This is an opportunity to explain how you will be affected by the decision and why that is an important consequence. By state law, the Planning Board must consider only certain criteria when reviewing subdivisions (76-3-608(a), MCA). Please see the attached guidelines for the criterion. Thank you for participating!

8. **NEW BUSINESS:** (Agenda items new to this meeting).

   a. Public Hearing and Recommendation for Adoption of the 21st Street Underpass Study. Elyse Monat, Transportation Planner

   Attachments
   Draft 21st St. Underpass Study

b. Public Hearing and Recommendation for Approval of the West Billings Neighborhood Plan. Anna Vickers, Planning Division Manager

Attachments
West Billings Neighborhood Plan
West Billings Neighborhood Plan Appendices A-B
West Billings Neighborhood Plan Appendices C-G

c. Plat Review and Board Discussion. Yellowstone Club Estates City Major Subdivision. Hunter Kelly, Planner

Attachments
Preliminary Plat
Draft Subdivision Improvement Agreement
Findings of Fact
Variance Request Letter
Agricultural Covenant

d. Plat Review and Board Discussion. 44 West 2nd Filing City Major Subdivision. Dave Green, Planner

Attachments
Proposed Plat
Draft SIA
Findings of Fact
Traffic Study
TIS Studied Intersections

e. Plat Review and Board Discussion. 44 West 3rd Filing City Major Subdivision. Dave Green, Planner

Attachments
Proposed Plat
Draft SIA
Findings of Fact
Traffic Study
TIS Studied Intersetions

f. Plat Review and Board Discussion. Shop House Acres County Major Subdivision. Dave Green, Planner

Attachments
Proposed Plat
Draft SIA
Findings of Fact
Variance request from applicant
Attachment A - Staff variance review
Traffic Study

9. **OTHER BUSINESS:**

a. (Standing Item) Long Range Strategic Issues and an overview of future City and County issues and projects.

10. **ADJOURNMENT**

11. **FUTURE AGENDA ITEMS**

CITY/COUNTY PLANNING BOARD

City Council Chambers, 5th Floor
316 N 26th St, Billings MT

BILLINGS - YELLOWSTONE COUNTY
MPO
METROPOLITAN PLANNING ORGANIZATION

Public Hearing Participation Guidelines

All meetings and official activities of the MPO are held in buildings and locations that comply with accessibility standards according to the Americans with Disabilities Act (ADA). A TTY number for the hearing impaired, 406-657-3079, is available upon request. Special arrangements for participation in the public hearings by individuals with hearing, speech, or vision impairment may be made upon request at least three days prior to the hearing. Please notify the Planning Division Office, at 406-247-8610.

The County Planning Board welcomes public input on matters brought before the Board. To ensure a fair and effective public comment process, we ask that you consider the following guidelines when presenting your comments: **Address the Planning Board directly. You must state your name and address before commenting**. This is an opportunity to explain how you will be affected by the decision and why that is an important consequence. Be informed of the process and the requirements of the Board. If you are commenting about a subdivision, please limit your comments to the review criteria.

By state law, the Planning Board must consider only certain criteria when reviewing subdivisions (76-3-608(a), MCA). These criteria include: Effect on agriculture and agricultural water user facilities; Effect on local services; Effect on the natural environment; Effect on wildlife and wildlife habitat; Effect on public health and safety.

Provide specific information about why you are concerned about the pending application, how the decision will impact the review criteria listed above, and provide suggestions on how to minimize or eliminate the impact.

Respect the right of others to participate. Wait until the previous speaker has completed their comments before making your own comments. Do not talk over the person commenting or with other people in attendance.

The public hearing is not an opportunity to question or accuse the applicant or their agent. If you have questions of the Board, the applicant or the agent, ask questions directly to the Board during the public hearing portion of the meeting. The Board will respond or request the applicant or agent to respond after the public comment portion of the hearing is closed.

After the public comment portion of the hearing is closed, no further comments are allowed unless you are addressed directly by a Board member.

You should expect the Board to make a balanced recommendation in accordance with its statutory responsibilities. The Board's ability to make reasonable and thoughtful recommendations is dependent on a fair consideration of everyone's interests.

Thank you for participating.

Date: 06/09/2026
Title:
Presented by:
Department: Planning & Community Services
Presentation:

Information

RECOMMENDATION
APPROVAL OF **MEETING MINUTES**: May 27, 2026

BACKGROUND (Consistency with Adopted Plans and Policies, if applicable)

ALTERNATIVES
City Council may:

- Approve; or,
- Not Approve

FISCAL EFFECTS

Attachments

Minutes of May 27, 2026

Billings PLANNING & COMMUNITY SERVICES

BILLINGS - YELLOWSTONE COUNTY MPO METROPOLITAN PLANNING ORGANIZATION

CITY/COUNTY PLANNING BOARD

Wednesday, May 27, 2026 at 4:30pm

Members	Position	01/13/2026	01/27/2026	02/10/2026	02/242026	03/10/2026	03/24/2026	04/142026	04/28/2026	05/12/2026	05/27/2026	06/09/2026	06/23/2026	07/14/2026	07/28/2026	08/11/2026	08/25/2026	09/08/2026	09/22/2026	10/13/2026	10/27/2026	11/10/2026	11/24/2026	12/082026	12/22/2026
Jim Ronquillo	Billings Ward I	1	C	C	C	1	1	A	A	A	1														
Roger Gravgaard	Billings Ward II	1	C	C	C	1	1	1	V	1	1														
Dennie Stephenson	Billings Ward III	1	C	C	C	1	1	1	1	1	1														
John Staley **PRESIDENT**	Billings Ward IV	1	C	C	C	1	1	1	1	1	1														
David Nordel	Billings Ward V	V	C	C	C	A	A	V	A	A	1														
Troy Boucher	YC District 1	1	C	C	C	A	V	1	A	V	A														
Dennis Cook, **VICE PRESIDENT**	YC District 2	1	C	C	C	1	1	1	1	1	1														
Vacant	YC District 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacant	YC District 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacant	YC District 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alexis Bonogofsky	YC District 6	1	C	C	C	A	A	A	1	V	V														
Vacant	YC District 7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scott Reiter Megan Trevino	Ex-Officio SD2	1 A	C C	C C	C C	1 A	1 A	A A	A 1	V A	A 1														

Please note: "A" stands for excused absence, "1" stands for present, "V" stands for Zoom participation, "C" stands for Canceled

Call the Meeting to Order: President Staley called the meeting to order at 4:34 PM

Introduction of Planning Board Members and Planning Department Staff

Attending Staff: Dave Green, Planner II; Brenda Berns, Planning Clerk

Others in Attendance: Kolten Knatterud, IMEG

2. Approval of Agenda

Motion
Motion by Board member Cook to approve the agenda as submitted. Second by Board member Stephenson. Motion passed unanimously.

3. Approval of Minutes: May 12, 2026

Motion
Motion by Board member Stephenson to approve the May 12, 2026 meeting minutes as submitted. Second by Board Member Ronquillo. Motion passed unanimously.

4. Public Comment: No public comment was received.

5. Disclosure of Outside (Ex-Parte) Communication – None were disclosed.

6. Disclosure of Conflicts of Interest – None were disclosed.

7. Old Business – There was no old business.

8. **New Business**

a. **Pronghorn County Major Subdivision – Preliminary Plat Review. Presentation and Discussion. Dave Green, Planner II**

Dave Green gave an overview of the subdivision and the proposed phased development.

Staff reviewed the Montana Department of Transportation (MDT) report regarding the proposed Highway 312 bypass. It was noted that the bypass previously contemplated is no longer required. Based on the updated information, staff recommended removal of Condition No. 3 from the proposed conditions of approval.

Staff received written correspondence from Monica Plecker, Yellowstone County Public Works Director, which was entered into the record and identified as Exhibit A.

Research and survey information indicate that Leawood roadway is privately owned and is not maintained by the county. As a result, it cannot be relied upon as secondary access for development. An alternative access location will need to be identified.
The applicant and agent requested a 30-day continuance to address the loss of secondary access and evaluate potential alternatives.

Board Discussion
The applicant's representative requested a 30-day continuance to revise the preliminary plat and identify an alternative secondary access point following the determination that Leawood Drive cannot serve as an access route. The applicant will continue coordinating with county staff regarding access requirements.
Discussion occurred regarding potential impacts to previously discussed variances. Staff clarified that no variances are being requested at this time; however, the subdivision must comply with the requirement for secondary access.
The board discussed the possibility of a turn lane improvement. It was noted that a turn lane is not currently required, although the applicant may continue to evaluate the issue.
A question was raised regarding access to existing dry hydrants if the access configuration changes. Staff confirmed that the hydrants would remain accessible.
The public hearing process was reviewed. Staff explained that the hearing would be continued and that members of the public would retain the opportunity to provide comments. It was further noted that the staff report is available online and that notice is provided to property owners adjacent to the proposed subdivision.

Applicant:
Kolten Knatterud, IMEG
Mr. Knatterud stated that the development would utilize cisterns rather than wells and has no intention of connecting to the Hidden Lake water system. Regarding access, the applicant requested a 30-day continuance. Mr. Knatterud explained that the original proposal did not include a connection to Leawood Drive due to topographic constraints; however, requirements exist to provide connections to adjacent subdivisions. Two alternative access options are being evaluated, as the Leawood connection was determined to be less desirable. The applicant indicated they would continue working with Public Works and Planning staff to identify a resolution.
Regarding the proposed right-turn lane, the applicant stated that construction cost estimates are currently being obtained. Because Purple Sage improvements are anticipated, the applicant requested the 30-day continuance to allow additional time to evaluate associated expenses. He also indicated that the Subdivision Improvements Agreement (SIA) would be updated accordingly.

Questions
Commissioners asked questions regarding state review requirements, water service options, and the timeline for evaluating roadway improvements. The applicant explained that, because access is proposed from Highway 87, the project is already under state review and may require an access permit from the Montana Department of Transportation. The applicant further stated that the use of wells was not approved through the Department of Environmental Quality (DEQ) review process and that obtaining approval would likely be difficult due to the depth required and concerns regarding water quality. In response to questions about the proposed turn lane, the applicant indicated that additional information

should be available within 30 days and that the Subdivision Improvements Agreement (SIA) would be updated accordingly.
President Staley opened the Public Hearing

Several members of the public spoke in opposition to the proposal and raised concerns regarding roadway safety, traffic volumes, access, water service, school capacity, density, public notification, and future development impacts. Speakers expressed concerns about increased traffic on Highway 87, the need for a dedicated turn lane, the safety of school-aged drivers, water delivery and storage through individual cisterns, drain field locations on small lots, potential impacts on property taxes, and the cumulative effect of future residential growth in the area. Concerns were also raised regarding the adequacy of public notice and questions about the project's commercial components.
In response, the applicant and staff explained that each lot would be served by an individual cistern and drain field in accordance with Department of Environmental Quality (DEQ) requirements. It was noted that DEQ had reviewed and approved the proposed water and wastewater systems. Discussion also occurred regarding school capacity, with comments indicating that nearby schools have available capacity to accommodate future growth.
Board members acknowledged ongoing concerns regarding traffic safety and the need for a turn lane along Highway 87. Staff indicated that discussions with the applicant were continuing regarding the timing and potential construction of a turn lane and that additional information would be provided as part of an updated Subdivision Improvements Agreement (SIA). It was further noted that Highway 87 is under state jurisdiction and that transportation improvements may require review and approval by the Montana Department of Transportation (MDT).
Additional questions were asked regarding the transition to the newly established planning board structure. It was explained that state legislation requires the dissolution of the current board, with separate city and county boards to be established pursuant to the new law.

President Staley closed the Public Hearing

Motion
Motion by Board Member Gravgaard to recess the public hearing and continue consideration of the agenda item to June 23, 2026. Seconded by Board Member Nordel. Motion passed unanimously.

Adjournment 5:44 PM

Brenda J Berns, Planning Clerk

Yellowstone County

Public Works Department
Po Box 35024
Billings, MT 59107

Phone (256-2735)
Fax (254-7946)

TO: Dave Green, City/County Planning

FROM: Monica Plecker, Public Works Director MW

RE: Pronghorn Subdivision

DATE: 5/27/26

Mr. Green, Thank you for sending over information related to the Pronghorn Subdivision and the neighborhood letters. I have provided written responses to items that pertain to Public Works. Please find below Public Works information regarding inquiries related to Pronghorn Subdivision:

1. **Is a turn lane required on Highway 87 and will it be constructed?**

   Public Works agrees with the information the applicant's agent shared at the plat review meeting. The TIS informs that warrants will be met with Phase 5. The County would encourage and agree with the approach to construct the turn lane with Phase 1, if MDT allows.

2. **Leawood Drive – What is the legal status and maintenance of Leawood Drive? Who will be responsible for repairs because of construction traffic and added traffic from the new development?**

   Leawood Drive was created as part of Certificate of Survey 732 in 1956. The Certificate of Survey does not include dedication language even though the roadway is depicted like right of way. There is no acceptance language. County Records suggest the road is private and maintenance records affirm the neighbors claim that they county does not perform maintenance on Leawood Drive.

   The Subdivision Regulations require multiple things and sometimes these items compete with one another. First, the regulation require connectivity to adjoining roads. This is a requirement to public and private roads. Connectivity to existing roads is not exclusive of providing a second access, and meeting one requirement does not mean you meet both requirements. Secondly, A second point of access is required for all major subdivisions with the caveat the second access cannot be provided by a dead end street.

   Upon further review, Public Works agrees Leawood Drive, because of its private nature cannot be used as a secondary access and would not require the developer to construct the missing segment of Leawood Drive as proposed on the preliminary plat. The developer will need to work with Public Works and Planning to determine a new location for a second access that can be legally accessed by the public and meet the secondary access requirements.

#A

RECEIVED
CITY OF BILLINGS
27 MAY 2026
PLANNING & COMMUNITY SERVICES DEPARTMENT

Billings PLANNING & COMMUNITY SERVICES

City-County Planning Division
Tuesday, May 27, 2026
Yellowstone County Board of Planning

BILLINGS - YELLOWSTONE COUNTY MPO METROPOLITAN PLANNING ORGANIZATION

Printed Name	Address/email
Josh Hedrick	4823 US Hwy 87 N Blgs, Mont 59105
Brandon Ranney	5015 Leawood Dr Billings MT 59105
Seth Edwards	5023 Middle Valley Dr. Billings MT 59105
Keryl + Perry Halford	4837 Leawood Dr. Billings, MT
Teresa & Jerry Tuller	4960 Leawood Dr
Jessica L. Mallet	5001 Leawood Dr Billings, MT.
Scarlett Tuller	4901 Leawood dr, Billings, MT 59105
Jerry Tuller	4960 Leawood Dr Billings MT 59105
Terry Gustin	4919 Leawood Dr Blgs 59105
Paul + Colleen Berg	1032 Lost View Dr Blgs. 59105
Stuart & Tara Sinclair	5102 Middle Valley Dr. 59105
Lonnie + Irene Nelson	1108 Little Bustle Pl Blgs 59105
Erik & Laura Moen	1016 Lost View Dr
Denni Pehl	920 Lorraine St Blgs 59105
Martin Davis	5206 Deadwood 59105
Jodi + Jim Bohle	5037 Country View 59105
Les Krueger	5047 Leawood 59105
Erik Moen	1016 Lost View Dr. 59105

Tom A. Fischer	4395 Hwy 87 N
Diane Fischer	4395 Hwy 87 N
Stuart Sinclair	5102 Middle Valley Dr.
Ronni Tallerico	YCPW
Dawn Grayson	5110 Hidden View Pl.
	4960
Gary Splitberger	5112 Hidden View Pl.
Jordan Ferguson	4931 Middle Valley Dr.

Planning Board

Date:	06/09/2026
Title:	21st St. Underpass Study Public Hearing and Recommendation to the Policy Coordinating Committee
Presented by:	Elyse Monat
Department:	Planning & Community Services
Presentation:	Yes

Information

RECOMMENDATION

Staff recommends that the Planning Board listen to the presentation on the 21st St. Underpass Study, hold a public hearing, and receive public comments. Following the public hearing, staff recommends that the Planning Board forward a recommendation for adoption of the 21st Street Underpass Study to the Policy Coordinating Committee.

BACKGROUND (Consistency with Adopted Plans and Policies, if applicable)

The 21st St. Underpass is one of two grade-separated railroad crossings that link downtown Billings to the industrial and residential area south of the railroad. The 21st Street crossing is unique because it is the only grade-separated crossing that serves the central downtown area, making it one of the critical railroad crossings in Billings. However, there are significant limitations to the current use of the 21st Street underpass, including:

- Lack of vertical clearance for large vehicles (current clearance is 8 ft).
- Narrow lanes without shoulders.
- Lack of bicycle lanes or other options for bicycles.
- Narrow, dark, debris-prone sidewalks for pedestrians.
- Periodic roadway drainage problems.
- Steep roadway grades on both approaches to the underpass.

After the Montana Department of Transportation (MDT) concluded that it would not construct a grade-separated crossing at the 27th St. railroad crossing due to community preference, the City considered improving the 21st St. underpass to allow additional types of vehicles to utilize the underpass. The City placed a project to improve the 21st St. underpass in its Capital Improvement Plan (CIP). As a result, the Billings Metropolitan Planning Organization (MPO) offered to assist in the process with a planning-level study of the underpass to provide options for improvements. The City has since identified the 21st Street underpass as part of its long-range CIP projects list.

Through the Request for Proposals (RFP) process, Kittelson & Associates, Inc. was selected as the consultant for the project with HDR as their sub-consultant. The two firms worked together to conduct an existing conditions analysis and two rounds of public outreach. They also communicated with BNSF Railway, which owns the structure. Based on the planning-level technical analysis completed by experts in traffic and structural engineering, and with input from the public and the project advisory committee, the consultants developed six alternatives for the underpass, which were reduced to four alternatives in consultation with the project advisory committee. The purpose of this study was to provide options to the City of Billings for potential improvements, not to select a particular alternative.

The four alternatives include:

1. **Alternative 1: No Build**
    1. Alternative 1 maintains the infrastructure currently in place. This alternative means no actions are taken and no additional cost is incurred. This also means that heavy vehicles, including fire and emergency medical service (EMS) vehicles would still not be able to use the underpass. Additionally, bridge involved crashes may still occur due to limited vertical clearance, drainage issues will persist without an upgraded stormwater system, and sidewalks would continue to experience debris accumulation due to unstable slopes.
    2. Cost Estimate: $0
2. **Alternative 2: Minor Improvements with Overheight Vehicle Warning System**
    1. Alternative 2 adds low-cost improvements with the goals of reducing the overheight vehicle crashes into the overpass bridge and improving the pedestrian environment under the bridge. The alternative includes installing an overheight vehicle warning system, modifying the 21st Street underpass to improve the existing drainage system, and stabilizing the bridge abutment embankment slopes to reduce debris on the sidewalks.
    2. Cost Estimate: $600,000-$800,000
3. **Alternative 3: Increase Clearance to 11.5 Feet with Minor Pedestrian Improvements**
    1. Alternative 3 includes moderate modifications of the bridge structure to increase the vertical clearance by approximately 3.5 feet to achieve a vertical clearance of approximately 11.5 feet (11’-6”), as well as adding pedestrian improvements and an overheight warning system like Alternative 2. This alternative would

accommodate ambulances but continue to not accommodate fire apparatus, large EMS vehicles, and most commercial trucks.
    2. Cost Estimate: $8-10 Million
4. **Alternative 4: Increase Clearance to 13.5 Feet with Bridge Replacement**
    1. Alternative 4 increases the vertical clearance of the underpass to 13.5 feet. This alternative would allow heavy vehicles, including fire and emergency medical services (EMS), to utilize the underpass. In this alternative, achieving the increase in vertical clearance would require replacing the bridge structure, as the increase in roadway depth would expose existing bridge piles to a depth not meeting structural standards.
    2. Cost Estimate: $26-30 Million

More than 400 people responded to the second survey, which presented the four alternatives. From highest to lowest, the public preferred:

1. Alternative 2 (Minor Improvements with Overheight Vehicle Warning System)
2. Alternative 3 (Increase Clearance to 11.5 Feet with Minor Pedestrian Improvements)
3. Alternative 1 (No Build)
4. Alternative 4 (Increase Clearance to 13.5 Feet with Bridge Replacement)

BNSF indicated that it would prefer an option that does not impact railroad operations. Of the two construction options, BNSF would prefer Alternative 3.

Another item that must be considered is the underpass's proximity to the Billings PCE federal Superfund site. Construction would likely require mitigation measures to be taken.

21st Street is not currently designated as an urban route within the Billings MPO and, therefore, is not eligible for federal funding through the MPO. To become eligible for federal funding, a request would need to be submitted to MDT to add the roadway to the urban system.

This study is now going through the MPO's review process, in which the governing bodies forward a recommendation of adoption or denial to the Policy Coordinating Committee (PCC), which makes the final decision on the study for the MPO. The expected review schedule is:

- Technical Advisory Committee - May 28, 2026
- Planning Board - June 9, 2026. This meeting includes a public hearing.
- Board of County Commissioners Discussion - June 11, 2026
- Board of County Commissioners Regular - June 23, 2026
- City Council Work Session - June 15, 2026
- City Council Regular - June 22, 2026
- Policy Coordinating Committee - July 21, 2026

STAKEHOLDERS

Stakeholders were engaged throughout the process. The project advisory committee included representatives from the Billings City Council, the City and County Public Works Departments, MET Transit, local Tax Increment Financing (TIF) districts, the Montana Department of Transportation, Phillips 66, and more. Councilmember Roy Neese provided valuable insight and suggestions to the study. Consultants met with additional stakeholders, including the City of Billings Fire and Police Departments, and an EMS provider. More than 400 members of the public responded to each round of surveys, which resulted in almost 900 survey responses.

This meeting includes a public hearing where residents can share public comment.

The consultants also engaged with BNSF to get their feedback on the four alternatives.

ALTERNATIVES

The Planning Board may:

- Forward a recommendation of study adoption to the Policy Coordinating Committee.
- Forward a recommendation of study denial to the Policy Coordinating Committee.

A recommendation of study adoption does not commit the City of Billings or any other entities to action. The plan provides options for possible improvements to the 21st St. underpass. Adopting the plan provides the City with the opportunity to pursue grants and other funding sources in the future if they become available. Not adopting the plan would remove these funding opportunities.

FISCAL EFFECTS

There are no fiscal effects to adopting the study, as this is a study only.

If the City of Billings decides to make changes to the 21st St. underpass in the future, there would be a cost to do so, ranging from approximately $600,000 - $30 million. This funding would have to be approved at another time by the Billings City Council and be updated within the CIP. Federal grants and other funding sources outside the City would certainly be considerations in developing this project to move it forward. 21st Street is not currently designated as an urban route within the Billings MPO and, therefore, is not eligible for federal funding through the MPO. To become eligible for federal funding, a request would need to be submitted to MDT to add the roadway to the urban system.

Attachments

Draft 21st St. Underpass Study

BILLINGS 21ST STREET RAILROAD UNDERPASS

BILLINGS, MONTANA

May 6, 2026

BILLINGS - YELLOWSTONE COUNTY MPO METROPOLITAN PLANNING ORGANIZATION

KITTELSON & ASSOCIATES

HDR

Inside front cover

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BILLINGS 21ST STREET RAILROAD UNDERPASS

BILLINGS, MONTANA

Acknowledgements

The Billings – Yellowstone County MPO would like to acknowledge the following committees and individuals for their contributions in the development of this study. Their time and effort devoted to the process was instrumental in the development of this study.

PROJECT MANAGEMENT TEAM (PMT)

- Elyse Monat (Billings – Yellowstone County MPO)
- Lora Mattox (Billings – Yellowstone County MPO)

PROJECT ADVISORY COMMITTEE (PAC)

- Roy Neese (City Council Ward 2)
- Jay Anderson (Yellowstone County Public Works)
- Dakota Martonen (City Engineer's Office)
- Stephanie Donovan (Bicycle and Pedestrian Advisory Committee)
- Rusty Logan (MET Transit)
- Kurtis Schnieber (Montana Department of Transportation)
- Samantha Wood (Montana Department of Transportation)
- Janet Hardy (Phillips 66)
- Michelle Williams (Billings Depot)
- Mehmet Casey (Downtown Billings Alliance)
- Heather Doty (Billings Industrial Revitalization District (BIRD))

CONSULTANT TEAM

Kittelson & Associates, Inc.

- Justin Delgado
- John Ringert, PE
- Andy Daleiden, PE
- Ly Nguyen
- Mikayla Montoya

HDR

- Lisa Fisher, PE
- Brittany Cremer, MSPR
- Spencer Dodge, MA

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Billings Metropolitan Planning Organization (MPO) Statement

The Billings Metropolitan Planning Organization (MPO) provides continuing, cooperative, and comprehensive (3C) transportation planning services for the Billings Metropolitan Planning Area in accordance with requirements established by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). These planning efforts ensure that the regional transportation system supports current and future needs through a balanced, multimodal approach that considers all modes of travel, including roadway, transit, bicycle, and pedestrian facilities.

MPO activities include identifying transportation needs, evaluating potential projects, and developing planning-level concepts to inform decision-making. This may involve assessing existing infrastructure, identifying opportunities for public improvements, and preparing conceptual designs and cost estimates.

The Billings MPO does not advocate for, prioritize, or approve specific infrastructure projects or construction activities. Instead, the MPO's role is to maintain a coordinated, data-driven, and inclusive framework for evaluating transportation options and facilitating collaboration among jurisdictions, agencies, and the public to achieve a safe, efficient, and accessible regional transportation network.

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Section 1
INTRODUCTION

INTRODUCTION

Area Overview

Freight rail is a cornerstone of the City of Billing's history; the city was named for the Northern Pacific Railway president. Montana Rail Link (MRL) operated a railroad with a mainline that runs through downtown Billings until January 1, 2024, when the Burlington Northern Santa Fe Corporation (BNSF) took over control of the line. Rail activity in the City of Billings helps support three regional oil refineries (in Billings, Laurel, and Lockwood), coal extraction in southeastern Montana, other mining and mineral extraction, agricultural products, and a conglomeration of other smaller industries.

FIGURE 1 PROJECT STUDY AREA

While the railroad serves the critical movement of goods through Billings, it also presents a physical barrier to people needing to travel north and south in the city. Several at-grade rail crossings exist in the city including 27th Street (Highway 3), Broadway Avenue, 29th Street, 21st Street, and 13th Street. When a train is present, at-grade rail crossings may result in delays for pedestrians, bicycles, and vehicles, queues accumulating, and diverted EMS vehicles. The 21st Street underpass provides one of the only grade-separated crossings of the railroad downtown and is the subject of this study.

Project Background

Ideally, grade-separated crossings provide unobstructed passages for road users and can serve as alternative routes for users that do not wish to risk being delayed by a train passing through an at-grade crossing. However, the design of 21st Street crossing impacts the use of 21st Street as an alternative and the location of the 13th Street crossing may dissuade or not provide a viable alternative for many users wanting to access downtown.

The 21st Street underpass has low vertical clearance (8 feet) that makes it unusable for most large vehicles and presents a potential safety hazard to the rail infrastructure in the event a vehicle strikes the bridge requiring significant repair or bridge failure. In addition to height restrictions, there are significant concerns shared by the public, City, and local community members regarding the sidewalks, drainage, lighting, and lack of bicycle facilities, which present further barriers to using the corridor.

This study evaluates feasible alternatives to improve the 21st Street grade-separated rail crossing. Alternatives focus on opportunities to improve vehicular access, drainage, and enhancement of the pedestrian and bicycle experience.

Previous Studies

Many completed studies evaluated changes to the transportation system in downtown Billings. These include the following:

YEAR	RELEVANT TRANSPORTATION STUDIES
2023	A 2023 27th Street Railroad Crossing Final Report looked at short- and long-term alternatives for the 27th Street crossing, including grade separation options and costs, and ITS concepts.
2021	The 2021 Fifth Avenue Corridor Feasibility Study evaluated redeveloping the 5th Avenue North Corridor as a non-traditional and non-motorized corridor through downtown Billings.
	The 2021 Billings Downtown Traffic Study evaluated alternatives for improving transportation in the downtown area, including conversion of streets from one-way to two-way. This study included a study of reducing the number of lanes on Montana Avenue from three lanes to two lanes between Division Street and 21st Avenue.
2018	The Final 2018 Billings Urban Area Long Range Transportation Plan collected feedback from a steering committee and the public at large on many transportation issues facing the City of Billings. Delays and roadway closures near at-grade crossing were identified as one of the public's primary concerns in the downtown area. Potential solutions noted by steering committee and public included constructing new grade-separated crossings, relocating rail out of downtown, installing warning signs with real-time information systems, and improving existing grade-separated crossings.
2016	The 2016 Montana Rail Grade Separation Study generated a list of at-grade and grade-separated railroad crossings where potential feasible improvements may be considered. The study detailed improvement options for the 13th Street and 21st Street underpasses, such as modification to the horizontal and vertical clearances to facilitate legal height truck usage.
2004	A 2004 Railroad Crossing Feasibility Study, commissioned by the City of Billings, identified an underpass at 27th Street, which included shifting and raising the railroad, as the most beneficial long-term alternative. Additionally, this study identified several short-term improvements which could improve traffic operations in downtown Billings. These included the installation of advance railroad warning signs downtown (which was subsequently implemented), a downtown quite zone (implemented in 2008) and adding a southbound left-turn phase at the 27th Street/Montana Avenue intersection (which has been implemented), but did not provide a detailed analysis.
2003	A 2003 Montana Rail Grade Separation Study looked at the feasibility of railroad grade separation at 20 sites across Montana. These sites included 27th, 28th, and 29th Street at grade crossings
2000	A 2000 study looked at the reconstruction of the MRL bridge over 21st Street which found that clearance for ambulance vehicles would require at minimum 9 feet 6 inches of vertical clearance, but that the city would not achieve this clearance if it meant that a gravity storm system could not be maintained at the site.
1997 - 1958	Additional studies focusing on or including the 27th Street at-grade crossing have been documented in 1958, 1960, 1962, 1964, 1980, and 1997.

Project Intent

The intent of this study is to expand on previous studies, provide a more detailed analysis of the underpass as it exists and functions today, identify and evaluate opportunities for improvement, and collect public feedback on the costs and benefits associated with improvements.

Project Process and Breakdown

The development of this study included repeated engagement of stakeholders included on the Project Advisory Committee (PAC) and members of the public. This served to inform each stage of the study from its analysis of existing conditions to its development of final alternatives. Figure 2 provides a high-level project process outline.

FIGURE 2 PROJECT PROCESS

INITIAL ALTERNATIVES SCREENING

This project initially evaluated six alternatives for 21st Street and its surrounding corridors. These alternatives were evaluated for fatal flaws and presented to the PAC. The PAC recommended four alternatives be carried forward and analyzed as final alternatives.

FINAL ALTERNATIVES

Four alternatives were carried forward after initial screening. These alternatives underwent another round of assessment to refine project details, design considerations, cost estimates, and additional vetting by the public and PAC. A screening analysis was completed for all alternatives whose results are presented in this report. This study presents the evaluation of alternatives that include strategies to enhance the safety, multi-modal accessibility and roadway conditions of 21st Street.

Project Assumptions

While Billings is currently undertaking significant changes to its downtown roadway network, none of the construction projects active during this study's completion impacted the analysis described in this study. This study did not assume any changes to the roadway network impacting the study area. This project also did not account for any planned or desired redevelopment in downtown Billings. The City is actively undergoing an update to its comprehensive plan and is creating a transportation corridor plan, both of which may provide additional vision and context for the city and study area.

Section 2
PUBLIC OUTREACH

PUBLIC OUTREACH

A comprehensive public involvement plan (PIP) was developed and implemented for engaging the community. The (PIP) included the following activities:

- Hosting a project website;
- Conducting two rounds of virtual feedback collection (surveys) in June 2025 and December 2025 / January 2026;
- Engaging with the PAC through four meetings, and;
- Interviewing community members

Feedback from the community was used to aid in the development and assessment of alternatives. The goal was to provide transparency throughout the process and for the public outreach to objectively assist in the effort to identify opportunities and challenges with the existing underpass, and subsequent alternatives. The complete PIP is found in *Appendix A*.

Project Advisory Committee

The PAC served as a guidance and oversight body for the study. They were engaged on four separate occasions. These took the form of hybrid (in-person or virtual) meetings where findings at various study stages were presented to the committee for their review and discussion. Presentations given to the PAC and meeting minutes are included in *Appendix B*. The PAC included the following representatives (excluding MPO and consultant staff):

- Jay Anderson (Yellowstone County Public Works)
- Dakota Martonen (City Engineer's Office)
- Roy Neese (City Council Ward 2)
- Stephanie Donovan (Bicycle and Pedestrian Advisory Committee)
- Rusty Logan (MET Transit)
- Kurtis Schnieber (Montana Department of Transportation)
- Samantha Wood (Montana Department of Transportation)
- Janet Hardy (Phillips 66)
- Michelle Williams (Billings Depot)
- Mehmet Casey (Downtown Billings Alliance)
- Heather Doty (Billings Industrial Revitalization District (BIRD))

Public Involvement Comments

Two public online open houses with surveys were completed as part of the public and stakeholder outreach. Comprehensive public involvement summaries and raw survey responses are included in *Appendix C*.

The first round of public involvement took place from June 9th, 2025 to June 30th, 2025 and gathered input on the current use and suggested improvements to the 21st Street underpass. The survey received 446 individual responses. Key input from the first round of public comments included the following:

The survey received **446** individual responses

Nearly **50%** of the respondents indicated they **didn't use the underpass** on a weekly basis.

The areas for improvements, listed in level of importance, included:

- Increasing clearance levels
- Improving drainage
- Improving lighting
- Updating and improving sidewalks, bike paths, and mobility

Approximately **25%** of the respondents felt the City **should save money** by not updating the overpass and reallocating the money elsewhere.

Public involvement round two took place from December 16th, 2025 through January 21st, 2026, and collected feedback on the four final alternatives. In total, 429 individual responses were received with 80% of respondents indicating they currently use the underpass, and 86% of respondents indicating they were residents of the city. Key takeaways are called out below:

The survey received **429** individual responses

Alternatives preference from highest to lowest:

1. **Alternative 2**
   Minor Improvement with Overheight Warning System
2. **Alternative 3**
   Increase Vertical Clearance to 11.5' with Roadway Modifications
3. **Alternative 1**
   No Build
4. **Alternative 4**
   Increase Vertical Clearance to 13.5' with Roadway Modifications

Approximately **55%** of open-ended feedback indicated that:

- Cost was a considerable concern
- Upgrading alternate routes are a higher priority
- 27th Street is better connected

When asked whether funding came from federal sources would change the order of preference, **80% responded, no.**

Section 3
EXISTING CONDITIONS

EXISTING CONDITIONS

The evaluation of the existing conditions provides a baseline for the identification of applicable strategies and the evaluation of alternatives. *Appendix D* contains a comprehensive analysis of existing conditions.

Transportation System Inventory

STUDY AREA AND ROADWAY FACILITIES

The study area includes the 21st Street corridor, 27th Street, Montana Avenue, Minnesota Avenue, and 13th Street. Streets in this area are typically two to four travel lanes with some on-street parking and sidewalks. The downtown area contains a mix of one-way and two-way streets. The 27th Street and 13th Street crossings were included to analyze any potential impacts to their operations resulting from changes to the 21st Street underpass. Table 1 summarizes the characteristics of major roadways within the study area.

TABLE 1: MAJOR TRANSPORTATION FACILITIES

ROADWAY	BILLINGS MPO FUNCTIONAL CLASSIFICATION[1]	FEDERAL FUNCTIONAL CLASSIFICATION[2]	NUMBER OF LANES	POSTED SPEED (MPH)	SIDEWALKS	BICYCLE LANES	ON-STREET PARKING
Montana Avenue	Principal Arterial	Other Principal Arterial	3 Lanes	25	Yes	No	Yes
Minnesota Avenue	Local	Local	2 Lanes	25	Partial	No	Yes
27th Street	Principal Arterial	Other Principal Arterial	4-6 Lanes	25	Yes	No	No
N & S 21st Street	Collector	Local	2 Lanes	Not Posted[3]	Yes	No	No
N & S 13th Street	Principal Arterial / Collector	Minor Arterial	2-4 Lanes	25	Partial	No	No

1. *Per 2023 Billings Urban Area Long Range Transportation Plan.*
2. *Per MDT Urban Maps – Functional Classifications Maps.*
3. *Per the City of Billings Municipal Code Chapter 24 Article 24-300 25 miles per hour in the business district or any residential district should not be exceeded where no speed is posted. 25 MPH was assumed for the segment.*

INTERSECTIONS

Within the study area, four study intersections were identified and evaluated to understand how they operate and determine possible impacts with any changes to 21st Street. Study intersections along 27th Street and Montana Avenue are under MDTs' jurisdiction. All other intersections in the study area are under the City of Billings' jurisdiction.

- 27th Street and Montana Avenue
- 21st Street and Montana Avenue
- 27th Street and Minnesota Avenue
- 21st Street and Minnesota Avenue

PEDESTRIAN AND BICYCLE FACILITIES

As shown in Table 1, most study area roadways provide continuous sidewalks on one or both sides of the road. The notable exceptions are listed below.

- Minnesota Avenue only provides a sidewalk on the south side of the roadway between S 27th Street and 24th Street. It does not provide sidewalks in the vicinity of 21st Street.
- 13th Street only provides a sidewalk on its west side which ends as 13th Street turns into Minnesota Avenue south of the railroad tracks.

Pedestrian facilities exist on both sides of the street at the 21st Street underpass, however the sidewalks are known to flood, collect debris from the adjacent embankments, and be inadequately lit.

No dedicated bicycle facilities are present in the study area.

RAIL FACILITIES

In 2024, BNSF took over operations of the Montana Rail Link (MRL). MRL is now a subdivision of the Montana Division of BNSF. The MRL subdivision operates between Huntley, Montana and Spokane, Washington, passing through Missoula, Livingston, Bozeman, Billings, and Helena. The main rail yard is in Laurel, Montana, approximately 15 miles west of Billings. A smaller rail yard is in Billings. This yard runs parallel to and between Montana Avenue and 1st Avenue S, extending from S 29th Street to Underpass Avenue (6th Street W).

Nine rail crossings are present on the mainline in Billings. These include grade-separated crossings at Mullowney Lane, Laurel Road, Underpass Avenue (6th Street W), 21st Street, 13th Street, and at-grade crossings at Moore Lane, 29th Street, 28th Street/Broadway, and 27th Street. This project's study area focuses on the 21st Street underpass but includes the 27th Street and 13th Street crossings due to their proximity on either side of 21st Street. Table 2 includes a summary of the study area rail-crossings. Table 2 also provides information about warning devices used at at-grade crossings and restricted clearance at grade-separated crossings.

TABLE 2: STUDY AREA RAIL CROSSINGS

CROSSING LOCATION	GRADE-SEPARATED?	WARNING DEVICES	INTERCONNECTED SIGNALS	RESTRICTED CLEARANCE
13th Street	Yes	Clearance Warning on Structure and in Advance	Not Applicable	13'-8"
21st Street	Yes	Clearance Warning on Structure and in Advance as well as warning to Vehicles with Campers and Box Trucks	Not Applicable	8'
27th Street	No	Crossbucks, Pavement Markings, Constant Warning Time System, Gate Arms, Flashing Lights, and Bells	Interconnect with N 27th/Montana Avenue Intersection	-

TRANSIT AND EMS OPERATIONS

Due to height restrictions of 21st Street at the railroad underpass, Billings MET, the transit provider within the study area, does not utilize 21st Street between Montana Avenue and Minnesota Avenue. MET operates along a portion of the 27th Street corridor in the study area. It is unknown whether MET would utilize 21st Street if vertical clearance increased, as many factors influence transit routing.

The project team met with members of the Billings Fire Department, Billings Police Department and American Medical Response (AMR) (a division of Global Medical Response) to discuss their use and constraints utilizing the 21st Street railroad underpass. Findings from those interviews included:

- Billings Fire and AMR do not allow their vehicles to utilize the 21st Street corridor due to the height restrictions of the underpass.
- Billings Fire needs 13.5 feet of vertical clearance before they will allow their vehicles on 21st Street.
    - Not all fire vehicles require 13.5' clearance, but because Billings Fire alternates drivers on vehicles, they avoid the underpass completely in order to prevent confusion.
- Billings Fire has a station/crew south of the tracks, will pull resources from both north and south of the tracks during a structure fire.
    - If the 27th Street crossing is blocked by a train, they route vehicles to the 13th Street underpass.
- AMR exclusively route their vehicles to the 13th street underpass to avoid the probability of delays at the 27th street crossing.
    - AMR needs 10 feet of clearance before allowing their vehicles to utilize the 21st Street corridor.
- Billings Police does not have vehicle constraints currently but do respond to crashes on 21st Street associated with a vehicle versus bridge incident.

Transportation Volumes and Operations

AUTOMOBILE & TRUCK

Daily automobile traffic volumes were collected along 27th Street and 21st Street. Table 3 summarizes 24-hour traffic volumes along the 27th and 21st Street corridors.

TABLE 3 EXISTING 24-HOUR BIDIRECTIONAL VEHICULAR VOLUMES

CROSSING	VEHICULAR VOLUMES (TWO-WAY)		
	AM	PM	TOTAL
Rail Crossing at 27th Street	5,256	7,528	12,784
Rail Crossing at N 21st Street	321	638	959

Most vehicles classified as "heavy" are not able to utilize the 21st Street underpass due to height restrictions. These vehicles typically include buses, single unit box-type trucks, and large trucks with trailers. Table 4 shows the heavy vehicle activity at study intersections during the weekday AM and PM peak hours.

TABLE 4: HEAVY VEHICLE ACTIVITY SUMMARY – PERCENTAGE OF TOTAL TRAFFIC

INTERSECTION	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
	NORTH-BOUND	SOUTH-BOUND	EAST-BOUND	WEST-BOUND*	NORTH-BOUND	SOUTH-BOUND	EAST-BOUND	WEST-BOUND
27th Street / Montana Ave	9%	6%	5%	0%	3%	3%	1%	0%
21st Street / Montana Ave	0%	0%	7%	0%	0%	0%	2%	0%
27th Street / Minnesota Ave	7%	7%	0%	0%	3%	3%	25%	0%
21st Street / Minnesota Ave	0%	0%	33%	0%	0%	0%	0%	0%

**Montana Avenue is a one-way street with eastbound traffic only.*

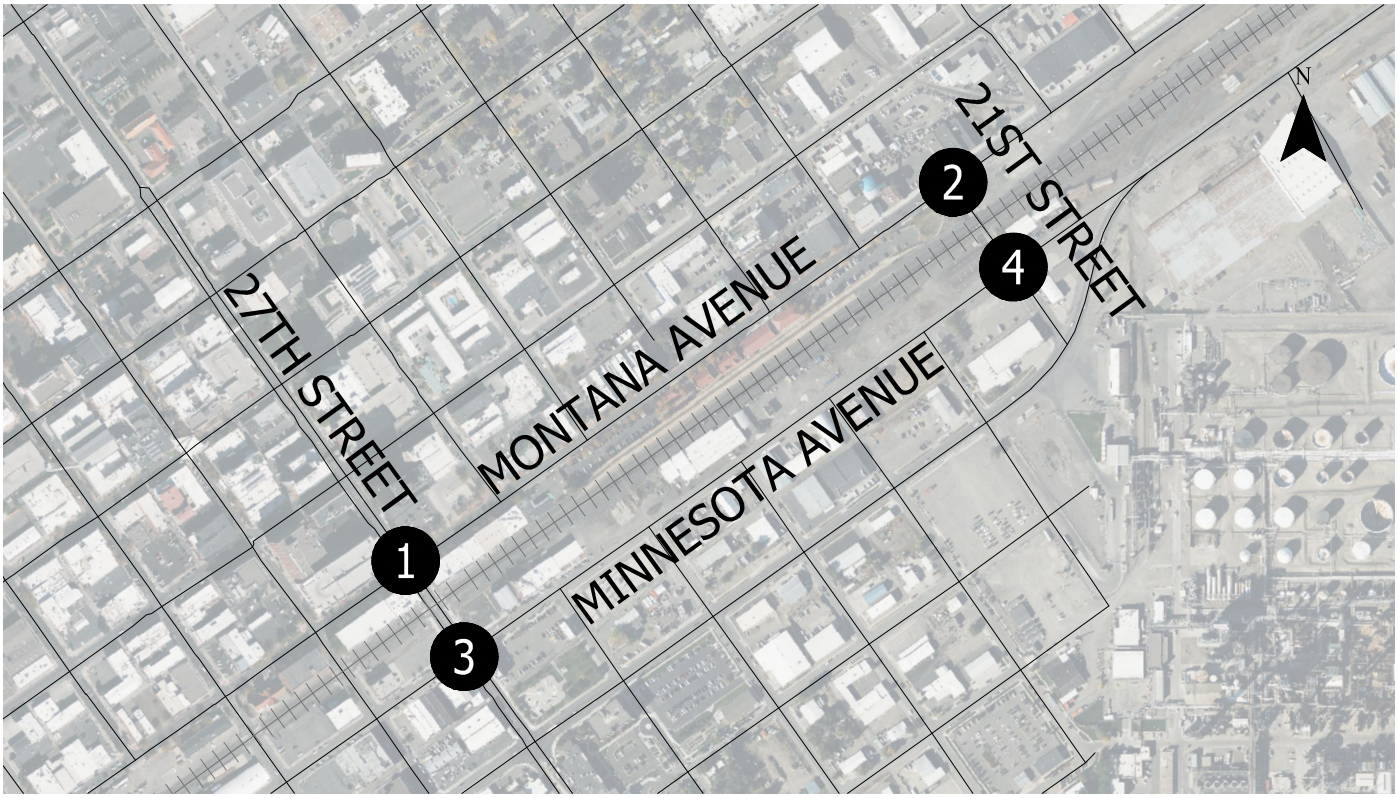
Daily, 21st Street at the underpass was found to have a heavy vehicle percentage of approximately 2.8% (FHWA classification of 4+ axles) with a total of approximately 27 heavy vehicles. Daily, 27th Street was found to have a heavy vehicle percentage of approximately 5.4%, with a total of approximately 695 heavy vehicles. Therefore, 27th Street is utilized by approximately 96% of the heavy vehicles that utilize either 21st Street or 27th Street and 21st Street only serves approximately 4% of the heavy vehicles.

Table 5 summarizes the existing traffic operations at each of the study intersections during existing year 2025 weekday AM and PM peak hours. All four study intersections operate acceptably during the existing year 2025 AM and PM peak periods. Existing traffic volumes at study intersections are shown in Figure 3. Count volumes are located in *Appendix D*.

TABLE 5 EXISTING YEAR 2025 WEEKDAY AM AND PM TRAFFIC OPERATIONS

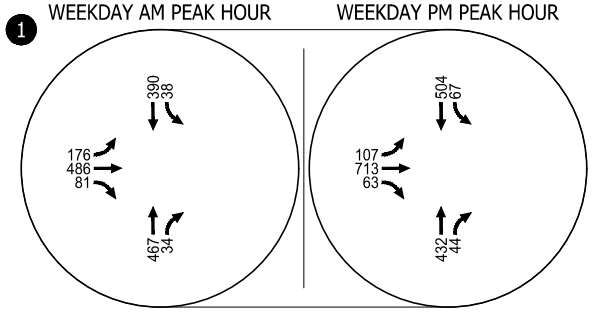
ID	Intersection	Intersection Control	Existing AM Peak Hour			Existing PM Peak Hour		
			V/C	LOS	Delay	V/C	LOS	Delay
1	27th Street / Montana Avenue	Signal	0.51	B	16.3	0.51	B	15.4
2	21st Street / Montana Avenue	OWSC[1]	0.07	B	10.2	0.12	B	12.6
3	27th Street / Minnesota Avenue	TWSC	0.04	C	15.5	0.10	C	22.4
4	21st Street / Minnesota Avenue	TWSC	0.01	A	9.6	0.05	A	9.5

V/C ratio is defined as vehicle-to-capacity ratio, which calculates the number of vehicles divided by the capacity of the roadway/intersection during the peak 15 minutes of the peak hour. LOS stands for Level of Service. Delay is reported in seconds per vehicle. Cells in the table above that are **bolded**, *italicized*, and highlighted indicate an intersection and/or lane group operating below the jurisdictional standards.
[1]Only the northbound approach is stop controlled.



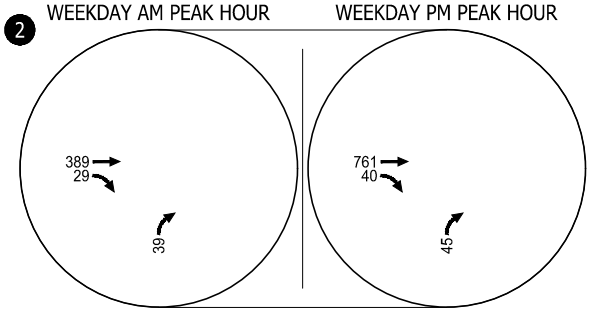
27TH STREET / MONTANA AVENUE

1 WEEKDAY AM PEAK HOUR WEEKDAY PM PEAK HOUR



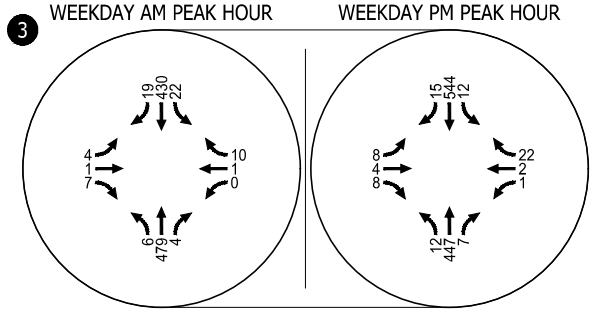
21ST STREET / MONTANA AVENUE

2 WEEKDAY AM PEAK HOUR WEEKDAY PM PEAK HOUR



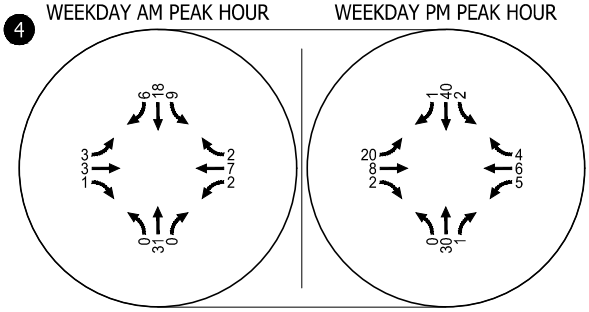
27TH STREET / MINNESOTA AVENUE

3 WEEKDAY AM PEAK HOUR WEEKDAY PM PEAK HOUR



21ST STREET / MINNESOTA AVENUE

4 WEEKDAY AM PEAK HOUR WEEKDAY PM PEAK HOUR



- Study Intersection

Year 2025 Existing Traffic Volumes
Weekday AM & PM Peak Hours
Billings, Montana

Figure
3

H:\31\31229 - Billings 21st St Railroad Underpass\report\figs\31229_Figures.dwg May 06, 2026 - 2:19pm - jdelgado Layout Tab: Existing Volumes Rpt

KITTELSON & ASSOCIATES

Traffic Diversion During Railroad Crossing

The traffic data on 21st Street and 27th Street were analyzed to determine whether real-time traffic diversion takes place between 27th Street and 21st Street when a train crossing interrupts the 27th Street crossing. A review of video footage captured during the count collection process identified five trains that passed through the 27th Street at-grade crossing in the AM (2) and PM (3) peak hours:

- 8:11:03 AM – 8:14:57 AM
  - 00:03:54 wait time
- 8:28:00 AM – 8:29:37 AM
  - 00:01:37 wait time
- 5:13:35 PM – 5:16:55 PM
  - 00:03:20 wait time
- 5:35:18 PM – 5:36:17 PM
  - 00:00:59 wait time
- 5:45:55 PM – 5:46:35 PM
  - 00:00:40 wait time

Based on a review of the traffic counts, there was not a corresponding increase in traffic volumes on 21st Street intersections when train crossings occurred at 27th Street. This indicates that during train crossings on 27th Street, traffic waits for the train or utilizes alternative routes other than 21st Street to cross the railroad. While active diversion to 21st Street from 27th Street during a train crossing was not observed based on a shift in traffic volumes, it is likely that some drivers choose to use 21st Street at certain times of the day that they anticipate 27th Street may be impacted by a train crossing.

RAILROAD ACTIVITY

Railroad activity in the study area was obtained from the Federal Railroad Administration (FRA) online highway-rail crossing inventory. Table 6 summarizes activity at at-grade crossings in the study area. Grade separated crossings like 21st Street and 13th Street do not have this information available, however, given their proximity to the 27th Street at-grade rail crossing, the characteristics are likely similar.

TABLE 6: RAIL ACTIVITY SUMMARY

CROSSING	DAILY THROUGH TRAINS (DAY/NIGHT)	DAILY SWITCHING TRAINS	MAX SPEED (MPH)	MIN SPEED (MPH)	NUMBER OF TRACKS (TYPE)
27th Street	18/18	6	25	5	2 (Main)[1]

Source: FRA

[1]The 21st Street rail bridge holds four tracks on top of it.

BICYCLE AND PEDESTRIAN VOLUMES AND LEVEL OF TRAFFIC STRESS

Pedestrian and Bicycle Activity

Pedestrian and bicycle activity along the 21st Street corridor is generally low. Table 7 summarizes the existing bidirectional peak hour pedestrian and bicycle volumes at rail crossings along 27th Street and 21st Street.

TABLE 7. EXISTING 24-HOUR BIDIRECTIONAL PEDESTRIAN AND BICYCLE VOLUMES

CROSSING	PEDESTRIAN VOLUMES			BICYCLE VOLUME		
	AM	PM	TOTAL	AM	PM	TOTAL
Rail Crossing at 27th Street	169	256	425	350	345	695
Rail Crossing at N 21st Street	1	16	17	8	19	27

Existing Pedestrian & Bicycle Level of Traffic Stress

Level of Traffic Stress (LTS) refers to the concept that users of a transportation facility have different tolerance levels for traffic stress. Traffic stress refers to a combination of factors including vehicle speeds, volumes, noise, fumes, etc. that can impact how different user groups (e.g., experienced bicyclist vs. new rider, adult vs. child, etc.) feel on a transportation facility. LTS scores range from 1 to 4 with 1 corresponding to high comfort/low stress for all users, and 4 indicating low comfort/high stress.

Pedestrian Level of Traffic Stress

Based on the presence of sidewalks on both sides of 21st Street, the two-lanes of traffic, and a speed of 25 mph, the study section was found to have a pedestrian LTS score of 2. This corresponds to a "high comfort for adults" definition according to the *Livable Streets Performance Measures* report. This procedure does not account for the lack of lighting and condition under the railroad structure.

Bicycle Level of Traffic Stress

Based on the speeds, lack of center line on 21st Street, and traffic volume level, the bicycle LTS was determined to also be a 2 in the study area segment of 21st Street. This corresponds to the following definition:

> *"Presenting little traffic stress and therefore suitable to most adult cyclists but demanding more attention than might be expected from children. On links, cyclists are…. on a shared road where they interact with only occasional motor vehicles (as opposed to a stream of traffic) with a low speed differential…Crossings are not difficult for most adults."*

Crash History

MDT provided crash data (2019 to 2023) for the study intersections and segments. A total of 74 crashes occurred at the four study intersections on 21st Street and 27th Street and on the study segment of 21st Street. Approximately 69% of those crashes occurred at the study intersections on 27th Street, which included one incapacitating injury crash at the 27th Street / Montana Avenue intersection.

Of the 23 crashes reported on 21st Street, approximately 13% occurred at the two study intersections. Approximately 87% of the crashes on 21st Street occurred along the 21st Street segment (i.e. not at an intersection), including approximately 12 crashes identified by MDT as involving the bridge/rail structure. Table 8 displays a summary of all crashes by collision type and displays a summary of all crashes by severity.

TABLE 8. CRASHES BY COLLISION TYPE – 2019 TO 2023

LOCATION	CRASH TYPE									TOTAL	ESTIMATED CRASH RATE[1]
	REAR END	ANGLE	TURNING	SIDESWIPE	FIXED OBJECT	HEAD ON	PEDESTRIAN	BICYCLISTS	OTHER		
27th St / Montana Ave	8	17	2	3	3	1		1	3	38	1.08
Montana Ave / 21st St			1							1	0.06
27th St / Minnesota Ave	5	5		2			1			13	0.66
21st St / Minnesota Ave		1							1	2	0.92
21st Street Segment[2]				3	17					20	11.42
Total	13	23	3	8	20	1	1	1	4	74	

[1] *Crashes per million entering vehicles*
[2] *Crashes between Intersections with Montana Avenue to the north and Minnesota Avenue to the South.*

TABLE 9. CRASHES BY SEVERITY – 2019 TO 2023

LOCATION	CRASH TYPE						
	FATALITY	INCAPACITATING INJURY	NON-INCAPACITATING EVIDENT INJURY	POSSIBLE INJURY	PROPERTY DAMAGE ONLY	UNKNOWN	TOTAL
27th St / Montana Ave		1	7	9	19	2	38
Montana Ave / 21st St					1		1
27th St / Minnesota Ave			1	4	8		13
21st St / Minnesota Ave				1	1		2
21st Street Segment Crashes[1]			1	2	17		20
Total	0	1	9	16	46	2	74

[1] *Crashes between Intersections with Montana Avenue to the north and Minnesota Avenue to the South.*

Based on the data presented above, the following trends were noted.

- The 21st Street segment between its intersections with Montana Ave to the north and Minnesota Ave to the south saw a significant number of crashes, given the relatively low traffic volumes.
    - The majority (approximately 60%) of the crashes along the segment involved the bridge structure.

The 2023 Billings LRTP project identified high crash corridors and intersections throughout the City of Billings. One of the project study intersections (27th Street and Montana Avenue) was the fifth highest Equivalent Property Damage Only (EPDO) value intersections in the LRTP.

In addition to MDT crash data, Billings Fire provided high-level response records for crashes occurring at the 21st Street Bridge (classified as bridge-involved). That data was from January 2019 through April 2025 and identified 26 bridge-involved crashes, three of which had an identified injury. One of the bridge hits involved an ambulance which corresponded with a change in use of the corridor described in the Transit and EMS provider section of this report. Figure 4 highlights some of the key findings from the existing conditions analysis.

21st Street Underpass Structure and Drainage Evaluation

Based on information from as-built plans and other design information for 21st Street and the railroad bridge structure provided by the City, an evaluation was conducted to provide insight into the ability to increase vertical clearance and make improvements for pedestrians and bicycles.

The as-built bridge plans and geotechnical information indicate that the existing bridge pier piles are supported in a relatively soft shale bedrock formation approximately 18 feet below the roadway with a pile tip (elevation of approximately 3088±). This information suggests that the piles develop a significant amount of their vertical strength from end bearing in the shale and that soil could be excavated adjacent to the pile at existing ground line with negligible impacts to the vertical strength. As-built plans also indicate that the minimum embedment required for lateral stability is approximately 15 feet. which would require a minimum groundline Elev. 3103±.

Surface drainage for the existing 21st Street roadway below the underpass is provided by two combination curb inlets located just south of the underpass at a sag curve low point. Based on as-built drawings from the *Replace Bridge 224 Over 21st Street Near Billings, MT project (as-builts)* and the City of Billings *Map Library Stormwater Drawings Viewer*, the combination curb inlet connects to a manhole located along the street that gravity drains via a 12" PVC storm drainpipe to the south and connects to a storm drain system running from west to east along Minnesota Avenue.

The existing 21st Street underpass is in an area of Billings known to have high groundwater. Using publicly available groundwater well logs obtained from the Montan Bureau of Mines and Geology Ground Water Information Center, wells surrounding the 21st Street underpass were reviewed to draw preliminary conclusions regarding groundwater in the area. Information from the six closest existing wells ranging in distance from approximately 500 to 800 feet from the 21st Street underpass were reviewed and identified static water levels ranging from 7 to 16 feet below ground. Using the approximate locations and elevations from the Montana Lidar Viewer produced estimated groundwater elevations ranging from approximately 3,105 to 3,109 feet.

As-built drawings indicate that the 12-inch PVC storm drainpipe has minimal upstream cover at the manhole near the underpass and a total elevation drop of 0.54 feet over a length of 168 feet, equating to a slope of 0.321%. From this information, maintaining a gravity storm drain system is not anticipated to be feasible if the storm drain inlets along 21st Street below the underpass are lowered. Additionally, due to the elevation of the sag point where the storm drain inlets are located, this would put the groundwater close to existing grade. Although this information is estimated preliminary information, it indicates a high likelihood of groundwater being located at a very shallow depth below the 21st Street roadway surface at the underpass. If the roadway profile is lowered, a pump system will likely be necessary to accommodate the storm drain system. Groundwater elevations will need to be considered as part of the design of improvements.

Based on the existing structural and drainage conditions, it is anticipated that lowering the 21st Street roadway below the underpass no more than three to four feet is feasible with minor modifications to the piers based on bridge as-builts. Widening the sidewalks under the existing structure are likely limited to a

small amount due to difficulty with installing retaining walls within the area of the existing bridge foundations.

Any stormwater improvements would be designed to maintain surface water collection in the storm drain system separate from groundwater to avoid soil contamination concerns from the nearby Billings PCE federal Superfund site. Construction of a storm drain and/or structural improvements would likely warrant dewatering and may require contaminated soil removal, both which would require proper mitigation measures.

Further investigation is required to understand impacts related to groundwater, utilities, storm drain, and sidewalk requirements associated with lowering the roadway profile.

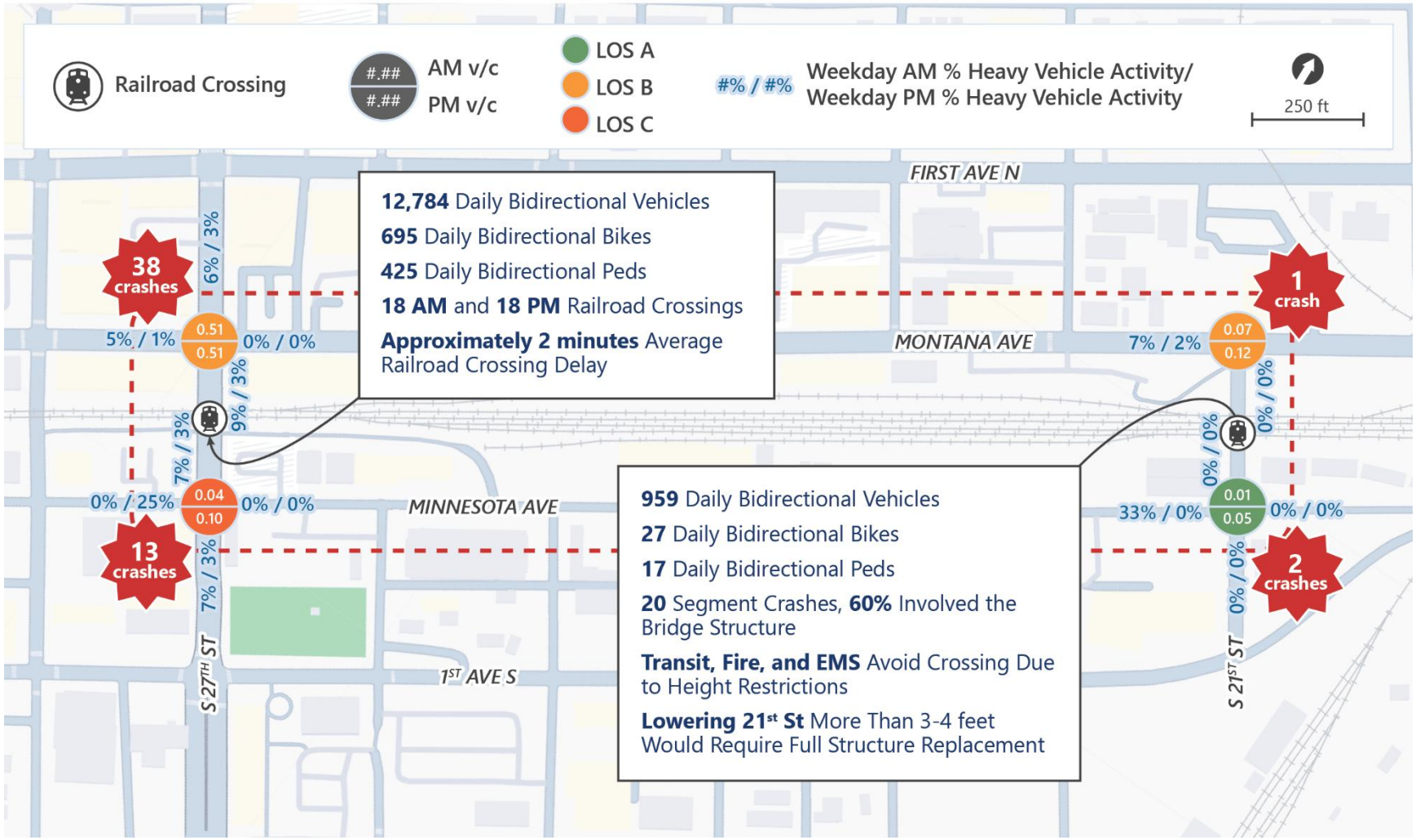
21st Street Underpass Vertical Design Evaluation

Based on review of the as-built drawings for 21st Street between Minnesota Avenue and Montana Avenue, the vertical curvature does not meet current AASHTO design policies with respect to the vertical curve lengths used to lower the roadway under the overpass. Vertical design elements that do not meet current policies include:

- **Grades at Pedestrian Crossings -** The vertical grade on 21st Street at the locations of the existing pedestrian ramps that serve the south pedestrian crossing across 21st Street at Montana Avenue and the north pedestrian crossing at Minnesota Street are approximately 4% and 5-6%, respectively. This is greater than the recommended 2% maximum cross-slope for crosswalk areas.
- **Vertical Curvature -** The lengths of the vertical curves on 21st Street between Montana Avenue and Minnesota Avenue are less than recommended for a speed of 25 mph, creating a lack of stopping sight distance during night driving as vehicles enter the sag curves under the railroad bridge.

Due to the limited distance between the railroad tracks and intersections of Montana Avenue and Minnesota Avenue, improving the existing curvature to meet stopping sight distance criteria in nighttime conditions is not possible without significant changes to Montana Avenue and Minnesota Avenue. The most effective option would be lowering the Montana Avenue and Minnesota Avenue intersections with 21st Street to reduce the vertical curvature on 21st Street. But that would require significant investment and would be in addition to lowering the intersections to provide additional clearance. Other low-cost options to improve stopping sight distance safety, while maintaining a similar vertical curvature, include installing street lighting to improve stopping sight distance at night and reducing the speed limit on 21st Street.

FIGURE 4 EXISTING CONDITIONS OVERVIEW



Section 4
FUTURE TRAFFIC CONDITIONS

Future Traffic Conditions

To analyze future year traffic conditions (2045), growth was forecast by reviewing travel demand model volumes and applying a growth rate to individual links. No projects were identified that would change the lane configurations at any of the study intersections before the year 2045. The complete analysis of future conditions analyzed is found in *Appendix D*.

FUTURE YEAR 2045 TRAFFIC OPERATIONS

A LOS analysis was conducted at the study intersections to assess how well they can accommodate forecast future traffic demands. The analysis methodology was the same as used in the existing conditions analysis. Table 10 shows the forecast traffic operations at each of the study intersections during future year 2045 weekday AM and PM peak hours. Figure 5 shows future year intersection volumes. Raw volumes used in this analysis can be found in *Appendix D*.

TABLE 10 FUTURE YEAR 2045 WEEKDAY AM AND PM TRAFFIC OPERATIONS

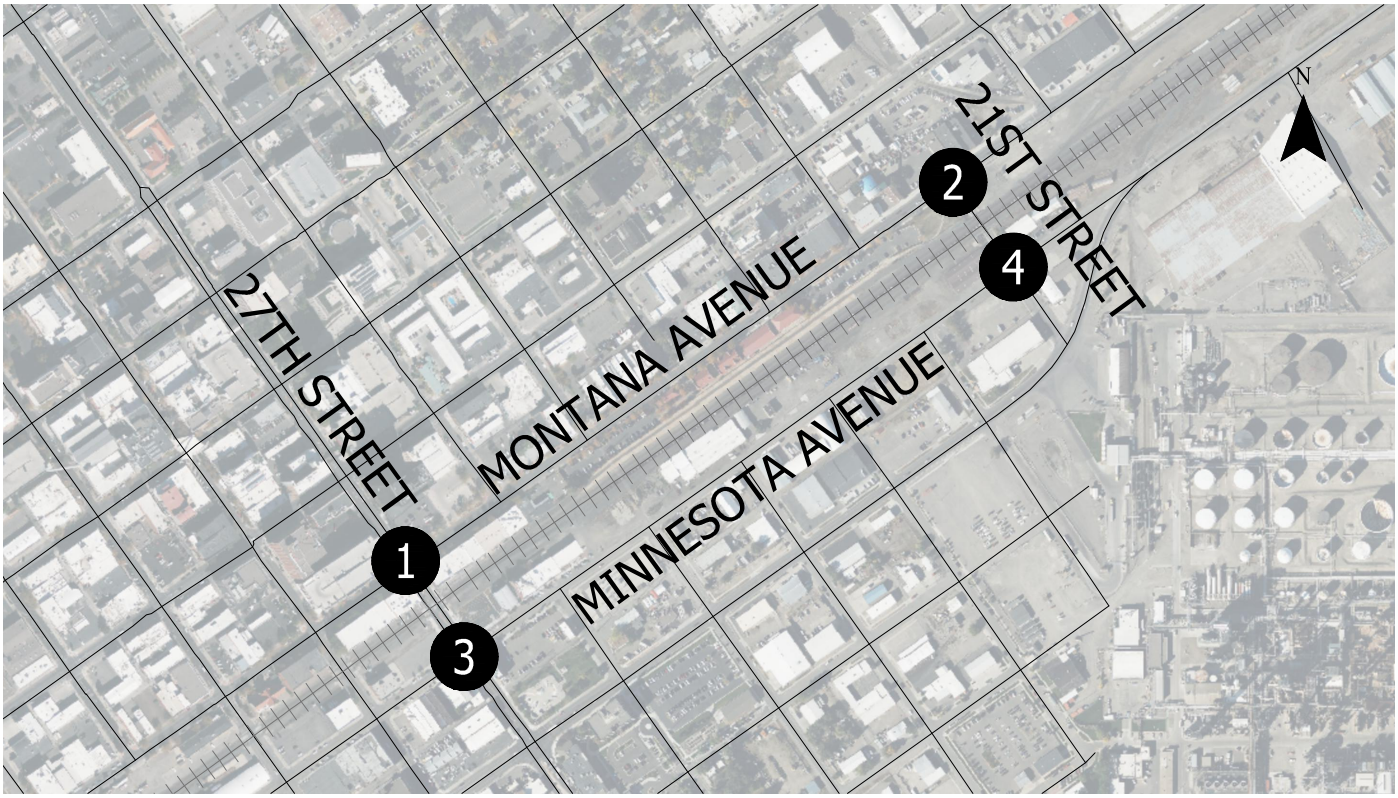
ID	Intersection	Intersection Control	Future AM Peak Hour			Future PM Peak Hour		
			V/C	LOS	Delay	V/C	LOS	Delay
1	27th Street / Montana Avenue	Signal	0.65	B	19.6	0.74	B	18.0
2	21st Street / Montana Avenue	OWSC[1]	0.22	B	12.5	0.29	C	16.5
3	27th Street / Minnesota Avenue	TWSC	0.05	C	19.0	0.13	***D***	***29.6***
4	21st Street / Minnesota Avenue	TWSC	0.02	B	10.4	0.08	B	10.7

V/C ratio is defined as vehicle-to-capacity ratio, which calculates the number of vehicles divided by the capacity of the roadway/intersection during the peak 15 minutes of the peak hour. LOS stands for Level of Service. Delay is reported in seconds per vehicle. Cells in the table above that are **bolded**, *italicized*, and highlighted indicate an intersection and/or lane group operating below the jurisdictional standards.
[1]Only the northbound approach is stop controlled.

All four intersections were found to operate acceptably in the year 2045 AM except for one intersection, which exceeds operations standards during the forecast year 2045 PM peak period:

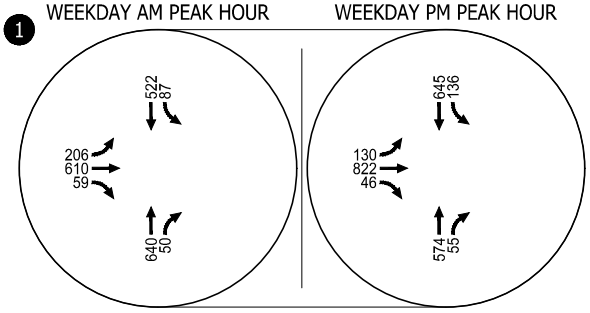
- The 27th Street and Minnesota Avenue Intersection is expected to operate at LOS D during the weekday PM peak hour. All movements operate at LOS B or better except the eastbound left turn movement. This movement has a v/c of 0.13 indicating it is significantly under capacity, so despite delay, drivers can find gaps to make their turn.

A planning-level signal warrant analysis was completed and found volume based warrant criteria were not met. Therefore, no operational improvements are recommended for the intersection as the delayed movement operates significantly undercapacity, and a signalized intersection is present one block south that drivers may use if they find recurring delays when repeatedly trying to make the eastbound left turn.



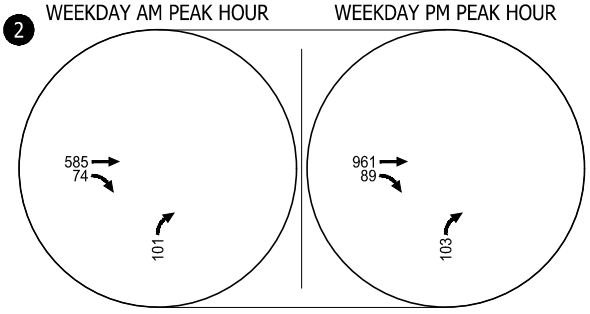
27TH STREET / MONTANA AVENUE

1 WEEKDAY AM PEAK HOUR WEEKDAY PM PEAK HOUR



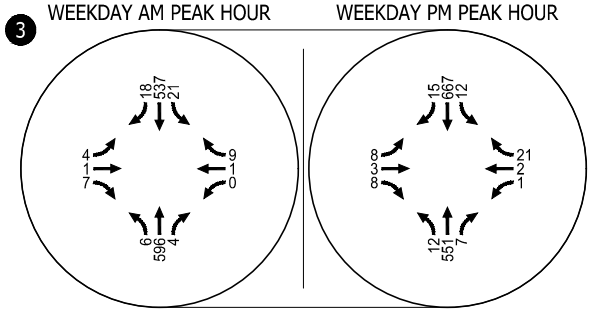
21ST STREET / MONTANA AVENUE

2 WEEKDAY AM PEAK HOUR WEEKDAY PM PEAK HOUR



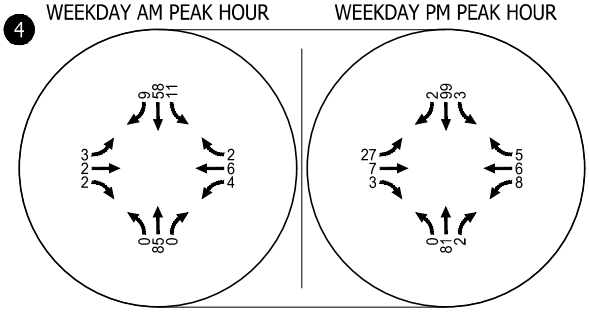
27TH STREET / MINNESOTA AVENUE

3 WEEKDAY AM PEAK HOUR WEEKDAY PM PEAK HOUR



21ST STREET / MINNESOTA AVENUE

4 WEEKDAY AM PEAK HOUR WEEKDAY PM PEAK HOUR



- Study Intersection

Year 2045 Future Traffic Volumes
Weekday AM & PM Peak Hours
Billings, Montana

Figure
5

H:\31\31229 - Billings 21st St Railroad Underpass\report\figs\31229_Figures.dwg May 06, 2026 - 2:19pm - jdelgado Layout Tab: Future Volumes Rpt

KITTELSON & ASSOCIATES

INCREASE IN FUTURE YEAR 2045 TRAFFIC VOLUMES IF CLEARANCE WAS INCREASED TO ACCOMMODATE HEAVY TRUCKS

While the Travel Demand Model does not assume improvements to the 21st Street underpass or evaluate changes to heavy vehicle volumes based on vertical design elements, the approximate increase in heavy vehicle use was estimated assuming the underpass is improved to approximately 13.5 feet of clearance that would accommodate most types of trucks.

It is reasonable to assume that a change to the vertical clearance or addition of other multi-modal improvements would not significantly impact the use of 21st Street by passenger vehicles that are accommodated by the 8-foot clearance. But increasing the clearance would increase the use of the 21st Street by large trucks that exceed the current clearance. Assuming percent of trucks between 27th Street and 21st Street is similar, at approximately 5.4%, the truck percentage on 21st Street would increase from approximately from approximately 2.8% to 5.4% based on existing conditions. This difference equates to and increase of approximately 57 daily truck trips in 2045.

Section 5
ALTERNATIVES EVALUATION

ALTERNATIVES EVALUATION

Post completion of the existing conditions analysis, public involvement round one, and an initial meeting with the PAC, the project team developed a short list of six alternatives. Those six alternatives were screened down to four alternatives for detailed evaluation. *Appendix E* includes the complete alternatives evaluation.

Initial Alternatives Screening

The six initial alternatives evaluated as part of the initial screening process are described in Table 11.

TABLE 11 INITIAL ALTERNATIVES

ALTERNATIVE		DESCRIPTION
Alternative 1	**No-Build**	This alternative is the base alternative. It does not include any changes to the railroad underpass or 21st Street.
Alternative 2	**Minor Improvements with Overheight Vehicle Warning System**	This alternative adds an automated overheight vehicle warning system to reduce crashes involving overheight vehicles and the undercrossing structure. It also includes lighting, drainage, and other minor modifications to improve the pedestrian and vehicle environment.
Alternative 3A	**Increase Clearance to 11.5 feet with Minor Pedestrian Improvements**	This alternative includes the improvements in Alternative 2, lowers the grade of 21st Street by approximately 3.5 feet to increase the vertical clearance of the uncrossing to approximately 11.5 feet, changes stormwater management to a pump system, and widens sidewalk (minor) where feasible. The increased vertical clearance accommodates most small emergency vehicles such as ambulances. This alternative does not modify the length of the bridge structure.
Alternative 3B	**Increase Clearance to 11.5 feet with 10′ Sidewalks on 21st Street**	This alternative includes the improvements in Alternative 3A and adds wider sidewalks on 21st Street. This alternative requires lengthening the bridge spans due to the wider sidewalks.
Alternative 4	**Increase Clearance to 13.5 feet with 10′ Sidewalks on 21st Street**	This alternative is similar to Alternative 3B but lowers 21st Street by two additional feet to obtain a standard minimum vertical clearance of 13.5 feet. This alternative would accommodate most trucks and emergency vehicles such as large fire trucks.
Alternative 5	**Increase Clearance to 16.0 feet with 10′ Sidewalks on 21st Street**	This alternative is similar to Alternative 4 but lowers 21st Street by approximately 2.5 additional feet (8 feet total) to obtain a vertical clearance of 16.0 feet. This alternative should accommodate all trucks and emergency vehicles. This vertical clearance is recommended for new federal projects.

The initial alternatives were presented to the PAC for feedback. Based on the PAC review, Alternatives 1, 2, 3A, and 4 were chosen to be forwarded as alternatives for further concept development.

Alternative 3B was not included due to having the same vertical clearance as Alternative 3A but requiring much more substantial work on the railroad bridge. This alternative would likely require temporary track be constructed to re-route the trains while the structure is reconstructed.

Alternative 5 was not included for the following reasons:

- A clearance of 16 feet is not required to accommodate all the emergency service vehicles and most trucks.
- The railroad bridge would require a full replacement. It would require a detour structure and shoofly to accommodate trains throughout construction.
- Due to the impacts of railroad traffic, approval from BNSF (railroad/bridge owner and operator) may be difficult to obtain.
- The section of 21st Street under the structure would be substantially below the groundwater level. This would require a substantial pumping system and modifications to the stormwater infrastructure in the surrounding area that serves 21st Street.
- The easternmost lane on Montana Avenue would need to be lowered approximately 8-9 feet. This would impact access and parking for an additional block to the east and west affecting the 22nd Street and 20th Street intersections.
- The estimated cost is very high due to the level of improvements, replacement of the structure, and building significant temporary track and structure facilities to maintain railroad operations.

Review of Final Alternatives

The four initial alternatives chosen to be carried forward for additional analysis were evaluated as the "Final Alternatives".

ALTERNATIVE 1:

No-Build

Alternative 1 maintains the existing infrastructure currently in place. Figure 6 shows the no-build condition alternative. Figure 7 shows the existing no-build street cross-sections. Figure 8 shows a rendering of the existing railroad bridge structure. The areas proposed for improvements are summarized below.

Improvement Areas:

- Bridge Structure, 21st Street, Surrounding Roadways: No change

Advantages:

Maintaining the current roadway configuration minimizes costs and allows the City and MPO to prioritize funding in other areas where a greater need for investment has been identified. No construction in the area avoids impacting BNSF railroad operations and Montana Department of Transportation (MDT) facilities in the project area.

FIGURE 6. ALTERNATIVE 1: NO BUILD

FIGURE 7. ALTERNATIVE 1: EXISTING STREET SECTIONS

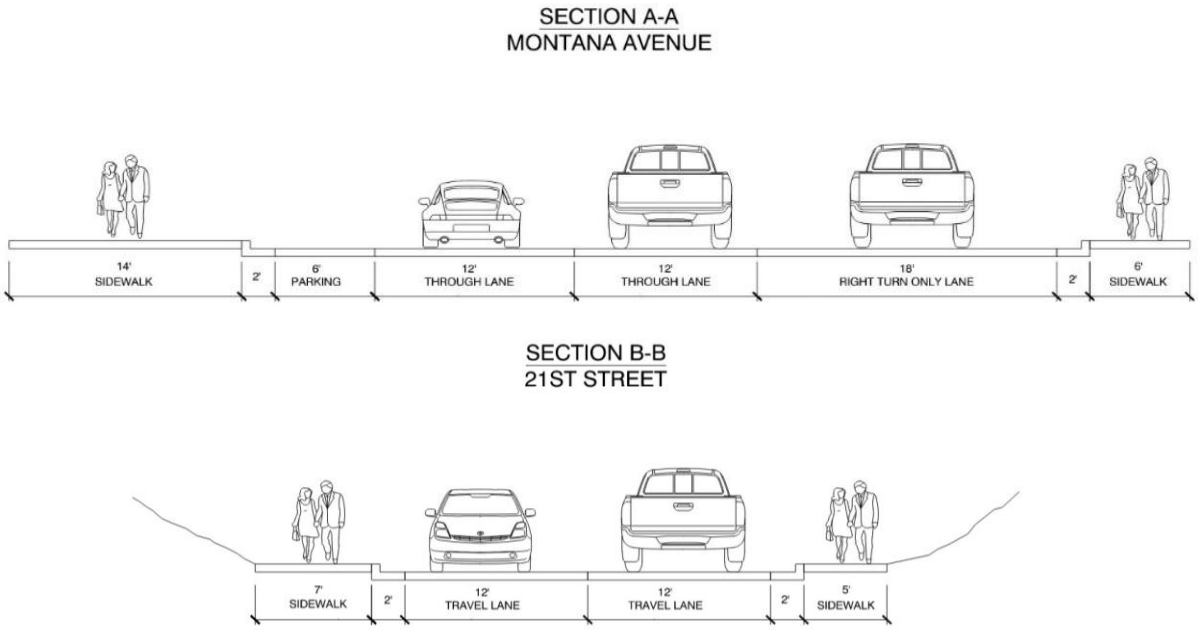
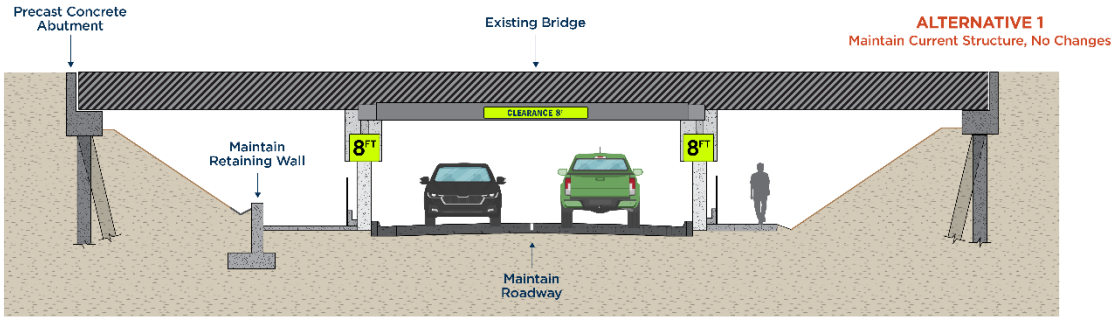


FIGURE 8. ALTERNATIVE 1: EXISTING BRIDGE STRUCTURE



Disadvantages:

The primary disadvantages is that no safety or multi-modal access improvements to the underpass will improve the existing deficiencies. The current configuration experiences frequent crashes involving the bridge structure and maintains the height restrictions that do not allow for buses, emergency vehicles, and heavy vehicle traffic to utilize the corridor. The earthen bridge abutment slopes will continue to result in increased debris on the sidewalks. The lack of sufficient drainage during storm events will continue to be an issue for short periods.

ALTERNATIVE 2:

Minor Improvements with Overheight Vehicle Warning System

This alternative adds low-cost improvements with the goals of reducing the overheight vehicle crashes into the overpass bridge and improving the pedestrian environment under the bridge.

FIGURE 9. EXAMPLE OF A VERTICAL CLEARANCE WARNING SYSTEM

The alternative includes installing an overheight vehicle warning system, modifying the 21st Street underpass to improve the existing drainage system, and stabilizing the bridge abutment embankment slopes to reduce debris on the sidewalks. Figure 9 shows an example of a warning system which utilizes signing and flashers to warn overheight vehicles prior to reaching the structure. These systems typically include sensors or mechanical devices to determine if a vehicle is overheight and signing to warn the driver and potentially provide information to the driver on how to avoid the low-height structure.

Figure 10 shows a concept for the proposed warning system. Figure 11 shows cross-sections of Montana Avenue and 21st Street. Figure 12 shows a rendering of the existing bridge structure with the proposed warning system.

This alternative includes the following modifications to 21st Street, the bridge structure, and the surrounding area:

Improvement Areas:

- Bridge Structure:
  - No change
- 21st Street:
  - Installing signage and flashers as part of an overheight vehicle warning system.
  - Stripe centerline.
  - Paving of the bridge abutment slopes to reduce debris on the sidewalks.
  - Adding pedestrian and vehicle lighting on 21st Street to increase light under the bridge and provide improved nighttime sight distance for drivers.
  - Adding drainage inlets to reduce stormwater flow to existing inlets.
- The Surrounding Roadways:
  - Installing signage and flashers for the overheight vehicle warning system.

FIGURE 10. ALTERNATIVE 2: MAINTAIN EXISTING 8 FEET OF VERTICAL CLEARANCE WITH WARNING SYSTEM

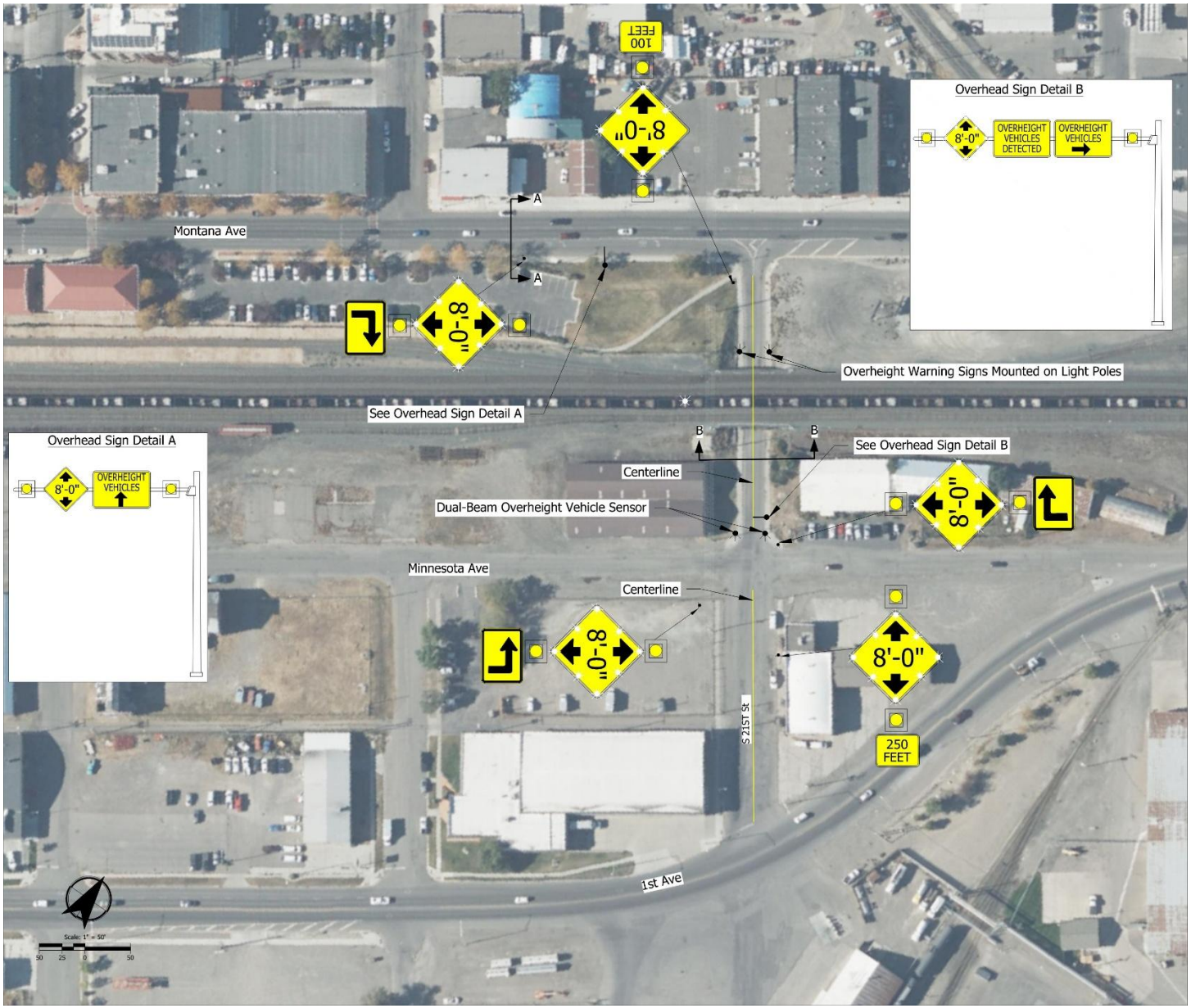


FIGURE 11. ALTERNATIVE 2: EXISTING STREET SECTIONS AND EXAMPLE DEVICES

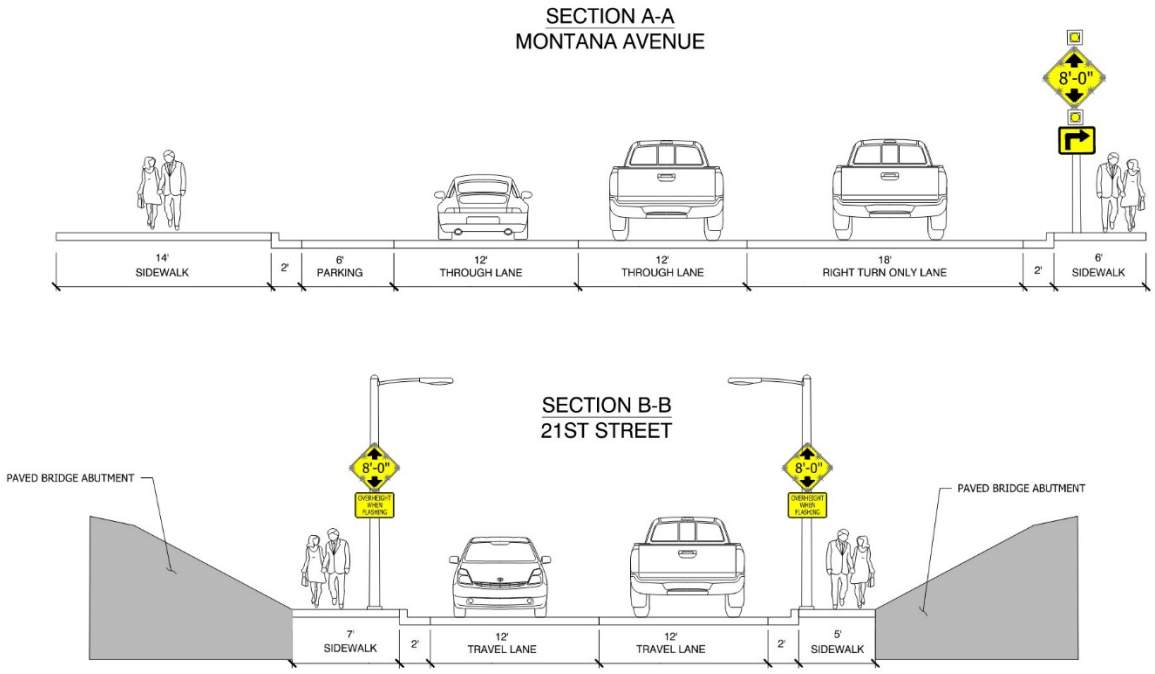
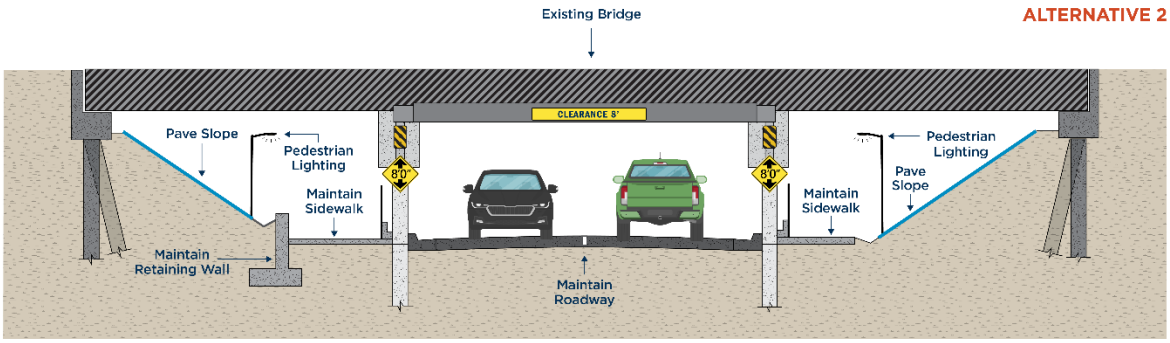


FIGURE 12. ALTERNATIVE 2: BRIDGE STRUCTURE



Additionally, due to the vertical curvature of the roadway impacting stopping sight distance, installing warning signage, such as "Hill Blocks View" (W7-6) with a speed advisory sign (W13-1P) could be considered based on an engineering evaluation. Warning and advisory signage is not included due to the concept level design conducted for this study, recommendation for lighting, the default speed being 25 mph, the roadway and underpass age and history, and speed not being identified in most crashes as a primary factor.

⊕ Advantages

The overheight vehicle warning system is expected to reduce vehicle/bridge crashes through advanced warning/flashing signage. As described in existing conditions section, in the five years from 2019 to 2023, approximately 20 crashes were reported on 21st Street between Minnesota Avenue and Montana Avenue with approximately 60% of the crashes involving the bridge structure.

Paving the abutment slopes under the underpass would reduce sediment from running off the slope and collecting on the sidewalk and clogging the drainage inlets. Additional inlets on both underpass approaches may reduce the occurrence of flooding by providing more points for water to enter the system.

Adding pedestrian and vehicle lighting on 21st Street will enhance the pedestrian experience and safety under the bridge and improve the nighttime sight distance for drivers on 21st Street.

Disadvantages:

At this time, it is unknown if there are drainage constraints downstream, so additional inlets may not be very effective in preventing flooding. No improvements to vertical clearance continue to provide the opportunity for vehicle/bridge crashes, and restricts emergency, transit, and heavy vehicles from being able to utilize 21st Street.

Cost:

Table 12 shows the estimated cost for this alternative. It is estimated this alternative would cost between $600,000 and $800,000, depending on the scale of the improvements. If this alternative is carried forward the cost estimate will be refined.

TABLE 12 ALTERNATIVE 2 COST ESTIMATE

ITEM	ESTIMATED COST
1. Roadway & Lighting Improvements	$570,000-$750,000
2. Drainage & Stormwater Improvements	$30,000-$50,000
3. Railroad Bridge Improvements	Not Applicable
4. Railroad Temporary Traffic Control	Not Applicable
Total	$600,000 - $800,000

ALTERNATIVE 3:

Increase Clearance to 11.5 Feet with Minor Pedestrian Improvements

Alternative 3 (3A in initial screening) includes moderate modifications of the bridge structure to increase the vertical clearance by approximately 3.5 feet to achieve a vertical clearance of approximately 11.5 feet (11'-6") as well as adding pedestrian improvements and an overheight warning system like Alternative 2. This alternative would accommodate ambulances but continue to not accommodate fire, large EMS vehicles, and most commercial trucks. With this alternative vertical curvature and grades would remain similar to the existing condition and therefore would continue to not meet current design standards.

This alternative is shown in Figure 13. Figure 14 shows cross-sections of Montana Avenue and 21st Street. Figure 15 depicts a rendering of the bridge structure with the proposed warning system.

This alternative includes the following modifications to 21st Street, the bridge structure, and the surrounding area:

Improvement Areas:

- Bridge Structure:
  - Pier encasement or retaining wall to support lowered roadway
  - Controlled density backfill behind pier encasement/retaining wall to maintain a shared use path along 21st Street
  - New cross bracing on piers for added support
  - New concrete slope paving below bridge
- 21st Street:
  - Lowering the existing roadway approximately 3.5 feet to obtain a vertical clearance under the bridge structure of 11.5 feet.
  - Lowering the intersections at Montana Avenue and Minnesota Avenue by approximately 3 feet.
  - Stripe centerline.
  - Installing new drainage pumping system due to the high groundwater level.
  - Adding pedestrian and vehicle lighting on 21st Street.
  - Eliminating on-street parking on 21st Street south of Minnesota Avenue to accommodate a retaining wall and avoid elevation conflicts.
- The Surrounding Area:
  - Minnesota Avenue will be cut-off to the east and west of 21st Street and a cul-de-sac installed at each end to provide room for vehicles to turn around.
  - Requires the east lane on Montana Avenue to be lowered by ~3-4 feet
  - Access restrictions and removal of parking on Montana Avenue between 22nd Street and 20th Street.
  - Sidewalk and travel lanes will have to be reconfigured to maintain through lanes and on-street parking.
  - Work with private property owners to remove some parking in the lot south of Montana Avenue.

FIGURE 13. ALTERNATIVE 3 CONCEPT: INCREASE VERTICAL CLEARANCE TO 11.5' WITH PEDESTRIAN IMPROVEMENTS

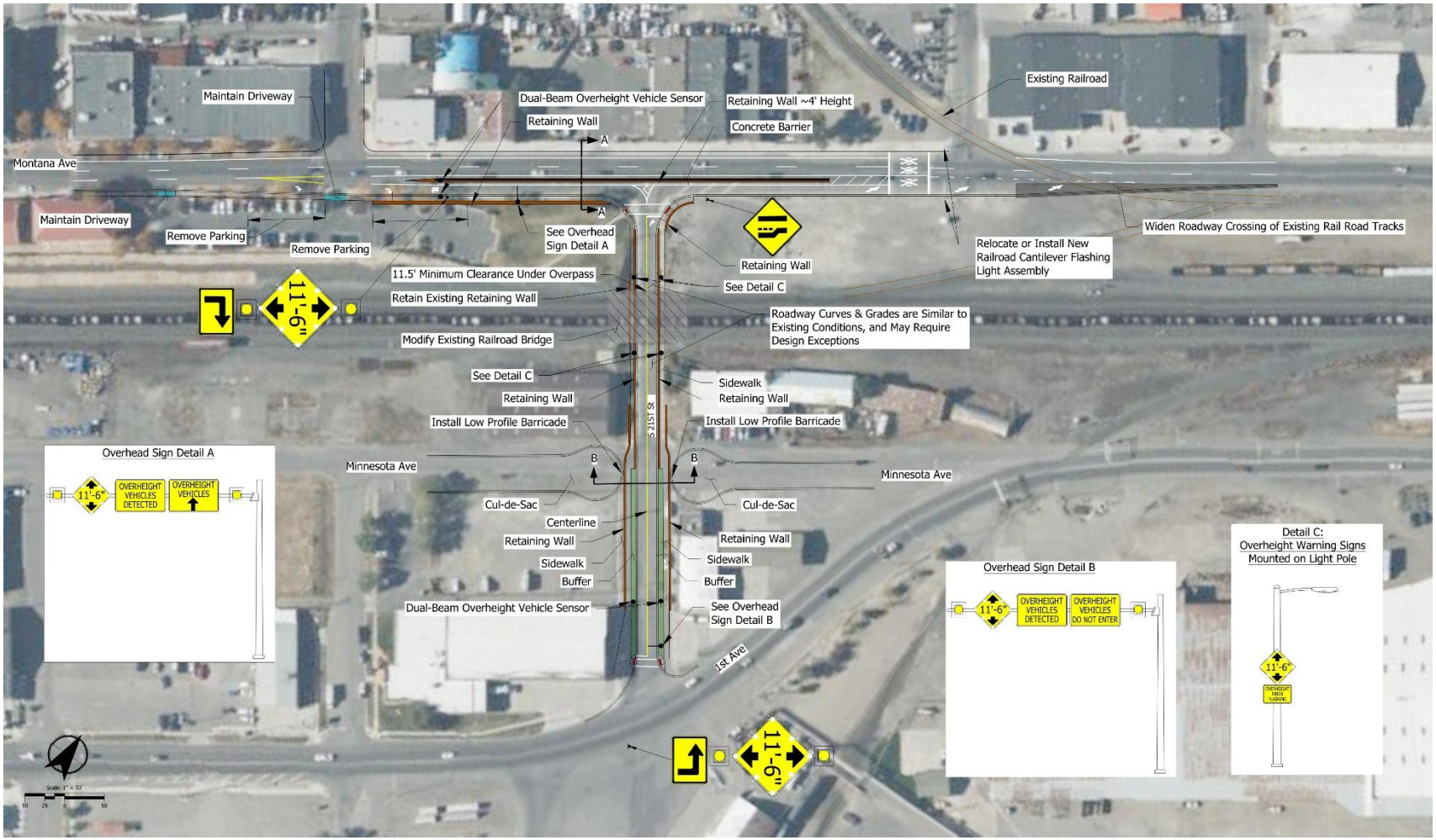


FIGURE 14. ALTERNATIVE 3 STREET SECTIONS

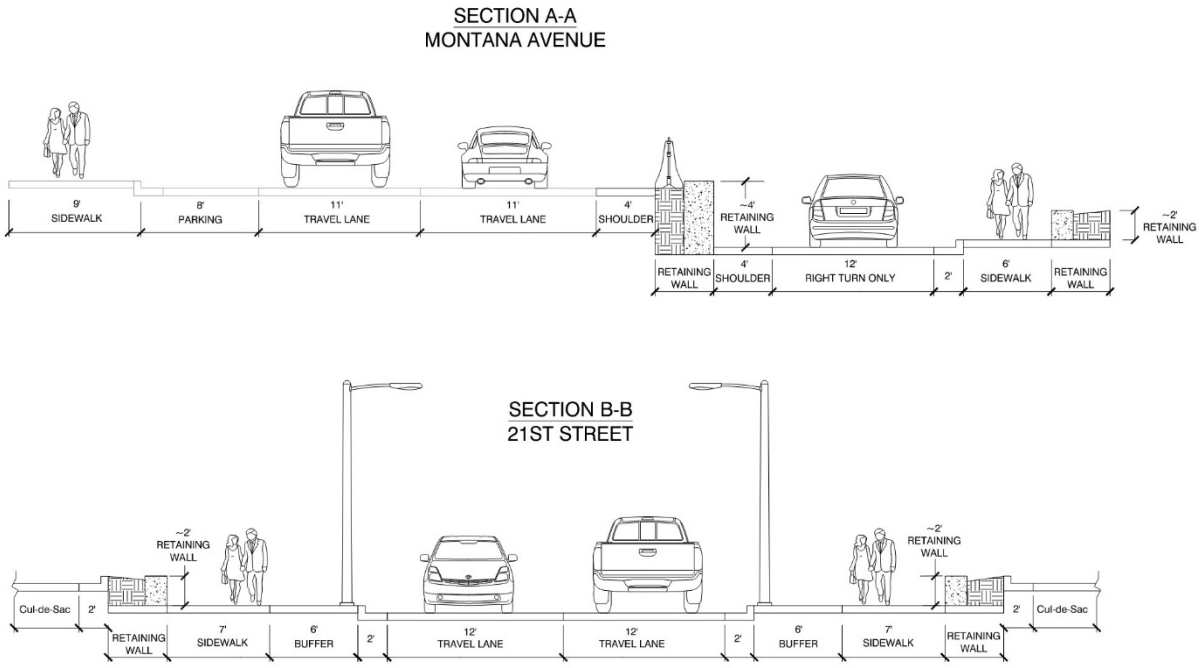
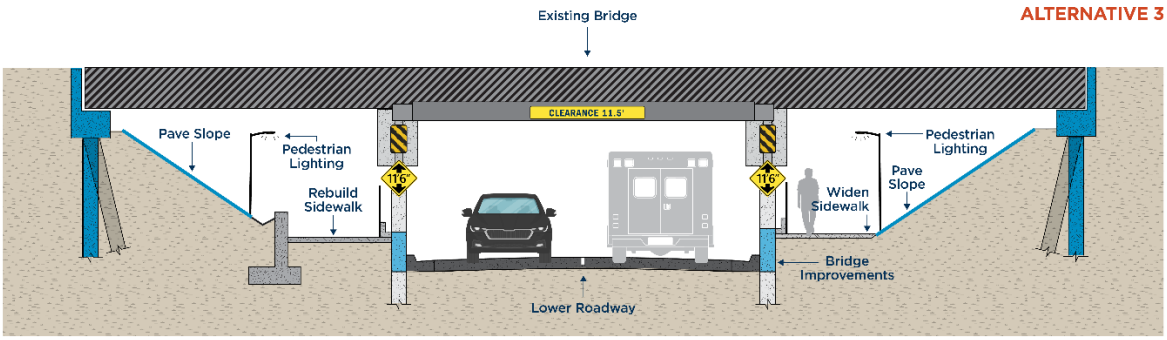


FIGURE 15. ALTERNATIVE 3 BRIDGE STRUCTURE



As shown in Figure 14, a key element of Alternative 3 is constructing a retaining wall on Montana Avenue to separate out the right-turn traffic movements turning to and from 21st Street. The retaining wall is necessary to maintain approximately the same grade and vertical alignment of 21st Street as under existing conditions which already exceed recommended urban street design policies. While the vertical alignment of 21st Street will continue to not meet current AASHTO policy for the vertical curve lengths, installing the roadway and pedestrian lighting will provide improved stopping sight distance in nighttime hours. Input from the City of Billings and stakeholders did not identify concerns regarding the existing grades and curvature of 21st Street. If it is determined that improving the vertical curvature of 21st Street to meet AASHTO policy is desired, improving the cross-slopes across the crosswalks, or generally improving the existing alignment, further lowering of Montana Avenue and Minnesota Avenue would be required which would lengthen the retaining wall on Montana Avenue and extend the access and parking impacts further to the east and west along Montana Avenue and result in higher and longer retaining walls.

Advantages:

Increasing vertical clearance by 3.5 feet to 11.5 feet would allow for ambulances, smaller transit vehicles, and some moderately sized trucks to utilize the corridor. An increase in vertical clearance reduces the likelihood of structure involved crashes which were a majority of the 20 crashes reported between 2019 and 2013 on 21st Street between Minnesota Avenue and Montana Avenue. There is the potential for the type of vehicles involved in a collision with the structure to change as increased vertical clearance may result in drivers of taller vehicles thinking they can now utilize the underpass. For this reason, this alternative would include the overheight vehicle warning system to further reduce crashes involving overheight vehicles.

A full reconstruction of the drainage system including the addition of a pumping system would significantly improve drainage assuming downstream drainage infrastructure can accommodate the additional demand.

Similar to Alternative 3, paving hillslopes under the underpass would reduce sediment from running off the slope and collecting on the sidewalk. Adding pedestrian lighting on 21st Street will enhance the pedestrian experience and feelings of safety and provide light under the bridge.

Disadvantages:

Achieving this increase in vertical clearance (3.5 feet) would include the lowering of 21st Street at its intersections with Montana Avenue and Minnesota Avenue intersections by at least 3 feet, which will impact on-street parking and nearby business access. A drainage system with pumps to overcome the high groundwater level would be expensive to install/maintain and may require upgrades to off-site facilities downstream. This option would have some impact on BNSF railroad operations for brief periods as temporary shoring of the bridge will be necessary during excavation and reinforcing the piles that hold up the bridge structure.

Cost:

Table 13 shows the estimated cost for this alternative. It is estimated this alternative would cost between $8-10 million, depending on the scale of the improvements. If this alternative is carried forward the cost estimate will be refined.

TABLE 13 ALTERNATIVE 3 COST ESTIMATE

ITEM	ESTIMATED COST
1. Roadway and Pedestrian Improvements	$6.2 – 7.3 Million
2. Drainage & Stormwater Improvements	$700,000 - 1 Million
3. Railroad Bridge Improvements	$1 - $1.5 Million
4. Railroad Temporary Traffic Control	$100,000 - $200,0000
Total	$8 - 10 Million

ALTERNATIVE 4:

Increase Clearance to 13.5 Feet with Bridge Replacement

Alternative 4 increases the vertical clearance of the underpass to 13.5 feet. This alternative would allow heavy vehicles, including fire and emergency medical services (EMS), to utilize the underpass. In this alternative, achieving the increase in vertical clearance would require replacing the bridge structure, as the increase in roadway depth would expose existing bridge piles to a depth not meeting structural standards. This alternative is shown in Figure 16. Figure 17 shows cross-sections of Montana Avenue and 21st Street. Figure 18 depicts a rendering of the new bridge structure with the proposed warning system.

This alternative includes the following modifications to 21st Street, the bridge structure, and the surrounding area:

Improvement Areas:

- Bridge Structure:
  - New 4 track 112′-2″ bridge featuring 3 - 30″ deep box beam spans
  - 10′ multi-use paths on both sides of 21st Street under bridge
  - Maintain 11′ travel lanes along 21st Street
  - New concrete slope paving below bridge
- 21st Street:
  - Lower 21st Street to increase vertical clearance to 13.5 feet.
  - Widen sidewalks to 10 feet multi-use paths to accommodate pedestrians and bicycles.
  - Stripe centerline.
  - Modify drainage system by transitioning to a pump system.
  - Eliminate on-street parking south of Minnesota Avenue to accommodate a retaining wall and avoid elevation conflicts.
  - Add new/enhanced pedestrian lighting.
- Surrounding Areas:
  - Lower Montana Avenue right-turn lane. Shift through lanes north and reduce the width of the northern sidewalk.
  - Minnesota Avenue will be cut-off to the east and west of 21st Street and a cul-de-sac installed at each end to provide space for vehicles to turn around.
  - Sidewalk and travel lanes will have to be reconfigured to maintain through lanes and on-street parking.
  - Work with private property owners to remove some parking in the lot south of Montana Avenue.

The primary differences between Alternative 4 and Alternative 3 are the full replacement of the bridge structure and additional lowering of the rightmost lane on Montana Avenue which extends the parking and access impacts.

Advantages:

Increasing vertical clearance by approximately 5.5 feet to 13.5 feet would accommodate large fire trucks and all typical emergency service vehicles. An increase in vertical clearance reduces the likelihood of

structure involved crashes which were a majority of the 20 crashes reported between 2019 and 2023 on 21st Street between Minnesota Avenue and Montana Avenue.

In addition to accommodating emergency vehicles, the 13.5 feet of clearance would accommodate most semi-trucks and trailers, although very long vehicles may be limited by the vertical curvature of 21st Street in the approaches to the underpass. The existing traffic counts at 27th Street identified a heavy vehicle percentage of approximately 7% in the weekday AM peak hour and approximately 3% in the weekday PM peak hour. Assuming a similar percentage of trucks would utilize 21st Street with the increased clearance, it is estimated that approximately 22 trucks would be served in the weekday AM peak hour and 19 trucks would be served in the weekday PM peak hour under existing traffic conditions.

A full reconstruction of the drainage system including the addition of a pumping system would significantly improve drainage assuming downstream drainage infrastructure can accommodate the additional demand.

Similar to Alternative 3, paving the abutment slopes under the underpass would reduce sediment from running off the slope and collecting on the sidewalk. Adding pedestrian and roadway lighting on 21st Street will enhance the pedestrian experience, safety, and improve nighttime sight distance for drivers.

Disadvantages:

Achieving this increase in vertical clearance (5.5 feet) would include the lowering of 21st Street at its intersections with Montana Avenue and Minnesota Avenue intersections by at least 5 feet, which will impact on-street parking and nearby business access. This option requires a robust drainage system with pumps to overcome the high groundwater level which would be expensive to install/maintain and is expected to require upgrades to off-site facilities downstream. This option would also have significant impact on BNSF railroad operations for an extended period and therefore an alternative shoofly track with a temporary crossing of 21st Street would need to be constructed during the removal of the existing bridge and construction of the new bridge structure.

Cost:

Table 14 shows the estimated cost for this alternative. It is estimated this alternative would cost between $26-30 million, depending on the scale of the improvements. If this alternative is carried forward the cost estimate will be refined.

TABLE 14 ALTERNATIVE 4 COST ESTIMATE

ITEM	ESTIMATED COST
1. Roadway and Pedestrian Improvements	$6 – 7.5 Million
2. Drainage & Stormwater Improvements	$1-1.5 Million
3. Railroad Bridge Improvements	$17.5 - $19 Million
4. Railroad Temporary Traffic Control	$1.5 - $2 Million
Total	$26 - 30 Million

FIGURE 16. ALTERNATIVE 4 CONCEPT: INCREASE VERTICAL CLEARANCE TO 13.5'

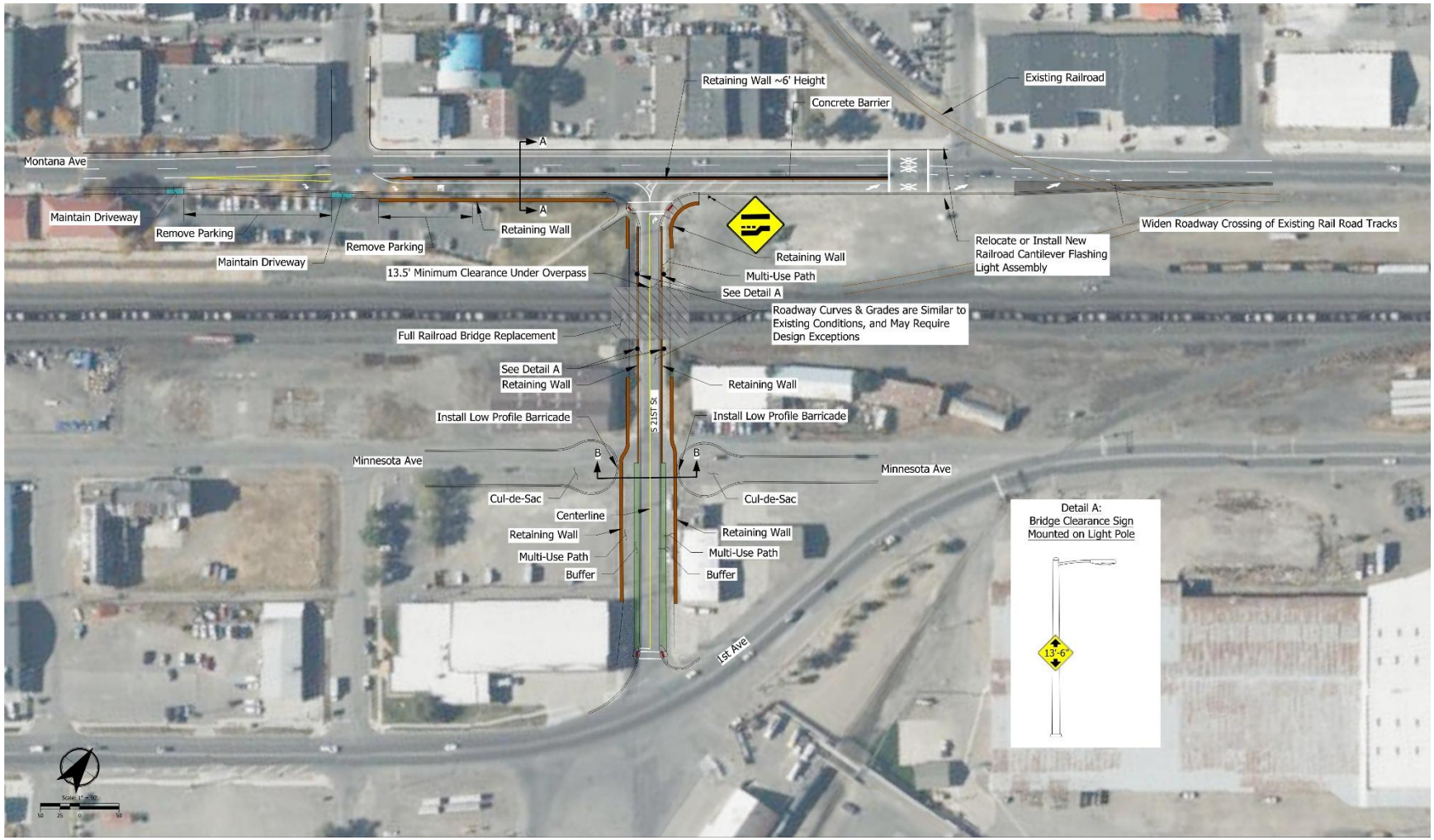


FIGURE 17. ALTERNATIVE 4 CROSS-SECTIONS

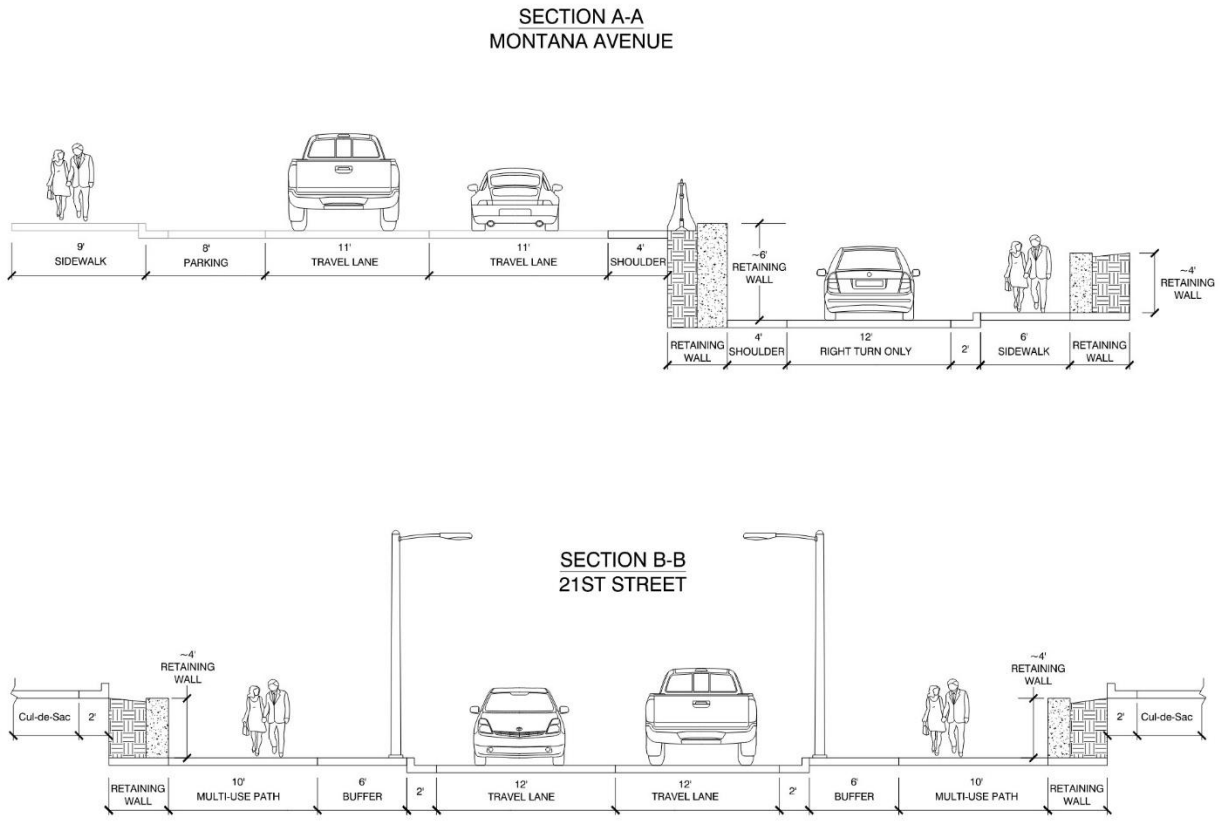
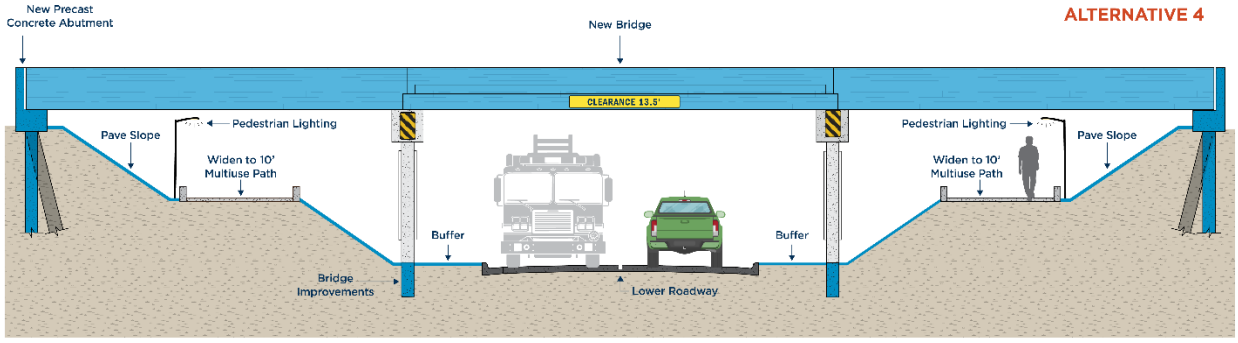


FIGURE 18. ALTERNATIVE 4 BRIDGE STRUCTURE



Similar to Alternative 3, if it is determined that improving the vertical curvature of 21st Street to meet AASHTO policy, improve the cross-slopes across the crosswalks, or generally improve the existing alignment, is desired, further lowering of Montana Avenue and Minnesota Avenue would be required which would lengthen the retaining wall on Montana Avenue and extend the access and parking impacts further to the east and west along Montana Avenue and result in higher and longer retaining walls.

BNSF Review Comments

BNSF has a vested interest in project design and potential impacts. As such, the project team engaged them through the duration of this study. BNSF's main focus is on ensuring safe, reliable, and efficient freight movements. This could be impacted by significant construction.

BNSF staff did have some concerns related to structure strike(s) associated with the existing 21st Street Underpass but have not seen significant issues to date that threaten the integrity of existing infrastructure. The final alternatives were shared with BNSF staff who provided high level comments back, summarized below:

- BNSF prefers Alternative 3.
- BNSF prefers any alternative that does not impact or alter the existing structure.
- No utilities (lighting and signage) will be accepted on the structure.
- A preliminary engineering agreement will be required for all future submittals.
    - *BNSF requires these agreements when they are asked to review engineering plans that may require them to utilize third party reviewers. The City will be required to fund third party review costs incurred by BNSF. Additional costs may also be identified in discussions with BNSF.*

Alternatives Evaluation Criteria

The evaluation criteria are used for two key purposes:

- Evaluating existing conditions and along with treatments included in each of the four alternatives
- Comparing alternatives and ultimately advancing a preferred alternative.

Table 15 outlines a broad set of evaluation criteria that were developed based on the existing conditions analysis, PAC concerns, and project feedback from BNSF and the public.

Each criterion will be used to assess how alternatives compare to one another and the current conditions of the underpass. Each evaluation criterion is given one of three scores represented by a colored dot as described below:

+2 points **+1 point** **+0 point**

TABLE 15 EVALUATION CRITERIA

ALTERNATIVE (S)	EVALUATION CRITERIA	SCORING KEY	
Alternative (s)	Feasibility of Implementation & Railroad Approval	🟢	The alternative has few physical, legal, or other obstacles to implementation.
		🟠	The alternative has some physical, legal, or other obstacles to implementation.
		🔴	The alternative has significant physical, legal, or other obstacles to implementation.
	Built Environment Constraints	🟢	The alternative is expected to have no or little built environment impacts.
		🟠	The alternative is expected to have moderate built environment impacts.
		🔴	The alternative is expected to have significant built environment impacts.
	Roadway Impacts	🟢	The alternative is expected to have no or little roadway impacts.
		🟠	The alternative is expected to have moderate roadway impacts .
		🔴	The alternative is expected to have significant roadway impacts.
	Railroad Bridge Impacts	🟢	The alternative is expected to have no or very little impacts to the existing bridge.
		🟠	The alternative is expected to have moderate structural impacts to the existing bridge.
		🔴	The alternative is expected to have significant structural impacts to the existing bridge.
	Drainage Impacts	🟢	The alternative is expected to improve drainage at the underpass.
		🟠	The alternative may improve drainage at the underpass with proposed improvements.
		🔴	The alternative is not expected to improve drainage at the underpass.
	Conceptual Cost Estimate	🟢	Cost estimate is significantly lower than other alternatives.
		🟠	Cost estimate is similar to other alternatives.
		🔴	Cost estimate is significantly higher than other alternatives.
	Community Priorities Alignment	🟢	The alternative is expected to significantly align with community feedback.
		🟠	The alternative is expected to have some aspects align with community feedback.
		🔴	The alternative is expected to have little to no alignment with community feedback.
	Safety & Emergency Service Access	🟢	The alternative is expected to have a positive safety impact for all users.
		🟠	The alternative is expected to have a positive safety impact, but only for some users.
		🔴	The alternative is expected to have no impact or measurable safety benefit.
	Mobility & Freight	🟢	The alternative is expected to improve mobility for all roadway users.
		🟠	The alternative is expected to improve mobility for some roadway users.
		🔴	The alternative is not expected to improve mobility.

Alternatives Evaluation

The evaluation criteria described above were used to evaluate alternatives as shown in Table 16. Based on the evaluation criteria, alternatives scored highest in the following order:

- Alternative 2 (Highest Score): Minor Improvements With Over-height Vehicle Warning System
- Alternative 1: No Build
- Alternative 3: Increase Clearance to 11.5 Feet With Minor Pedestrian Improvements
- Alternative 4 (Lowest Score): Increase Clearance to 13.5 Feet With Bridge Replacement

TABLE 16 ALTERNATIVE EVALUATION

EVALUATION CRITERIA	ALTERNATIVES			
	1. NO-BUILD	2. MINOR IMPROVEMENTS WITH OVER-HEIGHT VEHICLE WARNING SYSTEM	3. INCREASE CLEARANCE TO 11.5 FEET WITH ROADWAY MODIFICATIONS	4. INCREASE CLEARANCE TO 13.5 FEET WITH BRIDGE REPLACEMENT
Feasibility of Implementation & Railroad Approval	🟢	🟢	🟠	🔴
Built Environment Constraints	🟢	🟢	🟠	🟠
Roadway Impacts	🟢	🟢	🟠	🟠
Railroad Bridge Impacts	🟢	🟢	🟠	🔴
Drainage Impacts	🔴	🟠	🟠	🟠
Conceptual Cost Estimate	🟢	🟢	🟠	🔴
Community Priorities Alignment	🟠	🟢	🟢	🔴
Safety & Emergency Service Access	🔴	🟠	🟠	🟢
Mobility & Freight	🔴	🔴	🟠	🟢
Point Total	11	14	10	7

🟢 *+2 points*

🟠 *+1 point*

🔴 *+0 points*

Section 6 FUNDING SOURCES AND REGULATORY COMPLIANCE

FUNDING SOURCES & REGULATORY COMPLIANCE

Funding and Grant Opportunities

There are two sources of federal funding that could provide additional funding to complete elements of the proposed improvements; the Federal Railroad Authority (FRA) and US Department of Transportation (USDOT) surface transportation funding.

FRA GRANT PROGRAMS

Much of the FRA funding for smaller projects is primarily focused on improving safety by eliminating rail crossings. As the bridge/roadway is already grade separated, the project would not be eligible for grade-separation funding from the Rail Crossing Elimination (RCE) program, and less competitive for other rail funding such as the Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program. As the bridge is a railroad bridge, and the roadway a city road, the project is not eligible for other rail funding programs.

USDOT FUNDING

The USDOT administers two surface transportation funding programs that may be appropriate for the project.

Better Utilizing Investments to Leverage Development (BUILD) Grant Program

The BUILD grant program provides grants for surface transportation infrastructure projects with significant local or regional impact. Several of the alternatives analyzed may be competitive for the BUILD program. Additional analysis and a Benefit Cost Analysis in conformity with USDOT requirements would help determine the competitiveness of the project. Competitive projects must score a "high" rating on the eight merit criteria.

- **Safety** - Improve substandard vertical clearance for fire trucks and ambulances. Reduce repeated crashes with higher-profile vehicles.
- **Environmental Sustainability –** Improve stormwater management and reduce flooding.
- **Quality of Life –** Enhance bicycle and pedestrian experiences by widening the sidewalks and installing lighting.
- **Mobility and Community Connectivity –** Improve vehicular roadway capacity by increasing access for higher-profile trucks. Reconnect communities divided by the low bridge.
- **Economic Competitiveness –** Promote economic growth by allowing box trucks, buses, pickups with campers, and motorhomes and vehicles pulling travel trailers access through the underpass.
- **State of Good Repair** – Improve the condition and safety of core infrastructure.
- **Partnership and Collaboration –** Coordination and local community groups on reviewing alternatives and soliciting feedback. Coordination with BNSF on alternatives, impact to the railroad and construction timing.

- **Innovation –** Implementing solutions that are unique to the community with dynamic messaging and ITS.

Safe Streets and Roads For All (SS4A)

The other competitive grant program that may be a good fit for some of the alternatives is the SS4A program, which funds grants to prevent roadway fatalities and serious injuries.

Depending on the safety data, Billings could ensure that the project is included in a Safety Action Plan and request either planning or implementation funding to complete elements of the project designed to improve safety for vehicles, pedestrians, and bicyclists. The Safe Streets and Roads for All grant program may not be renewed after its scheduled sunset in Federal Fiscal Year 2026.

Regulatory Compliance

The regulatory compliance requirements will vary depending on the selected alternative and the funding source. The No-Build Alternative does not involve any improvements and is therefore not addressed in this section. Alternative 2, because it does not appear to require new right-of-way or substantial ground disturbance, would involve the lowest level of regulatory compliance when compared to the other build alternatives. In general, Alternatives 3 and 4 are expected to have similar impacts related to new right-of-way, ground disturbance (i.e., overall project footprint), and changes in local access and would therefore involve very similar levels of regulatory compliance and environmental documentation. The following information provides details on the potential regulatory compliance requirements based on federal, state, and local regulations applicable to the proposed action.

FEDERAL COMPLIANCE

Any project that requires federal approval, funding, or permits, will need to be evaluated in accordance with the National Environmental Policy Act, or NEPA. The project is likely to involve federal funding from the U.S. Department of Transportation Federal Highways Administration (FHWA) and, as such, the project would be required to comply with regulations found at 23 CFR 771, Environmental Impact and Related Procedures. Additional federal laws and regulations that would be applicable to the NEPA evaluation include a review for compliance with the following:

- **National Historic Preservation Act (Section 106) -** Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to "take into account the effects of their undertakings on historic properties." The purpose of the Section 106 process is to identify historic and archaeological properties that could be affected by the undertaking; assess the effects of the project; and investigate methods to avoid, minimize, or mitigate adverse effects on historic properties. Historic resources, if either listed on or eligible for the National Register of Historic Places (NRHP), are also generally afforded protection under Section 4(f).
    - **Applicability -** Alternative 2 would require minimal review under the NHPA because improvements are occurring within existing right-of-way. Alternatives 3 and 4 would require an historic properties inventory within the project's area of potential effect to identify any NRHP-eligible properties and assess effects to those properties. The existing railroad is likely a significant historic resource.

- **Section 4(f) of the Department of Transportation Act:** Section 4(f) protects publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites of local, state, and national significance. Federally funded transportation projects cannot "use" Section 4(f) properties unless there are no feasible and prudent avoidance alternatives and all possible planning to minimize harm has occurred.
    - **Applicability -** Alternative 2 is not anticipated to have any impact on Section 4(f) resources. Alternatives 3 and 4 may have impacts on Section 4(f) resources depending on the status of adjacent historic resource determinations and overall effects on the historic railroad. Section 4(f) applicability would be determined during the NEPA evaluation.
- **Endangered Species Act (Section 7) -** Section 7 of the Endangered Species Act (ESA) directs federal agencies to ensure that actions they authorize, fund, and/or conduct are not likely to jeopardize the continued existence of any federally proposed or listed species or result in destruction or adverse modification of critical habitat for such species. A Biological Assessment must be prepared if actions by a federal agency, or permits issued by a federal agency, will result in effects to threatened and endangered (T&E) species that occur in the vicinity of a proposed project.
    - **Applicability:** Given the limited scope of effects, urban setting, and no suitable habitat for T&E species, none of the alternatives are anticipated to have an adverse effect on ESA listed species. A determination of "no effect" can be made early in the project development phase within the biological resource baseline report prepared for the selected alternative.

The project area overlaps the Billings PCE (tetrachloroethene) federal Superfund site, which contains contaminated shallow groundwater and soils over large plume in downtown Billings. Available well logs in the vicinity of the project suggest groundwater is approximately 10 feet below ground surface. Alternatives 3 and 4, due to excavation of the roadway, could potentially encounter contamination. If Alternative 3 or Alternative 4 were advanced into the design phase, it is recommended that a Preliminary Site Investigation be conducted through geotechnical borings to collect representative soil and groundwater samples in order to better characterize the contamination and assess potential risk associated with construction. Coordination with the U.S. Environmental Protection Agency would be required during the design phase to identify constraints and construction methods.

STATE COMPLIANCE

The project alternatives include improvements to Montana Avenue, which is a federal-aid route under the jurisdiction of the Montana Department of Transportation (MDT). With the assumption that state funding would partially fund improvements, the projects would also be required to comply with the Montana Environmental Policy Act, or MEPA, by following MDT's environmental process. Implementation of any of the build alternatives would require a MEPA review. Documentation requirements for Alternatives 3 and 4 would be more substantial given the increased impacts of these alternatives.

The Montana State Historic Preservation Office (SHPO) would be involved in the effect determination process during the Section 106 review. MEPA compliance with the Montana Antiquities Act, if required, would also be accomplished through the same process as Section 106.

The project would require compliance with the appropriate water quality requirements of the Montana Water Quality Act as it relates to stormwater management during construction and long-term operation. The Montana Department of Environmental Quality (DEQ) administers the Montana Pollutant Discharge Elimination System (MPDES) project and an MPDES stormwater general permit and preparation of a Stormwater Pollution Prevention Plan (SWPPP) would likely be required for Alternatives 3 and 4 if the disturbance area is equal to or greater than 1 acre. The DEQ also administers the Municipal Separate Storm Sewer Systems (MS4) program; however, compliance with this regulation on a project-level basis would occur at the local level, as described below.

Both Alternatives 3 or 4 would be considered "development" or "redevelopment" and, following MDT's process for MS4 compliance, implementation of either alternative would require an evaluation of the feasibility of using low impact development (LID) practices. The LID practices would need to infiltrate, evapo-transpire, and/or capture for reuse, the post-construction runoff generated from the first 0.5 inches of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation. Completion of this analysis would be in coordination with Yellowstone County MS4 regulations, as described below.

LOCAL COMPLIANCE

Alternatives 3 and 4 would require stormwater compliance and reviews at the local level. The City of Billings is a regulated MS4; the project is located within the City of Billings City Limits and MS4 boundary area, and thus, subject to local MS4 permit requirements. The project will be required to comply with local MS4 permit requirement, including the City of Billings Stormwater Management Manual. Alternatives 3 and 4 would require a City of Billings MS4 compliance review. Additionally, approval of the SWPPP for Alternatives 3 and 4 would require a City of Billings compliance review.

No other local permits relative to the implementation of the build alternatives have been identified.

Planning Board

Date:	06/09/2026
Title:	West Billings Neighborhood Plan
Presented by:	Tate Johnson, Planner 1
Department:	Planning & Community Services
Presentation:	Yes

Information

RECOMMENDATION

Staff recommends the Planning Board review the West Billings Neighborhood Plan and forward a recommendation to the Yellowstone County Board of Commissioners of approval of the West Billings Neighborhood Plan.

BACKGROUND (Consistency with Adopted Plans and Policies, if applicable)

The West Billings Neighborhood Plan updates the 2001 West Billings Plan and provides guidance for future growth and development in the West Billings area. The Plan covers approximately 15,000 acres and includes developed neighborhoods, commercial areas, agricultural lands, and natural open spaces. The planning area includes land within the City of Billings, unincorporated Yellowstone County, and areas outside the County's zoning jurisdiction. This Plan recognizes and addresses the differing authorities, responsibilities, and regulatory frameworks of the City of Billings and Yellowstone County throughout the document.

Since adoption of the 2001 West Billings Plan, the area has experienced significant growth, with population and housing development substantially increasing over the past two decades. While many of the goals and guiding principles established in the 2001 Plan remain relevant, the update evaluates current conditions, incorporates projected growth trends, and provides updated recommendations to address future development, land use, transportation, and infrastructure needs.

The Plan builds upon the vision and policy direction established in the 2001 West Billings Plan and the 2016 West End Multi-Modal Planning Study. It identifies goals, policies, and implementation strategies intended to guide future zoning decisions, infrastructure investments, and development patterns. Key objectives include directing growth toward areas with existing infrastructure, improving transportation connectivity, expanding multi-modal facilities, enhancing public safety, and preserving community character and open space resources.

The West Billings Neighborhood Plan was prepared in compliance with the Montana Land Use Planning Act (MLUPA) as a neighborhood land use plan. However, the Plan also was developed to help guide development on the City-County interface and inform transportation planning for areas in the County outside the City fo Billings. The Plan is intended to be consistent with Billings 2045 and will serve as a guiding document for future planning, zoning, subdivision, and capital improvement decisions within the West Billings area. In the event of any inconsistency between the two documents, Billings 2045 shall take precedence.

STAKEHOLDERS

This project included significant community engagement and outreach throughout the planning process. Public involvement efforts included a project website with project updates, multiple public surveys, stakeholder collaboration, public open houses, future land use workshops, presentations to community organizations and elected bodies, and ongoing coordination with the West End Neighborhood Task Force.

ALTERNATIVES

The Planning Board may:

- Recommend the Board of County Commissioners adopt the West Billings Neighborhood Plan; or
- Recommend the Board of County Commissioners not adopt the West Billings Neighborhood Plan; or
- Delay action on making a recommendation.

FISCAL EFFECTS

This project was funded by a Montana Department of Commerce Community Development Block Grant applied for by Yellowstone County, PL funding from the Billings Metropolitan Planning Organization (for the West End Multimodal Plan update), and additional support from the City of Billings for land use planning work of the Planning Division. Should the Commissioners choose to deny the West End Neighborhood Plan, the grant may require local reimbursement to the MT Department of Commerce.

SUMMARY

The West Billings Neighborhood Plan (Plan) updates the 2001 West Billings Plan and the 2016 West End Multi-Modal Planning Study to provide a coordinated framework for transportation, and infrastructure planning within the West Billings area. The Plan area encompasses approximately 15,000 acres between Shiloh Road and 64th Street West, extending from Interstate 90 to the rimrocks, and includes land within the City of Billings, Yellowstone County, and areas outside zoning jurisdiction.

Since adoption of the 2001 West Billings Plan, the area has experienced rapid population growth, substantial housing development, and major infrastructure expansion, accompanied by a steady conversion of agricultural land to urban and suburban uses. This update responds to those changes by integrating current demographic, housing, economic, and transportation data with extensive public engagement to guide growth over the next 20 years.

A major focus of the Plan is the integration of land use and transportation planning to address continued growth and increasing transportation demands in West Billings in the City and County. Existing development patterns within the area are characterized by disconnected street networks, limited pedestrian and bicycle connectivity, and constrained transit service. Public outreach conducted throughout the planning process consistently identified traffic congestion, safety, connectivity, and multimodal transportation improvements as key community priorities.

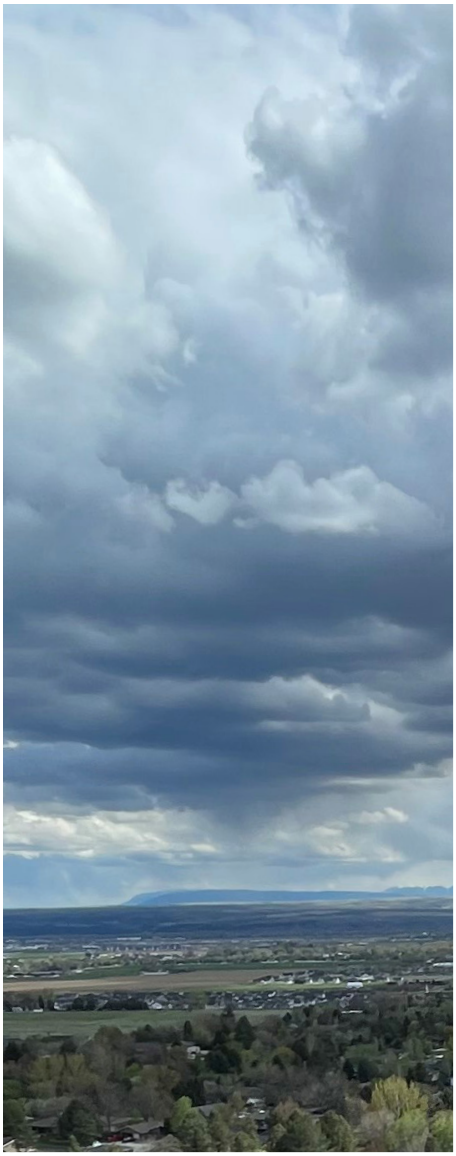
The Plan also updates the 2016 West End Multi-Modal Planning Study, which evaluated the cumulative impacts of existing and anticipated growth on the transportation system west of Shiloh Road. The transportation analysis incorporates current traffic counts, projected population growth, anticipated development patterns, and the updated Future Land Use Map to evaluate future transportation needs within the study area. Using this information, the Plan identifies potential transportation deficiencies, evaluates mitigation strategies, and prioritizes future transportation improvements. The resulting recommendations are intended to help the City of Billings and Yellowstone County coordinate roadway, pedestrian, bicycle, and trail investments with future growth and development in West Billings.

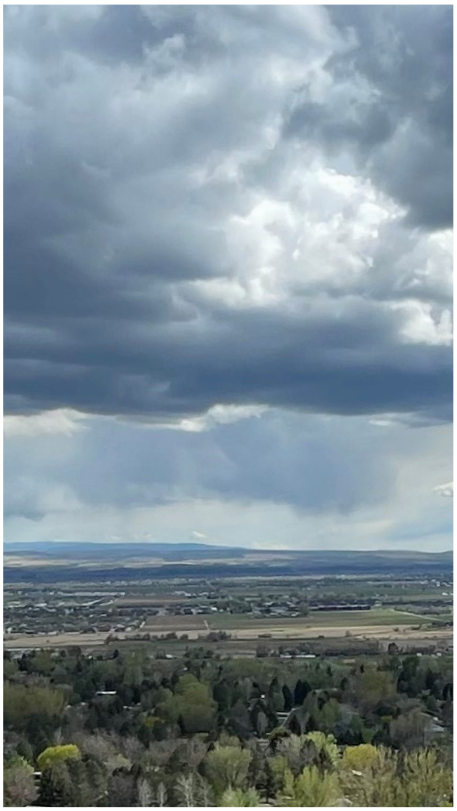
In addition to transportation planning, the Plan establishes Future Land Use Categories and a Future Land Use Map (FLUM) consistent with the Montana Land Use Planning Act (MLUPA). These tools are intended to guide future growth, zoning decisions, infrastructure investments, and development patterns over the next 20 years while promoting coordinated and efficient growth within the West Billings area. The FLUM and associated land use categories were reviewed through a public engagement process and adopted by the Billings City Council on May 11, 2026. The FLUM serves as the long-range vision for future development within the planning area and provides the foundation for the land use, transportation, and implementation recommendations contained in the West Billings Neighborhood Plan.

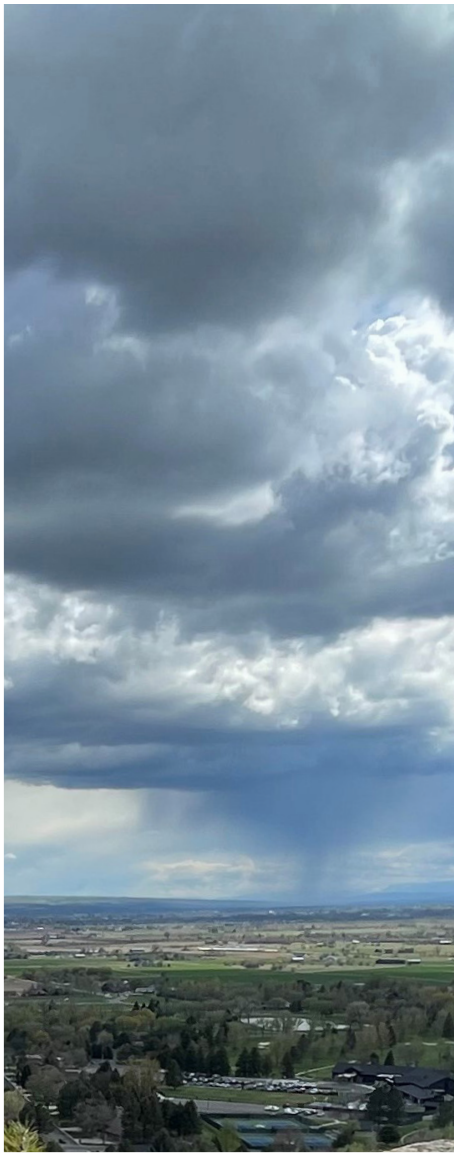
MLUPA does not apply to Yellowstone County growth, future development projects or land use processes. The FLUM will not guide development or be used in a regulatory way for development completed within the County. The transportation analysis and coordinated effort between County Public Works and City Public Works regarding transportation improvements are important for residents and businesses in the City and County in West Billings, which is why the West End Multimodal Plan and West End Neighborhood Plan are combined to be a tool for both jurisdictions.

Attachments

West Billings Neighborhood Plan
West Billings Neighborhood Plan Appendices A-B
West Billings Neighborhood Plan Appendices C-G







WEST BILLINGS NEIGHBORHOOD PLAN

FINAL REPORT

Executive Summary

The West Billings Neighborhood Plan Update serves to update the 2001 West Billings Plan and the 2016 West End Multi-Modal Planning Study. Taken together, this plan, the Billings Heights Neighborhood Plan and the Billings 2045 Plan, will serve as Billings' new Future Land Use Plan and bring the City of Billings into compliance with the recently passed Montana Land Use Planning Act, which imposes new requirements on such planning documents.

The West Billings Neighborhood Plan provides a coordinated framework for guiding land use, transportation, and infrastructure investment in one of Yellowstone County's fastest-growing areas. The plan area encompasses approximately 15,000 acres between Shiloh Road and 64th Street West, from Interstate 90 to the Rimrocks, and includes land within the City of Billings, Yellowstone County, and areas outside zoning jurisdiction.

Since adoption of the 2001 West Billings Plan, the area has experienced rapid population growth, substantial housing development, and major infrastructure expansion, accompanied by a steady conversion of agricultural land to urban and suburban uses. This update responds to those changes by integrating current demographic, housing, economic, and transportation data with extensive public engagement to guide growth over the next twenty years.

A cornerstone of the plan is the adoption of Future Land Use Categories and a Future Land Use Map (FLUM) in compliance with the Montana Land Use Planning Act (MLUPA). These tools formalize the community's vision for development, improve predictability for landowners, and align zoning decisions with long-term infrastructure capacity. The FLUM establishes a range of land use categories—from rural agricultural areas to higher-intensity urban nodes—each with defined density ranges, building types, and mobility characteristics.

The plan emphasizes the integration of land use and transportation planning. Existing development patterns are characterized by disconnected street networks, limited pedestrian and bicycle infrastructure, and constrained transit service. To address these conditions and respond to public input, the plan promotes interconnected streets, expanded active transportation facilities, and land use patterns that support future transit service.

This plan creates a legally compliant roadmap for accommodating growth while preserving the character, safety, and quality of life valued by West Billings residents.

Acknowledgments

The project team is grateful to those who gave their time and efforts to guide and inform the production of this plan. Like the 2001 plan, The West Billings Neighborhood Plan Update is a product of the contributions of interdisciplinary professionals, elected officials, and members of the public. The combined efforts of everyone who participated in creating this plan have given Billings its first future land use map, which will guide the future of the West End.

Steering Committee

City/ County Planning

Wyeth Friday, Planning and Community Services Director

Anna Vickers, Planning Division Manager

Lora Mattox, Transportation Planning Coordinator

Elyse Monat, Transportation Planner

Tate Johnson, Neighborhood Planner

Nicole Cromwell, Former Zoning Coordinator

MET Transit

Rusty Logan, Transit Manager

Sarah Graham, Transit Planner

City Public Works

Chris Hertz, Former Staff Engineer

City of Billings

Scott Aspenlieder, City Council Member

Yellowstone County

Mike Waters, County Commissioner

Chris White, County Commissioner

Mark Morse, County Commissioner

Yellowstone County Public Works

Monica Plecker, Public Works Director

Tim Miller, Former Public Works Director

City/County Planning Board

Dave Nordel, Planning Board Member

Montana Department of Transportation

Kyle Shuck, Billings District Projects Engineer

West End Neighborhood Task Force

Howard Holz, Task Force Member

Steve Zeier, Task Force Member

Billings Association of Realtors

Mikayla Kovash, BAR Past President

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Erin Claunch, Multi-Modal Project Manager

Diane Tolhurst, Public Outreach, Website Updates

Tom Hansen, GIS Mapping, Data & Research

Lauren Waterton, Former Project Manager

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CHAPTER ONE

INTRODUCTION

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Plan Overview

Context

The “West End” of Billings is a collection of neighborhoods generally known as the area west of 24th St., south of the Rims, and north of I-90, with its western boundary moving ever further west with development.

The West Billings Neighborhood Plan encompasses approximately 15,000 acres of the West End, including areas in the Billings city limits, and unincorporated areas of Yellowstone County. The plan boundary includes developed neighborhoods, commercial areas, working agricultural lands, and natural areas. Because of differing jurisdictional boundaries, this plan uses two different boundaries; one for transportation analysis, which corresponds to the MPO (Metropolitan Planning Organization) boundaries, and another boundary for land use analysis, which includes the area between Shiloh Road and 64th Street West, extending to 70th Street West north of Grand Avenue, as shown in Figure 1.1 to the right.

The 2016 City of Billings Growth Policy acknowledges the importance of West Billings and the likelihood of continued growth of the area. This Plan identifies guiding principles, goals and policies related to growth and land use planning within the West Billings Plan area. It creates land use categories and a future land use map that will guide policymakers and landowners over the next 20 years.

Purpose

The purpose of this plan is to take stock and look forward. It evaluates existing conditions in West Billings and states the community’s shared vision for its future by creating goals and recommendations for future growth. This neighborhood plan was created in compliance with the Montana Land Use Planning Act (MLUPA) as a Neighborhood Land Use Plan. The Future Land Use Map (FLUM) illustrates the general pattern of future land uses across the plan area and serves as a visual guide for how the community vision is intended to be implemented.

The West Billings Neighborhood Plan will inform zoning and future development decisions and document community priorities. It outlines a vision for West Billings that aligns growth with infrastructure improvements, prioritizes development adjacent to existing infrastructure, expands options for walking and biking, and enhances safety throughout the plan area.

Updating the 2001 Plan

The 2001 West Billings Plan is the current neighborhood plan for West Billings. In the 24 years since its adoption, much has changed. The population of the area has more than doubled, and the number of dwellings has more than tripled. Given the growth, regulatory changes, and local infrastructure investments, the time is right for an updated plan for West Billings.

The planning effort that resulted in the 2001

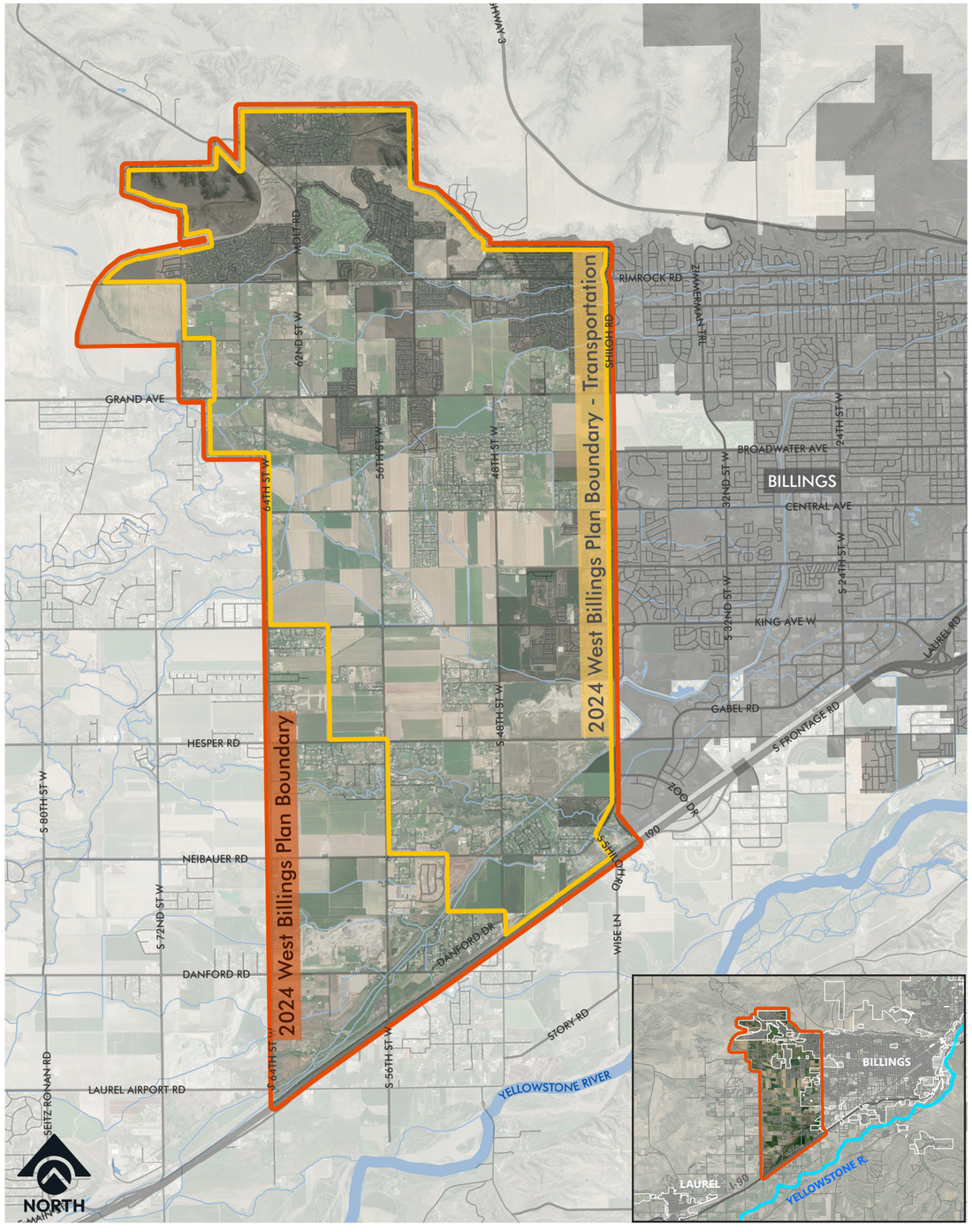

Figure 1.1 - Plan Area Map

Plan included extensive public engagement involving public meetings, surveys, visual preference surveys, and general discussions. While much has changed since that plan's completion, many elements are still relevant and important to the community. For that reason, the current plan relies on that previous document as the fundamental guide to developing the future of West Billings. The Plan is not a replacement of the 2001 Plan, but rather an update to a document that has guided the community for over the past 20 years. While the goals, policies, and future land uses are updated with this plan, the foundations remain the same.

The overall vision remains the same: "Create an achievable plan to meet the community's shared vision for the future of West Billings, enabling it to thrive on growth and change through innovative, compatible land use, and responsible development."

Themes from the 2001 plan include Planned Growth, Appropriate Land Utilization, Achieving a Community Character, and Enhancement of Public Safety, Open Space, Waterways and Scenic Resources. The key elements of the plan include:

- Establish development patterns that use land more efficiently
- Develop municipal water and wastewater facilities and other public services to support urban growth in West Billings
- Plan for the orderly and efficient urbanization of agricultural lands
- Create developments in West Billings that are compatible with their surroundings and provide a safe and desirable environment for residents, shoppers, workers, and visitors
- Identify and protect open spaces, flood channels, waterways, and scenic resources in West Billings

Many of these elements are carried through to this plan and updated with existing conditions.

Multi-Modal Update

In addition to the update to the 2001 West Billings Plan, this plan also updates the 2016 West End Multi-modal Planning Study ("Study"). The Study evaluated 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 Plan includes an update to that Study by incorporating current traffic counts with projected future development. That information was used to evaluate and prioritize potential project needs to help the City of Billings and Yellowstone County coordinate transportation improvements with projected land development. A summary of the existing conditions is in Chapter 2.

Growth Policy Alignment

Montana statute requires that neighborhood plans be consistent with growth policies. The Montana Land Use Planning Act now refers to a growth policy as a *land use plan*. Billings' land use plan, Billings 2045, will be adopted at roughly the same time as the West Billings Neighborhood Plan Update in mid 2026. The West Billings future land use map will be adopted as part of the Billings 2045 Plan, and the future land use categories established during the West Billings planning process will also be applied to the entire Billings zoning jurisdiction. Therefore, the two plans will be consistent in their approach to land use. Should any inconsistencies be within this Plan and Billings 2045, Billings 2045 takes precedence.

Jurisdictional Differences

The planning area includes land within the City of Billings and unincorporated areas of Yellowstone County. In addition, a portion of the planning area is located outside of the zoning jurisdiction. This Plan recognizes the jurisdictional differences between the City of Billings and Yellowstone County, which are reflected throughout the document.

Existing Conditions Overview

The following provides an overview of the existing conditions within the Plan Area. The Background Report within Chapter 2 provides a complete assessment of the existing conditions. The background information collected directly informed the development of the goals and policy recommendations outlined in this Plan.

Population

The West Billings Neighborhood has experienced substantial growth over the past two decades. According to census data, the population of West Billings surged from 6,226 in 2000 to 16,182 in 2020, a 160% growth rate. In comparison, Yellowstone County saw a growth rate of 27.35% during the same period, indicating the neighborhood's significant appeal.

Housing

The total number of housing units increased 208%, from 2,155 in 2000 to 6,644 in 2020. The majority of dwelling units are owner-occupied, accounting for 71.4% of the total, while renter-occupied units make up 28.6%. Vacancy rates are relatively low at 5.4%, suggesting a high demand for housing in the Plan Area. The area's housing stock is relatively new, with the vast majority of the neighborhood built within the past 40 years. Single family homes are the predominant housing type.

Land Use

The current land uses within the Plan Area include residential, commercial, industrial, agricultural, and public lands.

Land use in the West Billings Plan Area has changed significantly since the adoption of the 2001 West Billings Plan. In 2003, agricultural use dominated the Plan Area, accounting for 56% of the land, while developed land comprised only 16%. In 2024, agricultural land use has decreased

2003

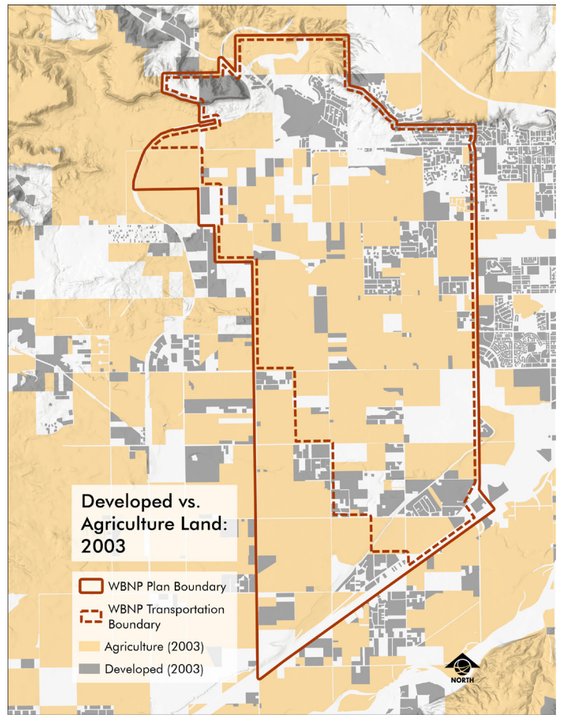

Figure 1.2 - Developed vs. Agriculture (2003)

2024

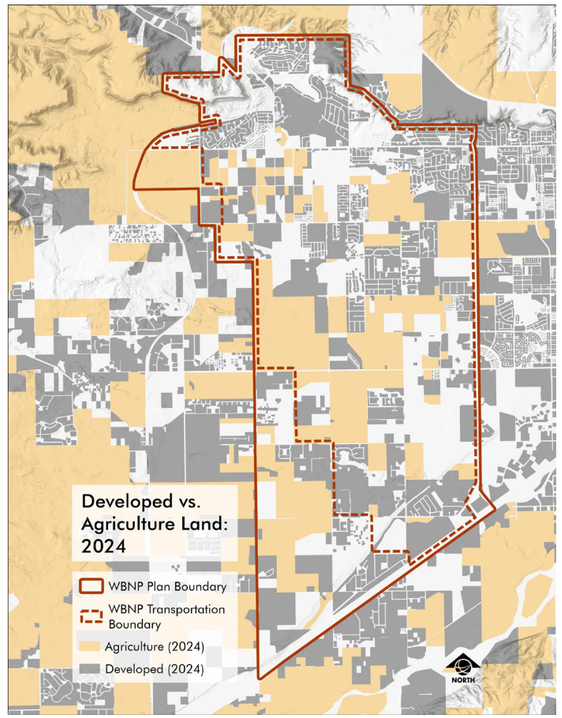

Figure 1.3 - Developed vs. Agriculture (2024)

Agricultural land use in the West Billings Plan Area is rapidly disappearing - See Chapter 2, Background Report for more details.

to 28% and developed land increased to 36%. More specifically, in 2024, residential usage constitutes about 29% of total land use within the Plan rea, while commercial, mixed-use, and industrial uses make up about 2%, 2%, and 3% respectively.

Vacant land, excluding agriculture and public lands accounts for 20% of the total plan area, with about 3,000 acres remaining unused in the plan area as of 2024.

See Figure 1.2 and 1.3 on above for visual reference.

Economic Development

Much of the economic activity within the Plan Area is focused along Shiloh Road. Healthcare represents the largest business sector, followed by construction, and retail trade. With a total of 289 businesses within the area and approximately 2,200 employees, many residents commute to other areas of Yellowstone County for work.

Transportation

Land within the Plan Area is accessed by a 135-mile street network in which small local access streets flow to larger collectors, which connect to a one-mile-by-one-mile arterial grid. Within the Plan Area, local access streets rarely connect from neighborhood to neighborhood or across arterials, which increases travel distances and requires most trips to include some travel on arterials. The southern boundary is defined by Interstate 90. Notable principal arterials include Rimrock Road, Grand Avenue, Central Ave, King Avenue W, Hesper Road, Neibauer Road, and Danford Road for east-west travel. The north-south travel arterials include 64th Street W, 62nd Street W, 56th Street W, 48th Street W, and Shiloh Road.

Existing pedestrian and bike infrastructure in West Billings is inconsistent and disconnected within the Plan Area. Sidewalks extend for a total of 64.5 miles within the Plan Area, yet only 32% of roads feature adjacent sidewalk infrastructure. In addition to sidewalks, there are 14.7 miles of paved multi-use trails in West Billings. There are currently no on-street bike lanes in the Plan Area.

Public transportation options in the West Billings area are notably limited, primarily confined to Shiloh Road, which delineates the eastern boundary of the Plan Area while also marking the westernmost extent of the bus network in Billings. Billings MET Transit provides services throughout the greater Billings area. Within the Plan Area, the North Westend and King Avenue West routes serve Shiloh Road and the immediate vicinity, with a small segment of the King Avenue West route extending just west of Shiloh Road to 44th Street W.

Shiloh Crossing - Sanbell

Between 2020 and 2024, there were a total of 239 reported crashes at intersections within the Plan Area, with crashes occurring primarily on Shiloh Rd, 48th St W, and 56th St W. Among these crashes, one incident was fatal at the intersection of 48th St W and King Ave in 2019, while four resulted in serious injuries.

Community Engagement

Throughout the planning process, community engagement has been critical to understanding issues within the Plan area. A complete summary of the public engagement process is provided in Appendix A. The following is a summary of the engagement conducted for the West Billings Plan.

Project Website

The project website was created in March 2024 to host project information, surveys, and other information critical to the project. It has hosted three (3) public surveys, an interactive webmap for the draft Future Land Use Map (FLUM), and provided project updates. The website also included contact information for key project team members.

Open House

In March 2024 a public open house was held to inform the public about the plan update and gather information about important issues.

This provided residents, interested community members, and City and County officials an opportunity to learn about and contribute to the plan development for West Billings. It offered a casual and interactive setting where attendees engaged with project materials, shared their perspectives, and interacted with the project team. Project team members engaged with attendees by using eleven informational boards dispersed around the room. The boards provided detailed information about what a neighborhood plan is, a contextual map of the area, the four major themes from the 2001 plan, land use and transportation, effects of transportation on land use and community character, transportation improvements map, and a next steps timeline for the project.

On August 14, 2025 the project team held an open house at Ben Steele Middle School. Before the meeting began, the project team distributed writing utensils and materials including a copy of the draft FLUM and future land use category descriptions. Attendees were encouraged to write comments on boards which displayed the Draft FLUM, guiding principles, and introductory information presented at the March 2024 open house. The project team gave a presentation introducing the project and recapping the work completed to that date, including the methods used to create the draft FLUM and next steps.

Future Land Use Workshops

In November 2024, the project team hosted two public future land use workshops. After a presentation on the planning process to-date and the rules of the future land use game, attendees made their own future land use maps collaboratively in groups of three to four.

Organization Presentations

Throughout the project, presentations were given to the Billings City Council, West End Neighborhood Task Force, West End Rotary Club, and the Billings Association of Realtors.

Open House March 2024 - Sanbell

Future Land Use Game November 2024 - Sanbell

CHAPTER TWO
BACKGROUND REPORT

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Introduction

Purpose

This Background Report is intended to inform the update to the 2001 West Billings Neighborhood Plan and the 2016 West End Multimodal Plan. It provides a snapshot of current (2024) conditions and trends in West Billings. It provides a detailed description of a wide variety of topics important to the community, such as demographics, housing, transportation, and land uses. The Background Report provides decision-makers, the public, and local agencies with context for the development of the Neighborhood Plan.

The overall approach to updating the Plans includes:

- Updating demographic and land use components
- Incorporating relevant components of City of Billings and Yellowstone County adopted plans and policies
- Review development and traffic data
- Summarize themes and issues identified during the first round of public involvement

Background Report Methods

This Background Report compiles essential data and findings from existing local planning documents and sources, providing a comprehensive review of the West Billings Neighborhood. The data draws from a range of reputable sources, including the US Census Data from 2020 and 2010, American Community Survey (ACS) data spanning 2017 to 2021, and Environmental Systems Research Institute (ESRI) data from 2023. By synthesizing these sources, the report offers a detailed understanding of demographic trends, housing dynamics, economic indicators, and other critical aspects of the plan area.

City and County Context

The “West End” of Billings is locally known as the area of town west of 24th St., south of the Rims, and north of I-90, with it’s western boundary moving ever further west with development. Growth in the area has accelerated in the last 30 years, driven, in large part by public investment in infrastructure like water, sewer, and transportation facilities.

The city’s boundary is a patchwork of annexed areas reflecting the incremental, uncoordinated history of development in the city and county. Development within the City has often “leap-frogged” over existing County developed areas, leaving islands of county land surrounded by incorporated areas.

The 2016 City of Billings Growth Policy acknowledges the importance of West Billings and the likelihood of continued growth of the area. That document identified a preferred development pattern focused on medium to high density residential, with commercial centers/nodes of development.

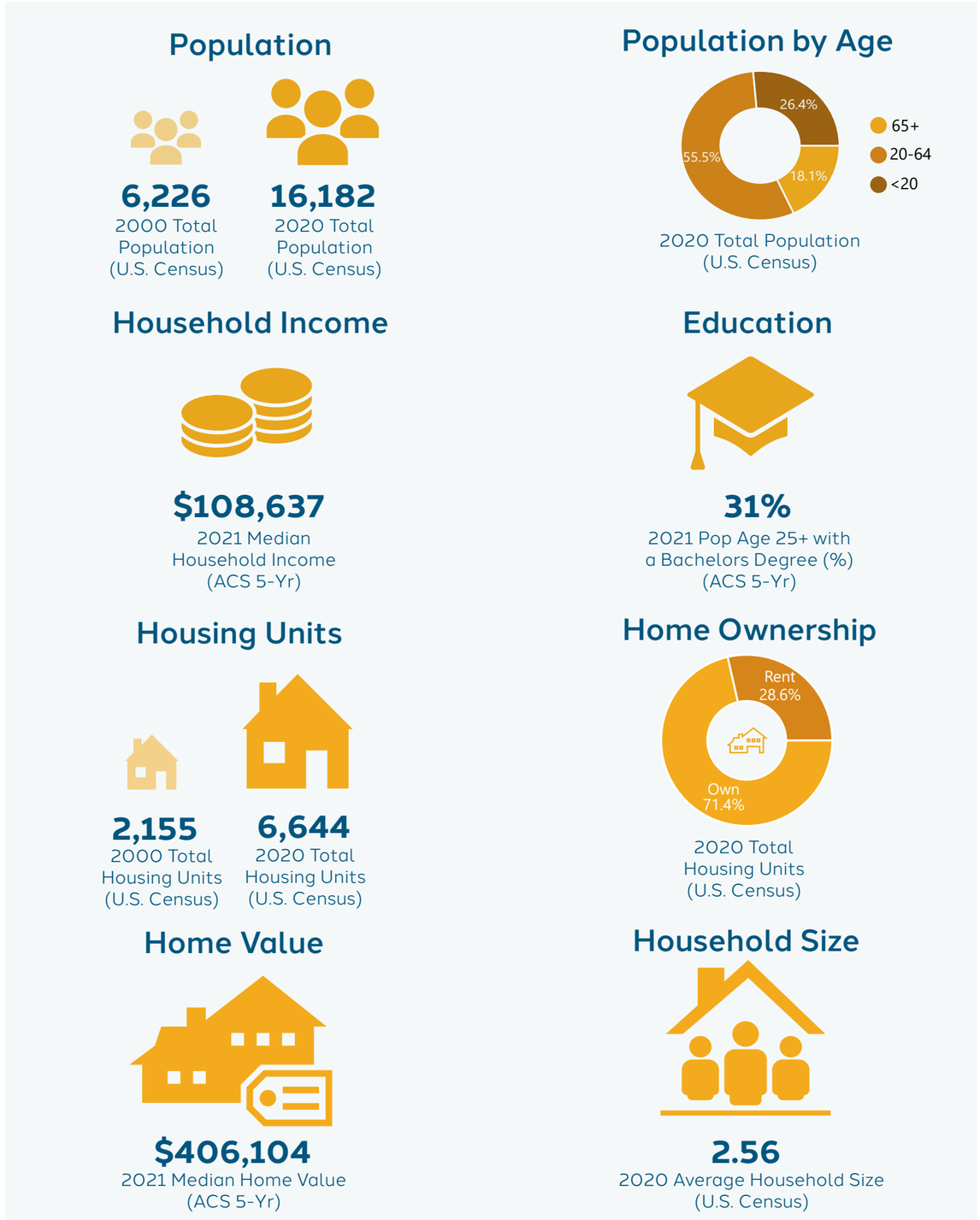

Figure 2.1 - Population and Household Statistics

Existing Conditions

Community Demographics

The West Billings Neighborhood has experienced substantial growth over the past two decades. According to census data, the population of West Billings surged from 6,226 in 2000 to 16,182 in 2020, a 160% growth rate. In comparison, Yellowstone County saw a growth rate of 27.35% during the same period, indicating the significant appeal of the neighborhood.

In terms of age distribution, the neighborhood has a diverse population with approximately 26.4% under the age of 20, 55.5% aged between 20 and 64, and 18.1% aged 65 and above. The plan area has a relatively small population of racial minorities, comprising just 11.5% of its residents. The median household income in West Billings is much higher than the county average, with a median of $108,637 compared to $65,656 for Yellowstone County. Education levels are relatively high, with 31.2% of the population aged 25 and above holding a bachelor's degree.These demographic characteristics are illustrated in Figure 2.1.

Housing

Over the past twenty years, residential land use in the West Billings plan area has developed to accommodate the area's rapid population growth. The total number of housing units increased 208%, from 2,155 in 2000 to 6,644 in 2020. Figure 2.2, shown to the right, illustrates the pattern and timing of residential development in the plan area based on year built. The majority of dwelling units are owner-occupied, accounting for 71.4% of the total, while renter-occupied units make up 28.6%. The average household size in the neighborhood is 2.56 persons. Home values in West Billings are 160% higher than the county average, with a median home value of $406,104 compared to $253,700 for Yellowstone County. Vacancy rates are relatively low at 5.4%, suggesting a high demand for housing in the plan area. According to the 2023 Billings Urban Area Long Range Transportation Plan, housing density within the Plan area is between 1-500 units per square mile, significantly lower than the older established neighborhoods of Billings. Those neighborhoods vary from 1,000 to 4,750 units per square mile.

Local Services and Facilities

West Billings is home to six schools, three public and three private institutions. These schools include Ben Steele Middle School (2017), Elder Grove Elementary School and Middle School (2020), Billings Christian School (1981), Billings Christian High School (2022), and Grace Montessori (2013). There are currently no libraries or formal community centers currently located in the plan area. Emergency services are provided by one City of Billings Fire station, Station 7 (2007), located off Grand Avenue on 54th Street West.

Development within the plan area is served by city water, sewer, and stormwater infrastructure within city limits and private wells and septic systems in the county. Figure 2.3 on page 22 shows the location of existing water and sewer infrastructure, as well as schools and fire services within the plan area.

Economic Development

As Montana's largest city and economy, Billings offers a wide array of economic opportunities. Top industries in Billings includes healthcare, retail trade, construction, wholesale trade, and educational services. These industries are all present in West Billings, with 263 businesses employing 1,988 individuals as of 2023. Employers in the area include Albertsons, Costco, First Interstate Bank, ExxonMobil, Intermountain Health, Cenex, and Town Pump. The Shiloh corridor hosts the largest

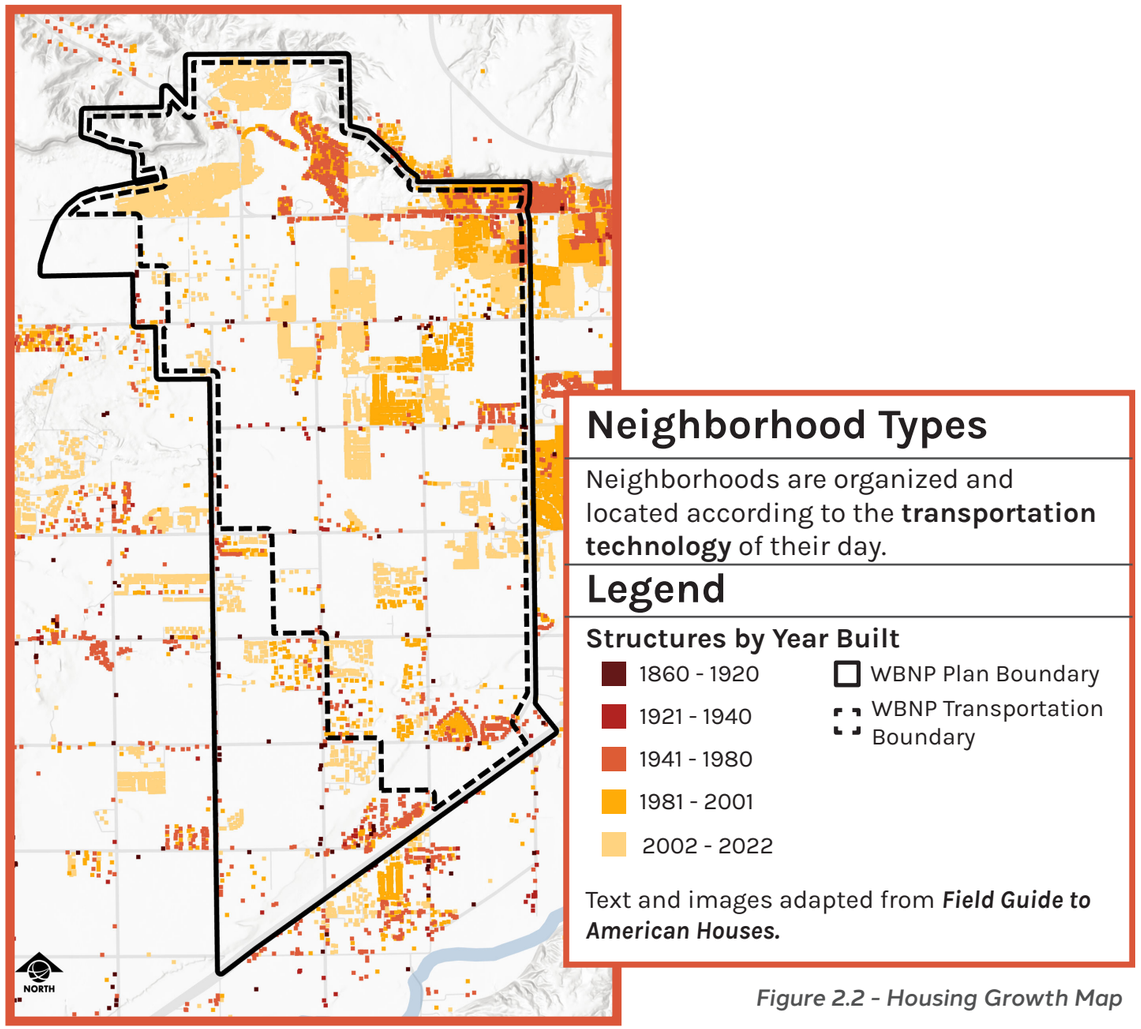

Figure 2.2 - Housing Growth Map

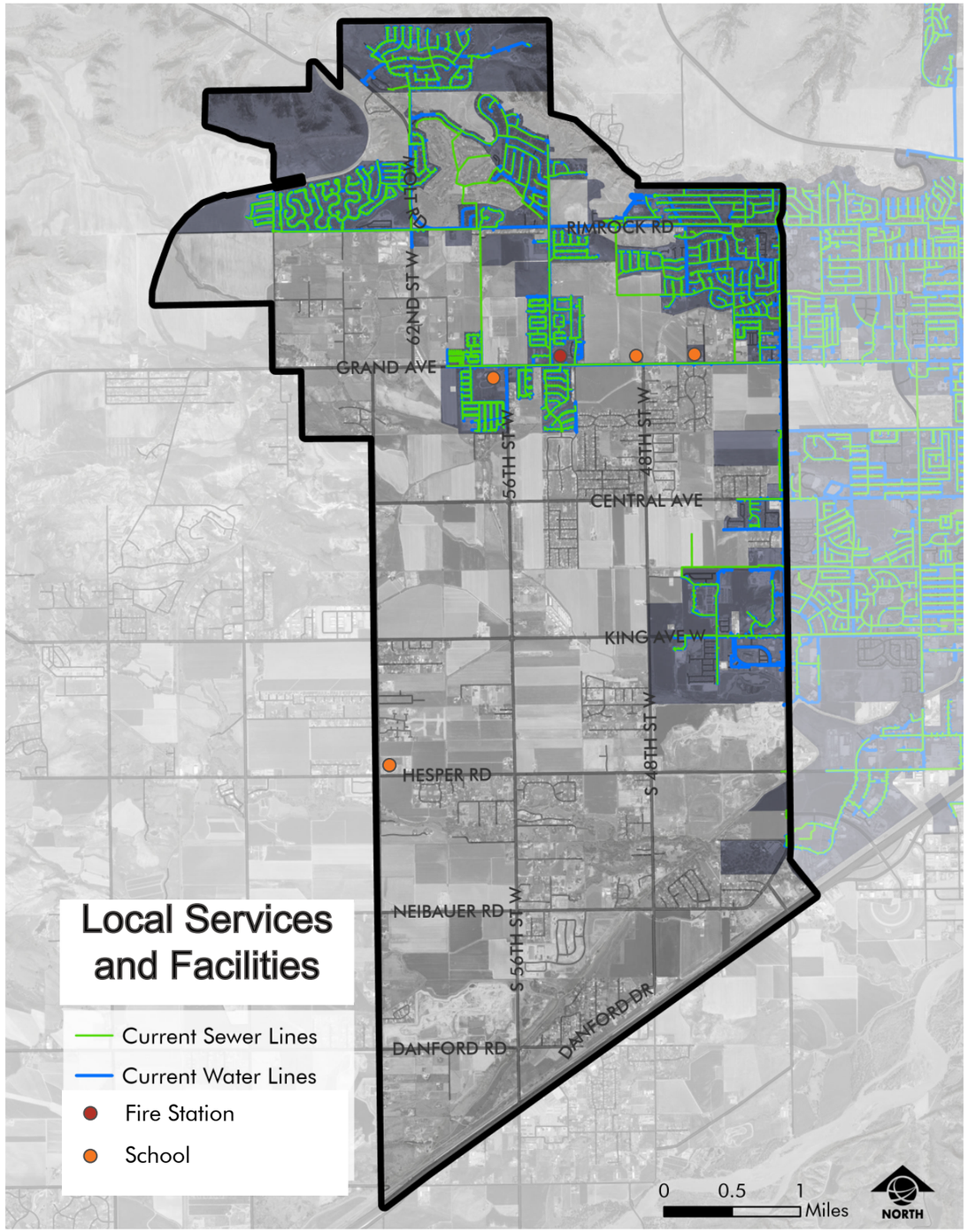

Figure 2.3 - Local Services Map

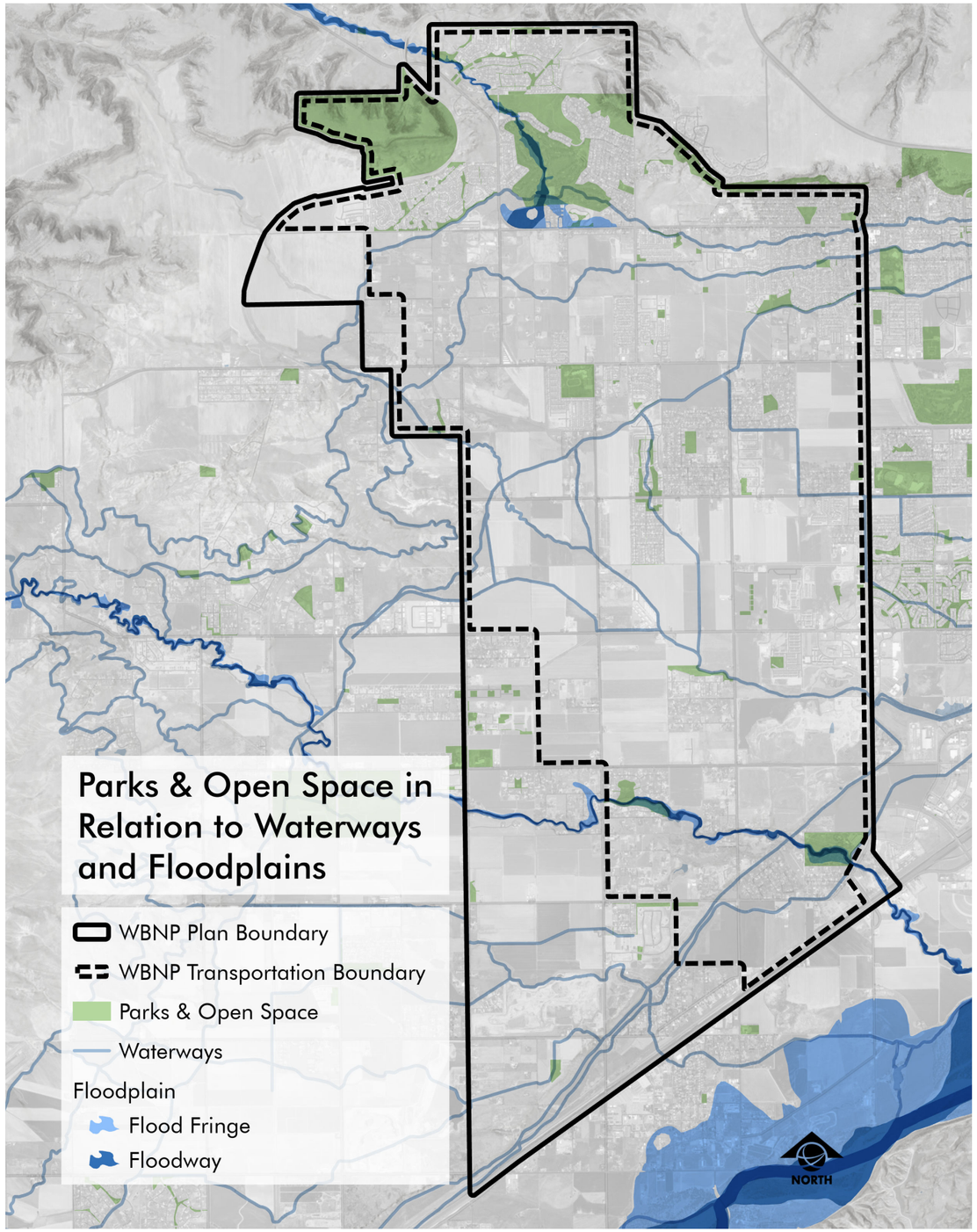

Figure 2.4 - Natural Environment Map

concentration of commercial activity, including retail uses, schools, and health care facilities. Additional development near the Zoo Drive interchange has increased the amount of retail square footage.

Land Use

Land use in the West Billings Plan Area has changed significantly since the adoption of the 2001 West Billings Plan. In 2003, agricultural use dominated the plan area, accounting for 56% of the land, while developed land comprised only 16%. In 2024, agricultural land use has decreased to 28% and developed land increasing to 36%. More specifically, in 2024, residential usage constitutes about 29% of total land use within the plan area, while commercial, mixed-use, and industrial uses make up about 2%, 2%, and 3% respectively.

Undeveloped land, excluding agriculture and public lands accounts for 20% of the total plan area, with about 3,000 acres remaining unused in the plan area as of 2024.

Natural Environment

The natural landscape of West Billings features several man-made and natural waterways, including Canyon Creek, Cove Creek, Big Ditch, High Ditch, Cove Ditch, Canyon Creek Ditch, and the BBWA Canal. 159 public parks provide area residents with access to 730 acres of wild and developed parklands for leisure and recreation.

The plan area also contains floodplains and about 160 acres of wetland, mostly along Canyon Creek, Cove Creek, and Hogan's Slough. These wetlands and riparian areas serve both as habitat for wildlife and as natural infrastructure, cleaning and absorbing water during floods and periods of high flow. Figure 2.4 on page 23 illustrates the location of parks and open space, waterways, and floodplain areas within the plan area.

Transportation

Land within the plan area is accessed by a 135-mile street network in which small local access streets flow to larger collectors, which connect to a one-mile-by-one-mile arterial grid. Within the Plan area, local access streets rarely connect from neighborhood to neighborhood or across arterials, which increases travel distances and requires most trips to include some travel on arterials. The southern boundary defined by Interstate 90. Notable principal arterials include Rimrock Road, Grand Avenue, Central Ave, King Avenue W, Hesper Road, Neibauer Road, and Danford Road for east-west travel, while 64th Street W, 62nd Street W, 56th Street W, 48th Street W, and Shiloh Road facilitate north-south travel.

Existing pedestrian and bike infrastructure in West Billings is inconsistent and disconnected within the Plan area. Sidewalks extend for a total of 64.5 miles within the plan area, yet only 32% of roads feature adjacent sidewalk infrastructure. In addition to sidewalks, there are 14.7 miles of paved multi-use trails in West Billings. There are currently no on-street bike lanes in the plan area.

Public transportation options in the West Billings area are notably limited, primarily confined to Shiloh Road, which delineates the eastern boundary of the plan area while also marking the westernmost extent of the bus network in Billings. Billings MET Transit provides services throughout the greater Billings area. Within the Plan area, the North Westend and King Avenue West routes serve Shiloh Road and the immediate vicinity, with a small segment of the King Avenue West route extending just west of Shiloh Road to 44th Street W. Between 2020 and 2024, there were a total of 239 reported crashes at intersections within the plan area, with crashes occurring primarily on Shiloh Rd, 48th St W, and 56th St W. Among these crashes, one incident was fatal at the intersection of 48th St W and King Ave in 2019, while four resulted in serious injuries. Figure 2.4 illustrates the existing street network, pedestrian and bicycle infrastructure, transit service, and planned transportation improvements within the plan area.

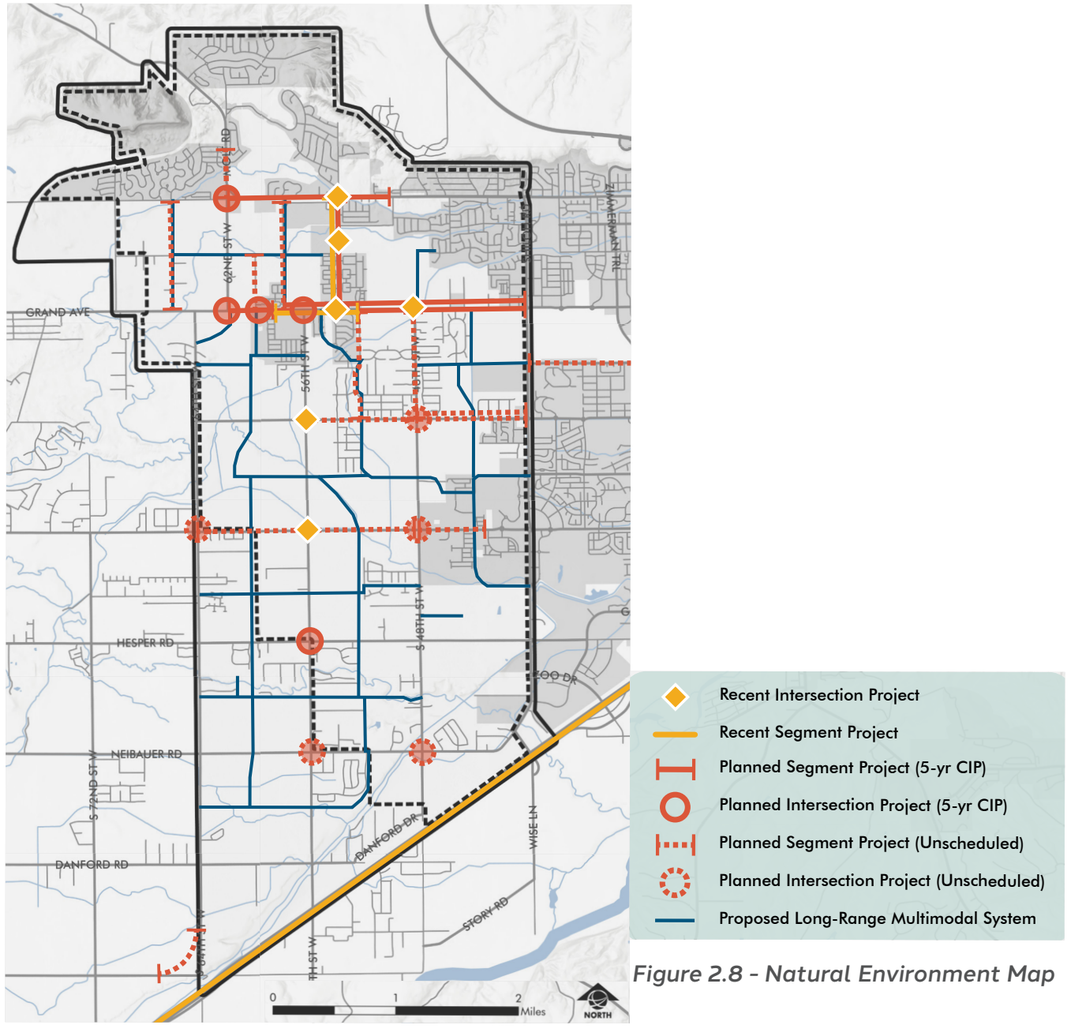

Figure 2.8 - Natural Environment Map

CHAPTER THREE
GUIDING PRINCIPLES

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Guiding Principles Introduction

The West Billings Neighborhood Plan steering committee developed guiding principles to focus their work into four areas:

- Land Use
- Community Vitality
- Natural and Recreational Areas
- Transportation Network

This chapter outlines the Goals and Policies developed under those Guiding Principles, which are intended to steer development and planning activities going forward. These Goals and Policies reflect the results of community engagement, updating of the 2001 goals and policies, and existing conditions in the plan area.

GUIDING PRINCIPLES: Guiding principles are broad value statements that express the public vision for the future of the plan area. They are adaptations of the 2001 plan guiding principles.

GOALS: More specific than guiding principles, these statements identify a desired future state of the community. Goals are what this plan hopes to accomplish. they provide direction for decisions.

POLICIES: Policies are guidelines that help inform future policy

ACTIONS: Actions Implement the recommended policies. They are specific statements with a call to action to achieve the desired goals.

Land Use (LU)

Encourage a mix of residential, commercial, and employment uses that support the transition from rural to suburban to urban areas.

What we heard: Be thoughtful about development, connect transportation improvements with new development to ensure traffic impacts are minimized

- "Encourage unique small businesses"
- "Preserve our agricultural heritage"
- "Plan for areas that don't rely on private automobiles"
- "Need better coordination with the City, County and School District"

Housing

Goal LU – 1:

Grow responsibly by encouraging density and mixed-use development adjacent to existing infrastructure.

Policies:

- **Policy LU 1.1:** Use the Future Land Use Map to identify preferred growth areas.
  - **Action:** Adhere to minimum density standards specified by each land use category.
- **Policy LU 1.2:** Encourage infill development and new development adjacent to existing infrastructure.
  - **Action:** Review city infill and annexation policy for efficacy and revise if necessary.

Townhomes - Floberg Real Estate

- **Policy LU 1.3:** Zone land to accommodate projected population growth.
  - **Action:** Comply with the Montana Land Use Planning Act (MLUPA) by approving zone change requests that substantially comply with the Future Land Use Map (FLUM).

Goal LU – 2:

Plan for a variety of housing types at a variety of incomes.

Policies:

- **Policy LU 2.1:** Prioritize development of vibrant neighborhoods that offer a variety of housing types.
  - **Action:** Review Zoning to ensure Residential Zones allow for housing variation.

Goal LU – 3:

Identify transition areas between rural, suburban, and urban areas.

Policies:

- **Policy LU 3.1:** Develop a long-term plan for county subdivisions adjacent to city limits that would support annexation and connection to City services.
  - **Action:** Complete a MLUPA-compliant services study that includes analysis of providing service to county subdivisions in the event of water and sewer systems failure.
- **Policy LU 3.2:** Discourage leap-frog development to unincorporated areas where water and sewer services are unavailable. Leapfrog development occurs when development of new subdivisions occurs away from existing development and available. infrastructure.
  - **Action:** Review relevant city and county policy for efficacy in preventing leap-frog development.

Shiloh Commons - Google

Commercial Development

Goal LU-4:

Foster a pedestrian friendly environment for commercial areas

Policies:

- **Policy LU 4.1:** Coordinate sidewalk connectivity between commercial areas and adjacent residential neighborhoods.
    - **Action:** Review the city's master site plan review and regulatory requirement process for efficacy providing adequate pedestrian facilities in developments that do not go through subdivision.

Goal LU – 5:

Promote land uses that support Billings' key industries, encourage the diversification of the City's tax base, and enhance economic development through intentional infrastructure investments

Policies:

- **Policy LU 5.1:** Support development of Billings' and Yellowstone County's key industries: healthcare and health supply chain, retail trade, wholesale trade, tourism, hospitality, and professional services, as identified by Big Sky Economic Development and SB Friedman, an economic development consulting firm.
    - **Action:** Comply with MLUPA by reviewing the growth policy every five years for its efficacy in providing sufficient land for commercial development.

Agricultural Lands

Goal LU – 6:

Preserve agricultural lands in the County.

Policies:

- **Policy LU 6.1:** Identify key agricultural lands on the Future Land Use Map.
    - **Action:** Investigate adoption of county-wide zoning to preserve agricultural land uses and prevent creation of nuisance land uses adjacent to existing county residential.
- **Policy LU 6.2:** Encourage cluster subdivisions that conserve open space and agricultural lands.
    - **Action:** Consider changes to county subdivision regulations that will make cluster development more competative with typical county subdivisions.

Agriculture - MSU

Harvest Festival - KTVQ

Community Vitality (CV)

Create neighborhood centers/ nodes with integrated uses that are distinctive and contribute to increasing the community's vitality.

What we heard: Focus on improving safety, develop quality commercial areas that serve all residents

- "The more we focus on the development of family-friendly commercial and public land, the better for everyone."
- "Small commercial/retail businesses should be allowed in neighborhoods as opposed to pushing all commercial activity to major intersections."
- "Safety in everything is and should be the City's number one priority."

Activity Centers

Goal CV – 1:

Encourage the development of activity centers throughout the neighborhood

Policies:

- **Policy CV 1.1:** Identify and develop neighborhood centers/nodes within the community.
    - **Action:** Amend planned neighborhood development (PND), zoning, subdivision regulations and department policies to support and incentivize neighborhood-scale commercial.
    - **Action:** Include employment land uses in neighborhood centers to shorten commute times and reduce the impact of development on the transportation system.
- **Policy CV 1.2:** Strip commercial development is discouraged and should be prohibited through zoning regulations and city policy.
    - **Action:** Review existing regulations and policies for efficacy in reaching this goal.
- **Policy CV 1.3:** As appropriate in residential areas, neighborhood parks can be used as neighborhood centers/ nodes so long as certain amenities are provided.
    - **Action:** Work with the City Parks Department to develop a list of park amenities that would serve as a neighborhood center/ node. Possible examples include a community center or branch library at Cottonwood Park.

Mixed Use Development

Goal CV – 2:

Enhance the neighborhood by encouraging mixed-use developments

Policies:

- **Policy CV 2.1:** Encourage development of complete neighborhoods that integrate neighborhood centers/ nodes into the community.
  - **Action:** Amend PND, zoning, subdivision regulations and department policies to support and incentivize neighborhood-scale commercial.
- **Policy CV 2.2:** Create opportunities for mixed-use developments where supported by infrastructure.
  - **Action:** Survey local developers regarding barriers to mixed use development and multifamily residential development on commercially-zoned infill properties.

Billings PD - MFPE

Local Services and Facilities

Goal CV – 3:

Support public safety services and infrastructure to ensure that West Billings continues to be a safe, welcoming community that serves all residents.

- **Policy CV 3.1:** Improve community understanding of the cost to serve new developemnt in West Billings.
  - **Action:** Complete a MLUPA-compliant services study to ensure fiscal sustainability of providing services to new development on the West End.
  - **Action:** Complete a site selection analysis and cost feasibility study for constructing additional additional fire and police stations in the plan area.

Natural and Recreational Areas (NR)

Build a safe, healthy, and adaptable community that provides quality parks and green spaces while protecting floodways and natural areas.

What we heard: Build a well-connected, planned network of trails, multi-use paths, parks and natural spaces that are easily accessible by all West End residents.

- "Trails linking the shops to neighborhoods"
- "A large park, like Pioneer Park, west of Shiloh."
- "Although Phipps is fantastic, this large section of Billings needs more public gathering spaces. Development of Cottonwood park or other natural areas would add to the character of the community."
- "The development of new trails has been wonderful! It is one of the things that we love about Billings. We don't have the best trail system in Montana, but it is improving all the time."

Natural Resources

Goal NR – 1:

Preserve and protect floodways, waterways, and scenic resources.

Policies:

- **Policy NR 1.1:** Identify and preserve natural areas by limiting development within these areas.
  - **Action:** Explore potential for limiting development in rock fall hazard areas and popular recreational areas along the rims.
  - **Action:** Follow FEMA FIRM panels and agency regulations.

The Back Nine - MTB Project

Water Conservation

Goal NR – 2:

Encourage water conservation to manage water resources.

Policies:

- **Policy NR 2.1:** Encourage water conservation through development of landscape irrigation standards and best practices.
  - **Action:** Engage the City's Energy and Conservation Commission to review existing landscape irrigation standards against the recently updated standards of other jurisdictions for potential changes.
- **Policy NR 2.2:** Align review of the future land use map with the City of Billings Water Master Plan to ensure that projected growth can be served with municipal water supplies.
  - **Action:** Analyze natural resources, environment and hazards in the Billings 2045 plan as they apply to the West Billings Plan area.

Parks and Trails

Goal NR – 3:

Connect neighborhoods with interconnecting parks and trails.

Policies:

- **Policy NR 3.1:** Create a linked network of green spaces

Trails - Billings Gazette

- **Action:** Continue to review development applications for compliance with the 2023 LRTP.

- **Policy NR 3.2:** Support ongoing individual park and citywide park master planning including updating the 2017 City Park Master Plan, and addressing maintenance costs.
  - **Action:** Complete a MLUPA-compliant services study to determine what kind of development will support the level of park service desired by area residents.

Transportation Network (TR)

Create a balanced and connected transportation network that supports multiple modes of travel while supporting the daily needs of residents.

What we heard: Coordinate transportation improvements with new development, prioritize safety for pedestrians, particularly children walking to school, increase the amount of protected bikeways and walking trails. Discourage speeding and reduce speed limits to improve safety

- "The focus needs to be on the communities being built and making it easier to walk, bike and roll around."
- "West Billings needs to focus on the expansion of roadways and traffic control. Main corridors should have speed reduced, additional traffic control and turn lanes."
- "Anything that can be done to make Billings less of the personal car-dependent city it is now would be great."
- "The City must develop a safer and more pedestrian-friendly transportation plan"

Multi-Modal Development

Goal TR – 1:

Provide a complete pedestrian transport network

Policies:

- **Policy TR 1.1:** Continue to require pedestrian infrastructure with all new developments
  - **Action:** Review the city's master site plan review process for efficacy providing adequate pedestrian facilities in developments that do not go through subdivision.
- **Policy TR 1.2:** Increase active transportation mode share for school-age children.
  - **Action:** Implement the recommendations of the Safe Routes to School Plans, Phase 1 and 2.
- **Policy TR 1.3:** Identify trail corridors and networks that can supplement the pedestrian network, help connect neighborhoods to schools, parks, and future transit access.
  - **Action:** Implement the trail-related recommendations of the 2023 Long Range Transportation Plan (LRTP) and the 2017 Billings Area Bikeway + Trails Master Plan Update.

Goal TR – 2:

Encourage development of bicycle infrastructure

- **Policy TR 2.1:** Continue to build out the network of bicycle facilities.
  - **Action:** Continue to implement and update the recommendations from the 2017 Billings Area Bikeway + Trails Master Plan Update.

Street Network

Goal TR – 3:

Provide an interconnected street network

Traffic and growth-related pressures were identified as top concerns expressed throughout the public engagement as part of this Plan Update,

Policies:

- **Policy TR 3.1:** Require connection of new developments with adjacent developments and vacant or agricultural land that will be developed in the future.
  - **Action:** Enforce requirements of Subdivision Regulations.
- **Policy TR 3.2:** Develop strategies to mitigate traffic congestion during peak periods
  - **Action:** Implement street network improvements in alignment with the 2023 Long Range Transportation Plan (LRTP).

MET Transit - KTVQ

Transit Development

Goal TR-4:

Encourage development at densities that support transit

Policies:

- **Policy TR 4.1:** Seek opportunities to expand transit service to and within West Billings over time
  - **Action:** Adhere to minimum density standards specified by each land use category to ensure that urban development supports transit service.

CHAPTER FOUR
FUTURE LAND USE

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Introduction

The Montana Land Use Planning Act (MLUPA) of 2023 generally requires Montana cities to coordinate and streamline planning and development review processes. MLUPA also requires cities to create and adopt a Future Land Use Map (FLUM). The Future Land Use Map places Future Land Use Categories throughout the plan area to formalize the public's vision for their community's future, create a useful tool for decision-makers in guiding development, and for landowners as they plan private investment.

The FLUM does not change existing zoning and becomes relevant only when considering a change from existing zoning.

Legal Requirements of the Future Land Use Map

The Montana Land Use Planning Act (MLUPA) of 2023 sets specific requirements for cities as to how they plan for future growth. This includes projection of future population growth and housing demand among other considerations. The details of this Plan's compliance with MLUPA can be found in Chapter 7.

Future Land Use Categories

The FLUM becomes relevant to a landowner when they decide to change their property's zoning. At that time, the landowner can reference the FLUM to find what Future Land Use Category their property is in. That Category provides a "menu" of zones they can change to through the administrative process created under MLUPA. The landowner may also choose a zone outside of their property's Category by going through the same public application process that existed before the passage of MLUPA.

The following pages illustrate the different land use categories.

Rural Residential/Agricultural (RRA)

Productive Ag Land - City Staff

Rural Residential - City Staff

Summary:

Agricultural production lands and rural residential uses on lots larger than one acre that include agricultural uses and may conserve the agricultural heritage of the Yellowstone Valley. Due to the low-density nature of development, public water and wastewater utilities are generally not available. These districts are not in the City Limits.

Primary Land Uses:

Agriculture / Rural Residential

Building Types:

Single-Family and Duplex Dwellings / Manufactured Homes / Accessory Dwellings Units

Density:

Max 1 unit per acre (accessory dwelling units are not primary units)

Mobility & Street Network:

The street grid is more spread out, typically following section lines with private vehicles as the primary mode of transportation. Local streets are generally gravel.

County Neighborhoods (CN)

Black Rock Estates - Google

Cloverleaf Meadows - Google

Summary:

Large lot rural neighborhoods not developed in the city with limited access to public water and wastewater utility systems.

Primary Land Uses:

Suburban Residential

Building Types:

Single-Family and Duplex Dwellings / Manufactured Homes / Accessory Dwellings Units

Density:

0.33 - 2.99 units per acre (accessory dwelling units are not primary units)

Mobility & Street Network:

Neighborhood streets connected to collectors or arterials, some of which may be paved. Future county neighborhoods should be connected to existing neighborhoods.

Suburban Residential (SR)

Yellowstone Country Club - Google

Vintage Estates - Google

Summary:

Existing single family residential with structures of similar setback and maximum heights with access to public water and sewer.

Primary Land Uses:

Suburban Residential

Building Types:

Single-Family / Accessory Dwellings Units

Density:

4 - 7 units per acre (accessory dwelling units are not primary units)

Mobility & Street Network:

Paved neighborhood streets connected to collectors or arterials. These neighborhoods may have access to nearby community ammenities including parks, schools, and neighborhood commercial areas.

Urban Residential Limited (URL)

Country Club Estates - Google

Ironwood- Google

Summary:

Suburban residential with structures of similar setback and maximum heights, with access to public water and sewer.

Primary Land Uses:

Suburban Residential

Building Types:

Single-Family and Duplex Dwellings / Accessory Dwellings Units

Density:

3.5 - 7 units per acre (accessory dwelling units are not primary units)

Mobility & Street Network:

Paved neighborhood streets connected to collectors or arterials. Future neighborhoods should be connected to existing neighborhoods. These neighborhoods may have access to nearby community ammenities including parks, schools, and neighborhood commercial areas.

Urban Residential (UR)

Trails West - Google

Josephine Crossing - Google

Summary:

Mixed density neighborhoods including some neighborhood commercial and housing choices from single family to townhome (4 units/structure). Public water and sewer is provided.

Primary Land Uses:

Residential / Neighborhood Services / Small Offices

Building Types:

Single-Family to Four-Family Dwellings / Accessory Dwellings Units / Neighborhood Services

Density:

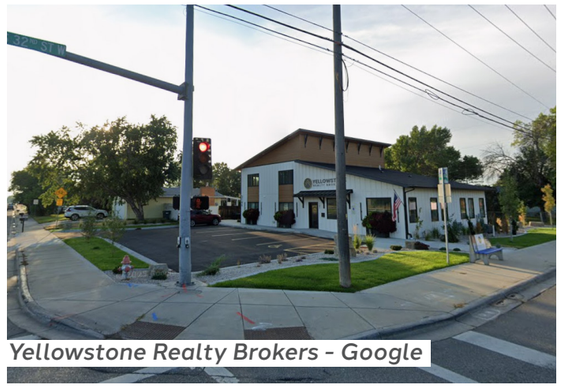
6 - 16 units per acre (accessory dwelling units are not primary units)

Mobility & Street Network:

Development is organized to support a walkable environment. Streets have adjacent sidewalks and shared use pathways to connect neighborhoods to community amenities and nearby commercial areas.

Urban Residential Mixed (URM)

Legacy Homes - Google



Yellowstone Realty Brokers - Google

Summary:

Higher density is adjacent to mixed use with corridor services such as smaller retail businesses. Highly walkable neighborhood with possible service from transit. Development should focus on active uses and providing a safe and comfortable environment for people, both residents and visitors.

Primary Land Uses:

Residential / Commercial / Offices / Public Spaces

Building Types:

Single-Family to Eight-Family Dwellings / Accessory Dwelling Units / Commercial Mixed-Use / Offices / Retail

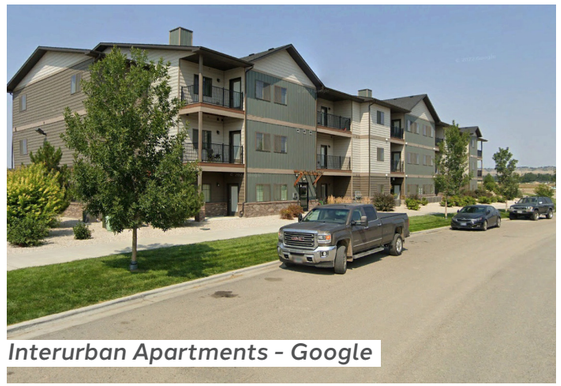
Density:

12 - 24 units per acre (accessory dwelling units are not primary units)

Mobility & Street Network:

Development is organized to support a walkable environment. Streets have adjacent sidewalks and shared use pathways to connect community amenities and commercial areas with walkable blocks.

Urban Node (UN)



Interurban Apartments - Google

Shiloh Commons - Google

Summary:

Higher-intensity, larger-scale places where destinations like shopping and services are walkable but primarily accessed by vehicles.

Primary Land Uses:

High-Density Residential / Commercial / Mixed-Use / Shopping Centers / Public Spaces / Offices

Building Types:

Apartments / Townhomes / Multi-Tenant Retail / Offices / Commercial with or without Drive-Through Services

Density:

16+ units per acre

Mobility & Street Network:

Arterials, collectors, local commercial streets supported by transit that are adjacent to sidewalks and shared use pathways.

Commercial Mixed (CM)

Commercial Uses - Google

Heavy Commercial Use - Google

Summary:

Standalone commercial areas either in the city or county sometimes with adjacent higher-density residential. Could include areas in the county for contractor shops, storage, warehousing, sometimes adjacent to Urban Nodes or Urban Residential Mixed.

Primary Land Uses:

Higher-Intensity Commercial Uses / High-Density Residential

Building Types:

Higher-Intensity Commercial Uses / High-Density Residential

Density:

16+ units per acre

Mobility & Street Network:

Arterials, collectors, and local commercial streets.

Downtown Urban (DU)

Downtown Billings - Google

Minnesota Ave. - Google

Summary:

High density residential, multi-tenant and multi-story buildings, buildings are built to the street, onsite parking may or may not be provided. Designed to be highly walkable.

Primary Land Uses:

High-Density Residential / Multi-Story Offices / Retail / Historic Buildings / Public Spaces

Building Types:

Multi-Story Buildings / Buildings are Built to the Street Front with or without Off-Street Parking

Density:

16+ units per acre

Mobility & Street Network:

Local streets that are adjacent to wider sidewalks that accommodate commercial activities and larger volumes of people.

Employment and Industrial (EI)

Pacific Supply - Google

Johnstone Supply - Google

Summary:

Areas of employment that provide a range of jobs in sectors such as production, manufacturing, research, distribution or extraction which may be incompatible with residential uses.

Primary Land Uses:

Warehousing / Hotels / Larger-Scale Buildings Providing Employment

Building Types:

Multi-Story or Multi-Acre Structures to Accommodate Employment

Density:

Residential units are unlikely in these areas, but are allowed in Heavy Commercial Areas.

Mobility & Street Network:

Sites are well connected to the arterial and collector street network and provide connections to interstate transportation networks (air, train, highway, etc.).

Open Space (OS)

Phipps Park - Google

Shiloh Conservation Area - Google

Summary:

Regional public parks, recreation areas, and natural or sensitive areas which provide a variety of recreational opportunities.

Primary Land Uses:

Regional and Neighborhood Recreational Facilities / Passive and Active Open Spaces

Building Types:

Facilities Associated with Public Use and Recreation

Density:

N/A

Mobility & Street Network:

Parks and recreation sites will be well connected to adjacent neighborhoods.

Public Institution (PI)

Ben Steele Middle School - Google

King of Glory Church - Google

Summary:

Public, civic, and institutional uses located within or on the edge of neighborhoods.

Primary Land Uses:

Schools / Churches / Hospitals / Public Facilities (Non-Recreational)

Building Types:

A Variety of Building Types Varying in Nature of Use and Sizing

Density:

Density associated with insitutional use.

Mobility & Street Network:

Typically located on collectors or arterials. Occassionally located within neighborhoods.

Alignment with Zoning

Future Land Use Categories incorporate existing city and county zoning by grouping together zones of similar scale, use, and intensity. In keeping with the Planned Neighborhood Development (PND) provisions of city zoning regulation, categories include a requirement that a development's average gross density falls within a specified range. This both allows for the mix of zones that the PND requires and ensures that developments meet the intent of the category and FLUM. Each category is described in terms of its primary zones, character, target densities for residential uses, building types, mobility network, open spaces, and performance metrics.

Future Land Use Map (FLUM)

The Montana Land Use Planning Act (MLUPA) requires that cities adopt a Future Land Use Map (FLUM), something Billings has never done before. To answer the question of how West Billings should grow over the next 20 years, the project team reviewed existing plan documents and undertook a public engagement process seeking the community's vision for the future of the plan area, which was used to update the themes of the 2001 West Billings Plan. A suitability analysis (described in Appendix B) of geographic factors known to drive development was also completed to inform the FLUM. This information was then used to create a map of future land uses, illustrated in Figure 4.1 to the following page, that accommodates anticipated population growth and housing demand, among other elements, over the next 20 years.

Statement of Intent

The future land use map gives Billings and Yellowstone County guidance as to what land is likely to develop first, what land has better access and supports more intense uses, and what land will be more cost effective to serve with municipal services like police, water and sewer.

Billings and Yellowstone County zoning and subdivision regulations have both been recently updated; zoning in 2021, and subdivision regulations in 2024. This plan is intended to comply with and reflect those updates as well as other local regulations like the limits of annexation policy and map. The future land use map developed as part of the overall Billings 2045 Plan will incorporate this map and also follow with existing local land use regulations.

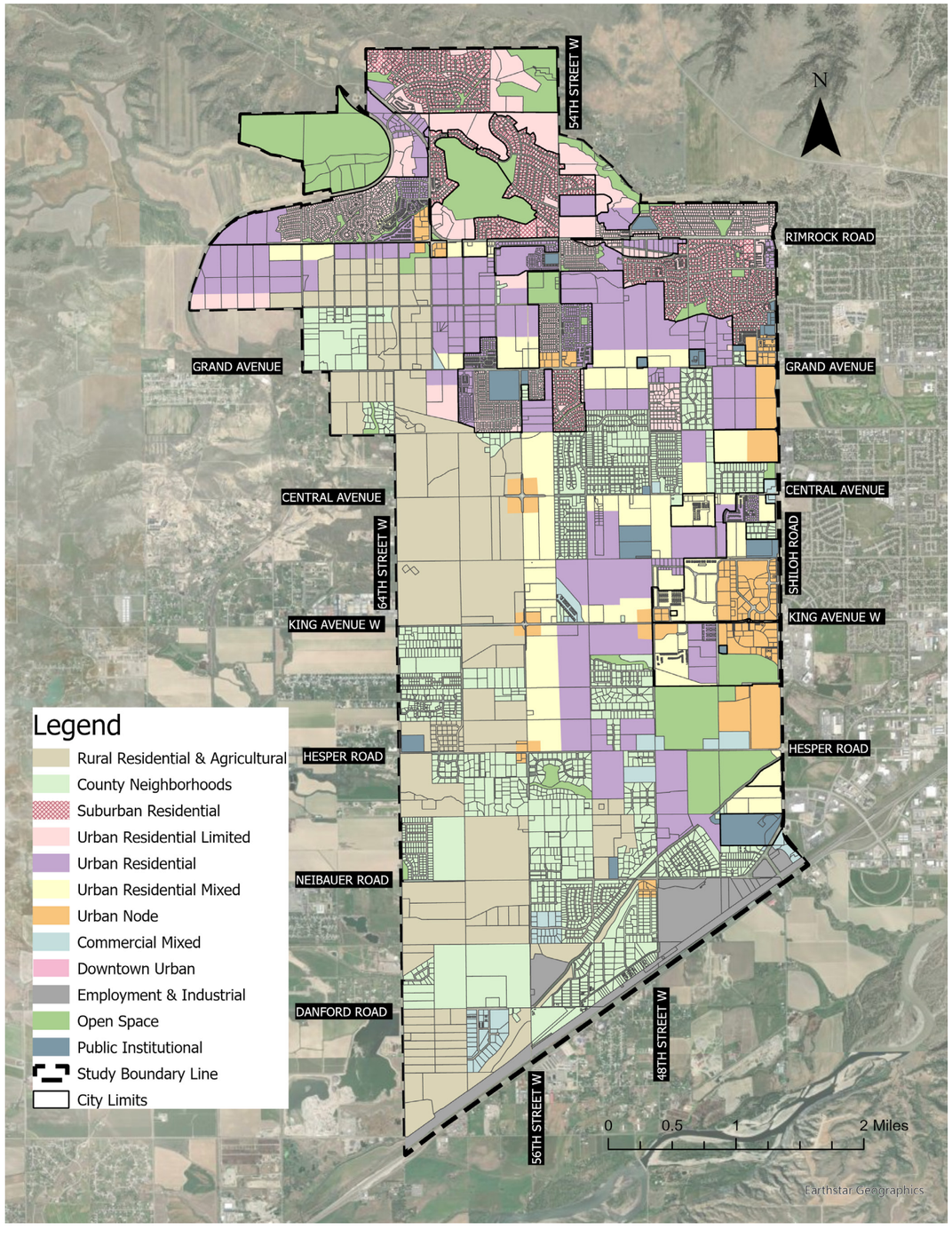


Figure 4.1 Future Land Use Map

Montana Land Use Planning Act Compliance

The Montana Land Use Planning Act (MLUPA) places many requirements on this plan, known as a Future Land Use Plan, and the Future Land Use Map (FLUM) it creates. Details of all aspects of this plan's MLUPA compliance are provided in Chapter 7. Aspects of the FLUM's compliance with MLUPA which have not already been addressed in this chapter are provided here.

Population Projections

Montana Code Annotated (MCA) Section 76-25-213 (4) requires that the FLUM identify the following:

(c) geographic distribution of future land uses in the jurisdiction, anticipated over a 20-year planning period that specifically demonstrate:

i) adequate land to support the projected population in all land use types in areas where local services can be adequately and cost-effectively provided for that population;

Historically, public investment in utility and transportation facilities combined with ample supply of developable land has driven rapid population growth in West Billings as compared to other areas of Yellowstone County. From 2000 to 2020, a total of 4,490 housing units were constructed in the plan area. This accounts for approximately 30 percent of all housing units constructed within Yellowstone County during that period. Population projections for this plan assumed that the West Billings plan area would continue to receive a similar share of county population growth over the next 20 years.

Consistent with the Montana Land Use Planning Act, population projections were estimated over the next 20 years (2045) based on data resources including the Billings Long Range Transportation Plan (LRTP), the US Census, and the Montana Department of Commerce Regional Economic Models Inc (REMI). For consistency among planning documents, data from the LRTP was used to create projections within the West Billings plan area. Below are the growth projections for the plan area.

Commercial Land Use Demand Projection

In order to meet the project guiding principles informed by the project's public input, the project team included varying scales of commercial zones in several future land use categories. Categories that allow commercial zones include; Urban Residential (UR), Urban Residential Mixed (URM), Urban Node (UN), Commercial Mixed (CM), and Employment and Industrial (EI).

The most current available data from Yellowstone County indicates that 760 acres within the plan area are under commercial use. Applying a compound annual growth rate similar to the plan area's projected population growth yields a projected demand of 1,400 acres. The FLUM provides 4,076 acres of future land use categories that allow commercial use.

Residential Land Use Demand Projection

Montana Code Annotated (MCA) Section 76-25-213 (4)(c) requires that the FLUM identify the following:

(ii) adequate sites to accommodate the type and supply of housing needed for the projected population; and

After performing an analysis of existing housing stock including factors like year built and residential density the project team cross referenced the plan area's population growth projections, as shown in Table 4.1 below, average houshold size, and percent of Yellowstone County residents who experience housing burden to determine the 20-year projected housing demand and percent of that projected demand which will need to be affordable to Billings area residents.

Because 29% of Yellowstone County residents experience housing burden, the project team determined that, to meet the above MLUPA requirement, 29% of the projected housing demand should be met by providing land in the FLUM categorized to provide "missing middle" housing, which tends to be more affordable than lower-density, typically single-family zones or higher-density apartment buildings. FLUM categories considered likely to provide missing middle housing include Urban Residential (UR) and Urban Residential Mixed (URM). To determine the area required to meet projected residential land use demand, the project team analyzed existing development in the plan area according to their zoning and the resulting residential density.

Population Projections				
	2000	**2021**	**2045 Projected**	**2020-2045 Change**
Study Area	**6,226**	**16,182**	**30,770**	**14,588**
MPO Planning Area	112092	142,358	190,986	48,628
Housing Needs				
	2000	**2021**	**2045 Projected**	**2020-2045 Change**
Study Area	**2,155**	**6,644**	**13,444**	**6,800**
MPO Planning Area		58,815	78,814	20,000
*Assumes a 30% capture rate of population growth and new housing units				

Table 4.1 Population Projections

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CHAPTER FIVE
MULTIMODAL PLAN UPDATE

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Introduction

The Billings Metropolitan Planning Organization (MPO) is responsible for coordinating federally required transportation planning for the urbanized area of Billings, ensuring that roadway, transit, bicycle, and pedestrian needs are addressed through a cooperative, continuing, and comprehensive planning process. As part of this effort, understanding growth trends and their effects on the transportation network is essential.

Billings is the largest municipality in Montana, with a 2024 population estimate of 121,483 according to the U.S. Census Bureau. The Billings MPO 2023 Long Range Transportation Plan (LRTP) projected that West Billings alone could grow by more than 13,000 residents by 2045. This area includes property within the city limits and outside the city limits. The updated Future Land Use Map (FLUM), discussed in previous chapters, illustrates how this growth is anticipated to occur.

As West Billings expands, traffic volumes will increase and demand for pedestrian and bicycle facilities will intensify. These changes will directly affect the safety and operation of vehicular, bicycle, and pedestrian systems throughout the area.

This chapter provides an update to the 2016 West End Multi-Modal Plan and offers multimodal transportation recommendations to support the safety, efficiency, and overall functionality of the West Billings transportation network.

This will include:

1. Analysis of existing vehicle and active transportation conditions within the study area;
2. Estimated future trip generation for West Billings based on projected growth and the updated FLUM;
3. A review of planned and committed transportation projects within the study area;
4. Identification of future deficiencies in vehicular and active transportation facilities based on the anticipated buildout of the area;
5. Evaluation of potential mitigation strategies to address these deficiencies; and
6. Recommendations to the City of Billings and Yellowstone County to resolve identified issues.

Existing Conditions

While the primary purpose of this study is to identify and prioritize potential project needs over a 20-year horizon, evaluating existing conditions is essential to establish a clear baseline for understanding future growth and demand. The following sections summarize Sanbell's assessment of current operational and safety conditions for all modes of travel.

Streets & Intersections

The following paragraphs present background information on the major streets and intersections within the study area. These descriptions include physical characteristics, speed limits, traffic control features, and roadway classifications, all of which help explain traffic demand and the composition of traffic using these facilities.

Streets

A series of streets transects this area of Billings and Yellowstone County, generally laid out on a standard north-south-east-west grid. Those streets have a variety of roles, typically defined by their Functional Classifications, 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 regional mobility. Collectors typically fall somewhere in the middle, aiming at a 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 streets and highways in the urbanized area of Yellowstone County. The Montana Department of Transportation (MDT) uses the categories of Interstate Principal Arterial, Other Principal Arterial, Minor Arterial, Major Collector, Minor Collector, Local, and Alley to classify roadways. Table 5.1 lists all non-local streets within the study area, with functional classifications provided based on both systems where applicable.

Yellowstone County Ordinance 07-107 establishes restrictions on truck traffic along designated County roads. The ordinance prohibits trucks—defined as vehicles with a combined gross vehicle weight of 16,000 pounds or more—from using restricted roads except when making local deliveries. Businesses located on restricted roads must route trucks along the shortest path to an unrestricted roadway. Within the West Billings Neighborhood Plan study area, most arterial streets are restricted, with the exceptions of Rimrock Road, Grand Avenue, King Avenue West, 56th Street West, and a portion of 64th St. W. Table 5.1 identifies these restrictions for each roadway.

With respect to the physical environment, roadway width (including lane and shoulder widths) and vehicle speeds are the two most significant factors influencing multimodal mobility in the study area. The Project Team inventoried these characteristics, and the results are summarized in Table 5.1. As shown, most street segments within the study area have posted speed limits of 45 mph or higher. When paired with narrow travel lanes and shoulders, these higher speeds create conditions that are generally uninviting—and often uncomfortable—for pedestrians and bicyclists.

Table 5.1: Study Area Arterial and Collector Street Characteristics

Street	Functional Classification		Truck Traffic Restriction	Typical Street Widths (ft)		Speed Limit (mph)
	MPO	MDT		Travel Lanes	Shoulders	
Rimrock Road	Principal Arterial/Collector[1]	Minor Arterial/Local[2]	Unrestricted	11.0 - 11.5	0.5 - 2.5	55 / 45[8]
Grand Avenue	Principal Arterial	Minor Collector/Major Collector[3]	Unrestricted	11.0 - 12.0	1.0 - 7.0	50 / 45 / 35[9]
Central Avenue	Principal Arterial	Minor Collector/Major Collector[4]	Restricted	11.0	0.5 - 1.0	50 / 45[10]
King Avenue	Principal Arterial	Major Collector	Unrestricted	11.5 - 12.0	0.5 - 1.0	60
Hesper Road	Principal Arterial	Local	Restricted	11.0	0.5 - 1.0	50 / 45 / 35 / 15[11]
Neibauer Road	Principal Arterial	Minor Collector/Major Collector[5]	Restricted	10.5 - 11.5	0.5 - 1.0	50 / 45[12]
64th Street West	Principal Arterial	Minor Collector/Local[6]	Unrestricted/Restricted[7]	10.5 - 11.0	1.0 - 2.5	50 / 35 / 15[13]
62nd Street West	Principal Arterial	Major Collector	Restricted	10.5 - 11.0	0.5 - 1.0	45
56th Street West	Principal Arterial	Minor Collector	Unrestricted	11.0	0.5 - 1.0	35 / 50[13]
54th Street West	Minor Arterial	Local	Unrestricted	11.0	0.5 - 1.0	45
48th Street West	Principal Arterial	Local	Restricted	10.0 - 11.0	0.5 - 1.0	35 / 45 / 50[14]
46th Street West	Collector	Local	Unrestricted	18.0	0.5 - 1.0	30

[1] Principal Arterial - 46th Street West to 62nd Street West / Collector - 62nd Street West to 70th Street West

[2] Minor Arterial - 46th Street West to 62nd Street West / Local - 62nd Street West to 70th Street West

[3] Major Collector - 48th Street West to 62nd Street West / Minor Collector - 62nd Street West to 64th Street West

[4] Major Collector - 48th Street West to 32nd Street West / Minor Collector - 32nd Street West to 64th Street West

[5] Major Collector - Autumn Lane to 48th Street West / Minor Collector - 48th Street West to 56th Street West

[6] Minor Collector - Grand Avenue to King Avenue / Local - King Avenue to Neibauer Road

[7] Unrestricted - Grand Avenue to King Avenue / Restricted - King Avenue to Neibauer Road

[8] 55 mph - 70th Street West to 54th Street West / 45 mph - 54th Street West to 46th Street West

[9] 50 mph - west of 64th Street West / 45 mph - 64th Street West to Widerness Drive / 35 mph - Wilderness Drive to 48th Street West

[10] 50 mph - west of 48th Street West / 45 mph - east of 48th Street West

[11] 50 mph - west of South 68th Street West and from Arthur Avenue to 48th Street West / 45 mph - east of 48th Street West / 35 mph - from South 59th Street West to Arthur Avenue and from Cherry Birch Lane to South 68th Street West/ 15 mph from Arthur Avenue to Cherry Birch Lane

[12] 50 mph - 56th Street West to 48th Street West / 45 mph - 48th Street West to Autumn Lane

[13] 50 mph - south of Peace Pipe Drive and North of Amen Corner Lane / 35 mph - Peace Pipe Drive to Hesper Road and from Eler Grove School north parking lot acces to Amen Corner Lane / 15 mph - from Hesper Road to Eler Grove School north parking lot acces

[14] 35 mph - Grand Avenue to Broadwater Avenue / 50 mph - Broadwater Avenue to Neibauer Road

[15] 35 mph - Grand Avenue to Broadwater Avenue / 45 mph - Broadwater Avenue to Central Avenue / 50 mph - Central Avenue to Neibauer Road

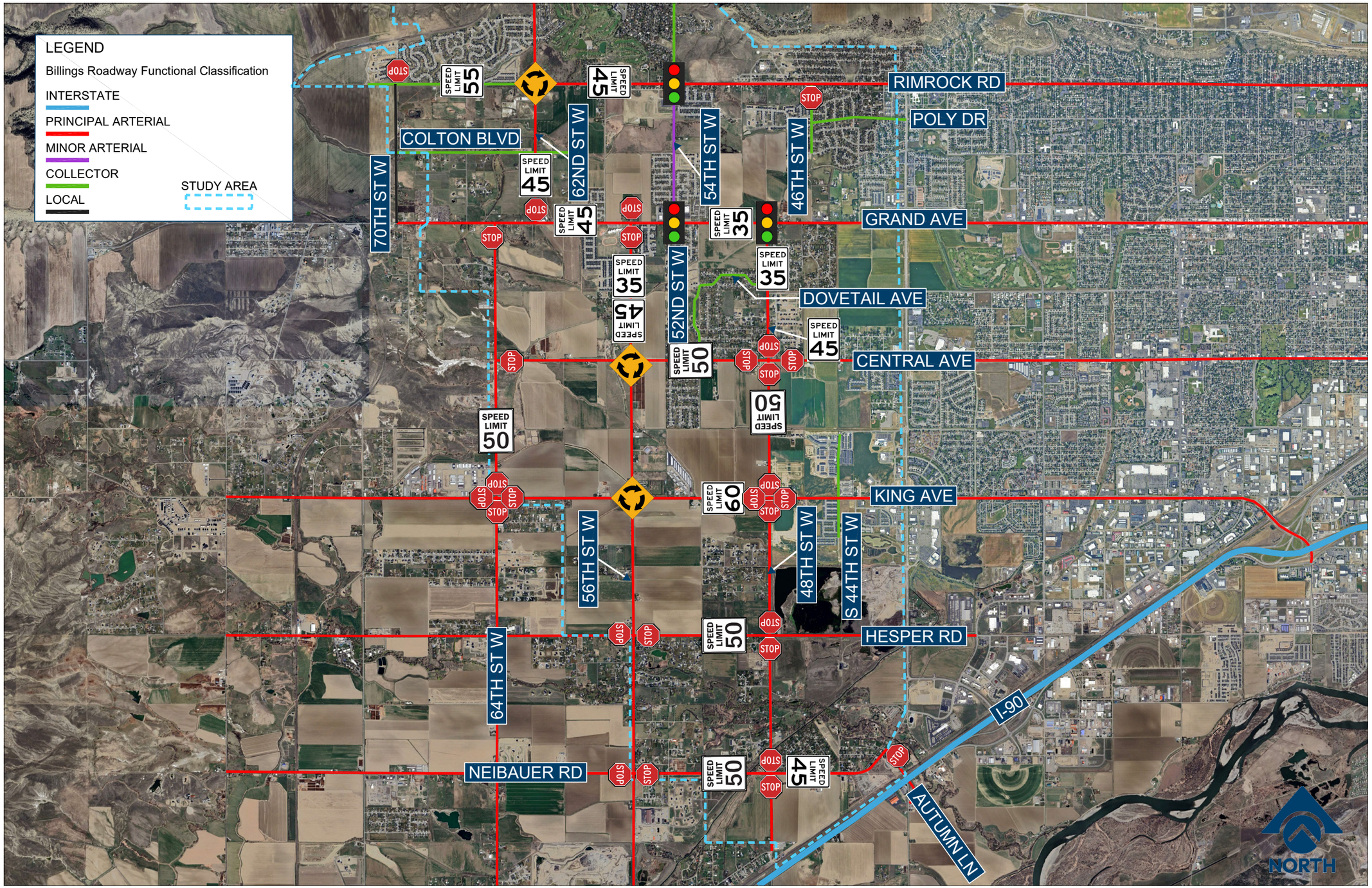

Figure 5.1 Streets and Intersection Characteristics

Figure 5.1 illustrates the City of Billings (MPO) street classifications, posted speed limits on study-area roadways, and the traffic control present at each study intersection.

Intersections

Twenty intersections within the study area were identified as key locations based on existing or anticipated traffic demand. These intersections are shown in Figure 5.2. The intersections in this review include:

- Central Avenue/56th Street West
- King Avenue West/56th Street West, and Rimrock Road/62nd Street West intersections currently operate as single-lane roundabouts
- Rimrock Road/54th Street West, Grand Avenue/54th Street West, and Grand Avenue/48th Street West intersections are signalized
- Central Avenue/48th Street West, King Avenue West/64th Street West, and King Avenue West/48th Street West intersections are controlled by all-way stop signs

The remaining study-area intersections are two-way stop-controlled, with several locations supplemented by overhead flashing beacons to alert high-speed drivers to approaching stop signs (red beacons) or to side-street stop control (amber beacons). Seasonal agricultural crop growth also limits sight distance at several intersections during certain times of the year.

Safety & Traffic

A comprehensive evaluation of existing traffic and safety conditions was completed to establish a baseline for analyzing future operating scenarios. This effort included reviewing historical traffic data from MDT and collecting new peak-hour turning-movement counts at key intersections.

Safety

The 2016 West End Multi-Modal Planning Study, completed by Sanderson Stewart and Fehr & Peers, identified seven intersections within the current study area that exhibited safety concerns at the time, based on intersections that had a crash rate greater than 1.0 crashes per million vehicles entering (MVE). These intersections included:

- Rimrock Road & 62nd Street West (excluding crashes occurring on the Molt Road curve)
- 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 these seven locations, only two have not yet been improved or are not currently planned for near-term improvements . Safety at the Central Avenue/48th Street West intersection was enhanced by converting it to all-way stop control, and the intersection is now in design for a traffic signal and turn-lane project scheduled for construction in spring 2026. Single-lane roundabouts have been installed at Central Avenue/56th Street West, King Avenue/56th Street West, and Rimrock Road/62nd Street West. A single-lane roundabout has also been designed for the Hesper Road/56th Street West intersection but would require further right-of-way acquisition for construction.

The study further noted that the Neibauer Road/56th Street West and Neibauer Road/48th Street West intersections had some of the highest crash and severity rates. In this context, the severity index represents the weighted average of crash severity—accounting for fatal, injury, and property-damage-only crashes—while the severity rate is calculated by multiplying the crash rate by the severity index.

Updated crash data was obtained from MDT for the five-year period from 2020 through 2024 and crash rates were compared to the 2016 study. The new rates are shown in Table 5.2. The results show that several of the high crash rate locations noted above have seen reductions, likely due to the safety improvements described previously. Some of the above intersections have maintained crash rates greater than 1.0 crashes per MVE due to lack of improvements, and some new intersections are experiencing high crash rates that did not previously. The crash rate calculated at the Rimrock Road/62nd Street West intersection remains high, but the data does not reflect the impact of the recently completed roundabout.

Intersections with higher than 1.0 crashes/MVE in 2020 through 2024 include the following:

- Rimrock Road & 62nd Street West (excluding crashes occurring on the Molt Road curve)
- Hesper Road & 56th Street West
- Neibauer Road & 48th Street West
- Neibauer Road & 56th Street West
- Grand Avenue & 62nd Street West
- Central Avenue & 64th Street West
- King Avenue & 64th Street West
- King Avenue & 48th Street West
- Hesper Road & 48th Street West

The King Avenue/64th Street West intersection experienced the highest total number of crashes over the five-year period (30) and a crash rate of 2.00 crashes/MVE. Two-thirds of crashes resulted in injury at this intersection. A single lane roundabout is currently planned and is projected to improve safety by addressing both the high volume and high severity of crashes.

The Neibauer Road/56th Street West intersection experienced the third-highest crash total (22) and the highest crash rate by far, at 3.58 crashes/MVE. Approximately 36 percent of all reported crashes resulted in injury at this intersection. There are currently no improvements planned for this intersection, or the intersections of Neibauer Road/48th Street West, Hesper Road/48th Street West, Central

Table 5.2 Crash History - Frequency and Severity

Intersection	2020-2024 DEV[1]	Reported Crashes[2]	Crash Type			Crash Data[3]		
			PDO	Injury	Fatality	Average Crash Frequency (Crash/Yr)	Crash Rate (Crash/MVE)	Severity Index
Rimrock Rd & 70th St W	893	1	1	0	0	0.20	0.61	1.00
Rimrock Rd & 62nd St W	3459	14	10	4	0	2.80	2.22	1.57
Rimrock Rd & 54th St W	11985	10	7	3	0	2.00	0.46	1.60
Rimrock Rd & 46th St W	10430	2	1	1	0	0.40	0.11	2.00
Grand Ave & 64th St W	5836	5	4	1	0	1.00	0.47	1.40
Grand Ave & 62nd St W	5699	12	8	4	0	2.40	1.15	1.67
Grand Ave & 56th St W	8875	6	4	2	0	1.20	0.37	1.67
Grand Ave & 54th St W	9675	6	3	2	1	1.20	0.34	2.83
Grand Ave & 48th St W	13654	18	16	2	0	3.60	0.72	1.22
Central Ave & 64th St W	4372	10	6	4	0	2.00	1.25	1.80
Central Ave & 56th St W	4643	4	4	0	0	0.80	0.47	1.00
Central Ave & 48th St W	9603	9	8	1	0	1.80	0.51	1.22
King Ave & 64th St W	8208	30	10	20	0	6.00	2.00	2.33
King Ave & 56th St W	10466	14	9	4	1	2.80	0.73	2.07
King Ave & 48th St W	11649	26	16	10	0	5.20	1.22	1.77
Hesper Rd & 56th St W	5138	19	11	7	0	3.80	2.03	1.78
Hesper Rd & 48th St W	4550	14	9	5	0	2.80	1.69	1.71
Neibauer Rd & 56th St W	3370	22	14	8	0	4.40	3.58	1.73
Neibauer Rd & 48th St W	3410	11	7	4	0	2.20	1.77	1.73
Neibauer Rd & Shiloh Rd	4720	6	2	4	0	1.20	0.70	2.33

[1] Daily Entering Volume (DEV) estimated from 2024 peak hour counts and 2020-2024 MDT published ADTs

[2] Crashes reported from January 1, 2020 to December 31, 2024

[3] Crash rates expressed as crashes per million vehicles entering (MVE)

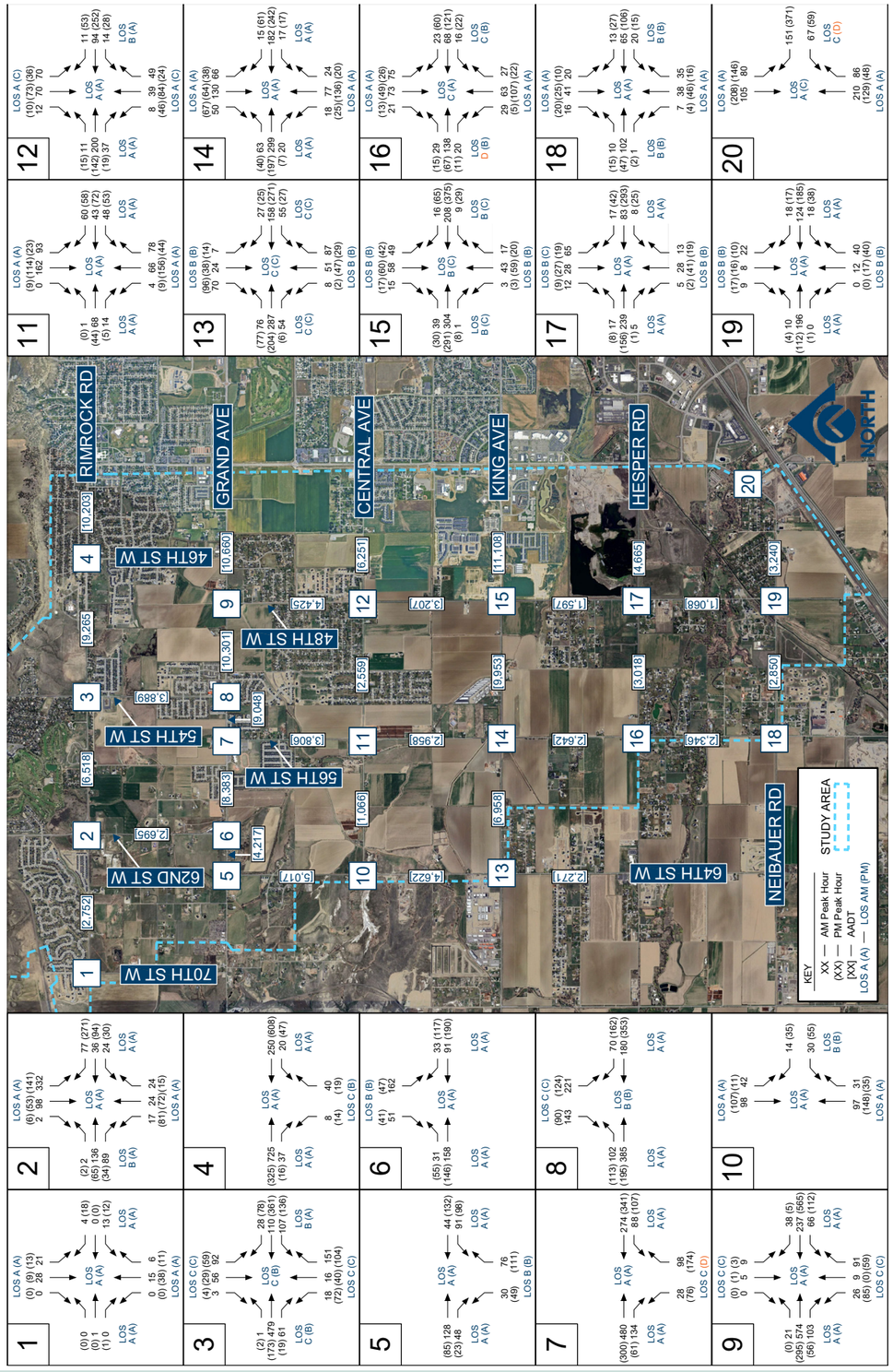

Figure 5.2: Existing Conditions (2024) Traffic Volumes

Avenue/64th Street West, or Grand Avenue/62nd Street West.

The remaining intersections on the above high crash rate list are all planned to have roundabouts or signals installed. For intersections without planned improvements, all-way stop-control should be considered where practical to reduce crash risk and severity.

It should also be noted that while the Neibauer Road/Shiloh Road intersection did not have an elevated crash rate, two-thirds of crashes at this intersection resulted in injury. The intersection's configuration is abnormal, with stop-control on the northbound approach, and free-flowing traffic for southbound and northwestbound vehicles, as well as a skew. Conversion to all-way stop-control may reduce driver confusion and provide a safer condition at this intersection. This could be paired with a reduction in the turning radius for the northwestbound right turns.

Traffic Volumes

Sanbell collected AM and PM peak-hour turning-movement counts at seven major intersections in May, August, and September 2023, and at 13 additional major intersections in January and February 2024. This data was used to support the existing-conditions traffic analysis and to calibrate the traffic model. Peak periods generally occurred from 7:15–8:15 a.m. and 4:45–5:45 p.m. Seasonal adjustment factors provided by the City of Billings were applied to the raw counts. Figure 5.2 summarizes the resulting peak-hour turning-movement volumes, with full count details provided in Appendix C.

Average Daily Traffic (ADT) volumes were compiled for key roadway segments using data collected by Sanbell and data provided by MDT. In total, 32 roadway segments were evaluated—18 with new data collected by the Project Team and the remainder from MDT. Using these datasets and a K-factor approach (represents the proportion of the Average Annual Daily Traffic [AADT] this is expected to occur during the peak hour), Sanbell estimated the AADT volumes for the study-area corridors. In addition to the previously mentioned turning-movement volumes, Figure 5.2 also presents the AADT estimates for the 2024 Existing Conditions scenario. The MPO's raw traffic count data are included in Appendix C.

Pedestrian Traffic Volumes

For the purposes of this analysis, bicycle volumes are included within the total pedestrian counts.

The highest pedestrian activity occurred during the May 2023 traffic count at the Grand Avenue/56th Street West intersection adjacent to Ben Steele Middle School. During the AM peak hour, 62 pedestrians were recorded crossing the south leg of 56th Street West, with more than 90% traveling toward the school. A second peak occurred between 2:30 and 3:30 PM, when 41 pedestrians crossed the same approach, this time with most traveling away from the school. Pedestrian activity at all other intersections within the study area was minimal.

Intersection Traffic Operations

Sanbell conducted AM and PM peak-hour intersection capacity analyses for the major intersections in the study area using Synchro (Version 12), which applies methodologies from the Highway Capacity Manual, 7th Edition (Transportation Research Board, 2022). Level of service (LOS) is a qualitative measure of intersection performance that reflects operational conditions such as speed, travel time, freedom of movement, delay, and overall comfort and convenience. LOS ranges from A, representing free-flowing operations with minimal delay, to F, representing severe congestion and high delay.

The purpose of this analysis was to establish a baseline for existing (2024) operating conditions and to identify intersections that are currently experiencing—or are nearing—capacity deficiencies during peak periods. Table 5.5 presents the results of the Existing Conditions (2024) intersection capacity evaluation .

The City of Billings and the Montana Department of Transportation generally use Level of Service (LOS) C as the minimum acceptable standard for existing intersection operations. The 2024 Existing Conditions analysis indicates that the 56th Street West/Hesper Road intersection and the Autumn Lane/Neibauer Road/Shiloh Road intersection operate below this threshold, with at least one approach functioning at LOS D during the AM or PM peak periods. Projected maximum queue lengths at all study-area intersection approaches were moderate to negligible, including those operating below the LOS standard. A detailed capacity summary table and the full set of capacity calculation worksheets for the 2024 Existing Conditions scenario are provided in Appendix D.

Corridor Traffic Operations

In addition to the peak-hour intersection analysis, Sanbell evaluated daily corridor LOS to assess overall capacity constraints and identify whether road widening or other improvements may be needed. This analysis used the Existing Conditions (2024) AADT volumes shown in Figure 5.2.

Planning-level corridor LOS was estimated by comparing Existing Conditions (2024) AADT volumes to assumed capacity values (noted in Table 5.3) to develop volume-to-capacity (V/C) ratios. Table 5.4 summarizes LOS categories and associated traffic conditions. In coordination with the City of Billings, LOS D was identified as the minimum acceptable threshold for corridor operations in both the West End Multi-Modal Planning Study and this study. Table 5.3 presents typical LOS thresholds by functional classification based on V/C ratios. Figure 5.3 shows the resulting LOS for the Existing Conditions (2024) scenario. Most corridors currently operate at LOS C or better; however, Grand Avenue and King Avenue West east of 48th Street West operate at LOS D. The color-coding used in Figure 5.3 aligns with Tables 5.3 and 5.4.

Table 5.3: 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 - 9,000)	Total Daily Volume			
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
5-Lane	21,920	28,350	34,780	≥37,800
Minor Arterial (Daily Capacity Per Lane - 7,000)	Total Daily Volume			
2-Lane	8,120	10,500	12,880	≥14,000
3-Lane	8,930	11,550	14,170	≥15,400
4-Lane	16,240	21,000	25,760	≥28,000
5-Lane	17,050	22,050	27,050	≥29,400
Collector (Daily Capacity Per Lane - 6,000)	Total Daily Volume			
2-Lane	6,960	9,000	11,040	≥12,000
3-Lane	7,660	9,900	12,140	≥13,200
4-Lane	13,920	18,000	22,080	≥24,000
5-Lane	14,620	18,900	23,180	≥25,200

Table 5.4: 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 5.5: Existing Conditions (2024) Intersection Capacity Calculation Results

Intersection	Approach	Existing (2024) 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		*One-Way Stop-Control (NB)*					
70th Street West & Rimrock Road	WB	0.0	A	0	0.0	A	0
	NB	0.0	A	0	0.0	A	0
	SB	8.8	A	1	8.9	A	1
	Intersection	6.8	A	--	2.5	A	--
Intersection Control		*Roundabout*					
62nd Street West & Rimrock Road	EB	10.6	B	2	4.3	A	1
	WB	4.5	A	1	6.5	A	2
	NB	7.9	A	1	4.9	A	1
	SB	9.5	A	5	4.9	A	1
	Intersection	8.8	A	--	5.5	A	--
Intersection Control		*Signalized*					
54th Street West & Rimrock Road	EB	22.7	C	16	10.8	B	4
	WB	12.3	B	3	9.1	A	8
	NB	31.1	C	2	33.0	C	4
	SB	35.3	D	5	34.8	C	3
	Intersection	23.7	C	--	16.6	B	--
Intersection Control		*One-Way Stop-Control (NB)*					
46th Street West & Rimrock Road	EB	0.0	A	0	0.0	A	0
	WB	0.7	A	1	0.6	A	1
	NB	16.7	C	1	13.3	B	1
	Intersection	0.9	A	--	0.8	A	--
Intersection Control		*One-Way Stop-Control (NB)*					
64th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	5.3	A	1	3.3	A	1
	NB	10.8	B	1	11.0	B	1
	Intersection	4.6	A	--	4.8	A	--
Intersection Control		*One-Way Stop-Control (SB)*					
62nd Street West & Grand Avenue	EB	1.2	A	1	2.2	A	1
	WB	0.0	A	0	0.0	A	0
	SB	14.6	B	3	13.5	B	1
	Intersection	6.9	A	--	3.0	A	--
Intersection Control		*Two-Way Stop-Control (NB/SB)*					
56th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	2.5	A	1	2.0	A	1
	NB	24.3	C	2	19.1	C	2
	SB	0.0	A	0	0.0	A	0
	Intersection	4.0	A	--	5.0	A	--

Intersection	Approach	Existing (2024) 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		*Signalized*					
54th Street West & Grand Avenue	EB	7.3	A	8	4.0	A	3
	WB	8.6	A	6	7.6	A	9
	SB	32.9	C	9	32.9	C	5
	Intersection	15.2	B	--	11.1	B	--
Intersection Control		*Signalized*					
48th Street West & Grand Avenue	EB	6.5	A	9	3.9	A	5
	WB	6.3	A	4	8.9	A	15
	NB	30.6	C	2	28.5	C	3
	SB	26.4	C	1	25.8	C	1
	Intersection	9.0	A	--	9.7	A	--
Intersection Control		*One-Way Stop-Control (WB)*					
64th Street West & Central Avenue	WB	10.6	B	1	10.9	B	1
	NB	0.0	A	0	0.0	A	0
	SB	2.3	A	1	0.7	A	0
	Intersection	2.5	A	--	2.3	A	--
Intersection Control		*Roundabout*					
56th Street West & Central Avenue	EB	5.0	A	1	4.2	A	1
	WB	4.8	A	1	5.1	A	1
	NB	4.7	A	1	4.7	A	1
	SB	6.1	A	2	4.6	A	1
	Intersection	5.4	A	--	4.7	A	--
Intersection Control		*All-Way Stop-Control*					
48th Street West & Central Avenue	EB	10.1	B	2	10.5	B	2
	WB	8.9	A	1	13.1	B	3
	NB	9.0	A	1	11.3	B	2
	SB	9.5	A	1	10.3	B	1
	Intersection	9.5	A	--	11.7	B	--
Intersection Control		*All-Way Stop-Control*					
64th Street West & King Avenue	EB	24.8	C	8	15.6	C	4
	WB	16.5	C	4	23.4	C	8
	NB	12.6	B	2	11.2	B	1
	SB	11.5	B	1	11.4	B	1
	Intersection	18.8	C	--	18.3	C	--
Intersection Control		*Roundabout*					
56th Street West & King Avenue	EB	8.7	A	3	5.2	A	2
	WB	5.7	A	2	6.7	A	2
	NB	6.8	A	1	5.9	A	2
	SB	6.6	A	2	5.4	A	1

Intersection	Approach	Existing (2024) 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		*All-Way Stop-Control*					
48th Street West & King Avenue	EB	15.0	B	4	15.6	C	4
	WB	11.6	B	2	23.4	C	8
	NB	10.3	B	1	11.2	B	1
	SB	11.1	B	2	11.4	B	1
	Intersection	12.9	B	--	18.3	C	--
Intersection Control		*Two-Way Stop-Control (NB/SB)*					
56th Street West & Hesper Road	EB	27.8	D	5	13.6	B	1
	WB	18.9	C	2	14.7	B	2
	NB	1.8	A	1	0.3	A	0
	SB	3.4	A	1	2.3	A	1
	Intersection	15.6	C	--	8.4	A	--
Intersection Control		*Two-Way Stop-Control (NB/SB)*					
48th Street West & Hesper Road	EB	0.5	A	0	0.4	A	0
	WB	0.6	A	0	0.5	A	1
	NB	12.3	B	1	14.2	B	1
	SB	14.9	B	2	16.7	C	1
	Intersection	4.9	A	--	3.4	A	--
Intersection Control		*Two-Way Stop-Control (NB/SB)*					
56th Street West & Neibauer Road	EB	11.8	B	1	10.7	B	1
	WB	11.6	B	1	11.2	B	1
	NB	0.7	A	0	0.4	A	0
	SB	1.9	A	1	1.8	A	0
	Intersection	7.0	A	--	7.7	A	--
Intersection Control		*Two-Way Stop-Control (NB/SB)*					
48th Street West & Neibauer Road	EB	0.4	A	0	0.3	A	0
	WB	0.9	A	0	1.2	A	1
	NB	10.9	B	1	10.4	B	1
	SB	12.6	B	1	12.2	B	1
	Intersection	2.6	A	--	3.2	A	--
Intersection Control		*One-Way Stop-Control (WB)*					
Autumn Lane & Neibauer Road & Shiloh Road	WB	15.3	C	2	31.3	D	10
	NB	0.0	A	0	0.0	A	0
	SB	3.6	A	1	3.3	A	1
	Intersection	5.5	A	--	17.3	C	--

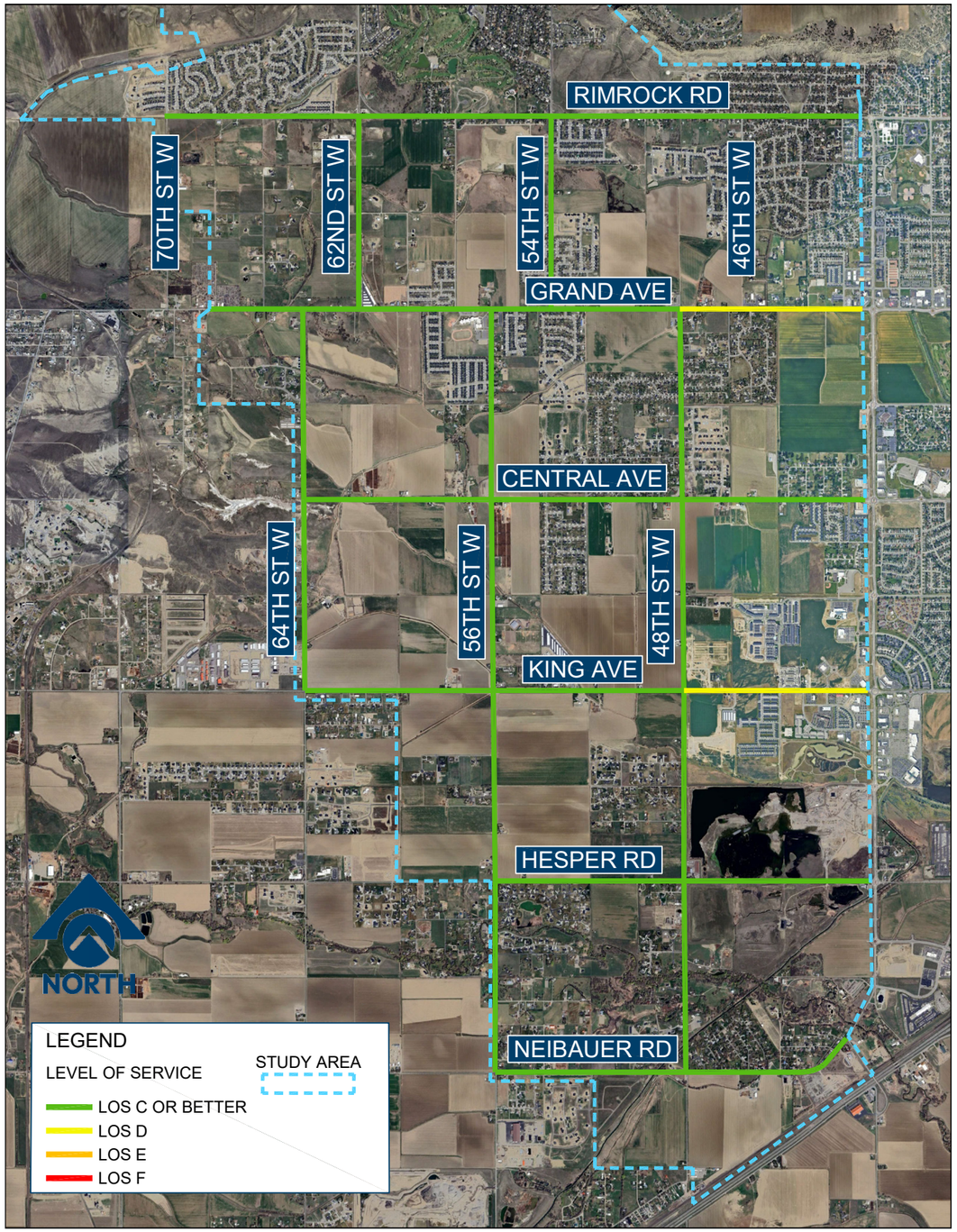

Figure 5.3: Existing Conditions (2024) Corridor Level of Service (LOS)

Active Transportation Facilities

"Active transportation" primarily refers to walking and bicycling, but it also includes other human-powered modes such as skateboards, kick scooters, and rollerblades. These trips provide affordable, healthy options for reaching jobs, schools, shopping areas, and recreational destinations. Just as roadway networks connect places for drivers, active transportation networks link people to their destinations using sidewalks, trails, low-traffic neighborhood streets, side paths, and bike lanes.

Figure 5.5 shows the existing active transportation network within the study area. Outside of sidewalks within developments, there are few sidewalks, side paths, trails, or bike lanes. This limited network is largely due to the area's predominantly undeveloped and agricultural character, especially south of Central Avenue. Just outside the eastern edge of the study boundary, development becomes denser as it nears the Billings urban core, where active transportation facilities are more common. High-quality paths along the eastern edge include the Rimrock Road Trail, Big Ditch Trail, Shiloh Road Trail, King Avenue West Trail, Zimmerman Trail, Gabel Road Trail, and the Olympic & Harvest Subdivision Trails. Monad Road also includes striped bike lanes, and sidewalks are generally present.

Although several low-stress facilities exist nearby, the study area lacks meaningful connections to them. Roads that could provide access are primarily arterials with narrow shoulders and speed limits ranging from 45 to 60 mph. In addition to high speeds, these corridors often include irrigation and borrow ditches, creating steep slopes and leaving little room for active transportation facilities without major reconstruction. Sidewalks and trails within subdivisions are similarly isolated, with limited connectivity to the broader Billings network just east of the study area.

What Type of Bike Rider are You?

For an active transportation system to be effective, it must offer a connected network that serves users with different equipment, comfort levels, and skills. For example, a corridor may include both side paths and bike lanes—allowing experienced riders to travel at higher speeds near traffic while providing children or more cautious users with a separate, more comfortable option. In Billings, on arterial roadways and in some cases, larger collectors, a separated multi-use path is used in lieu of on street bike facilities. However, each roadway is assessed on its own distinction.

A frequently referenced Portland Bureau of Transportation study identifies four general types of cyclists: the Strong and Fearless, the Enthused and Confident, the Interested but Concerned, and the No Way No How groups. Figure 5.4 illustrates the typical distribution of these categories and describes each. These categories help explain how different bikeway types influence a rider's comfort level.

The typology suggests that most potential riders—about 67 percent—fall within the Enthused and Confident or Interested but Concerned groups. This indicates

substantial opportunity to increase cycling by investing in a low-stress bikeway network that feels comfortable for a broader range of users. While the exact percentages in Billings may differ, the framework is useful for understanding which network characteristics can encourage more people to bike.

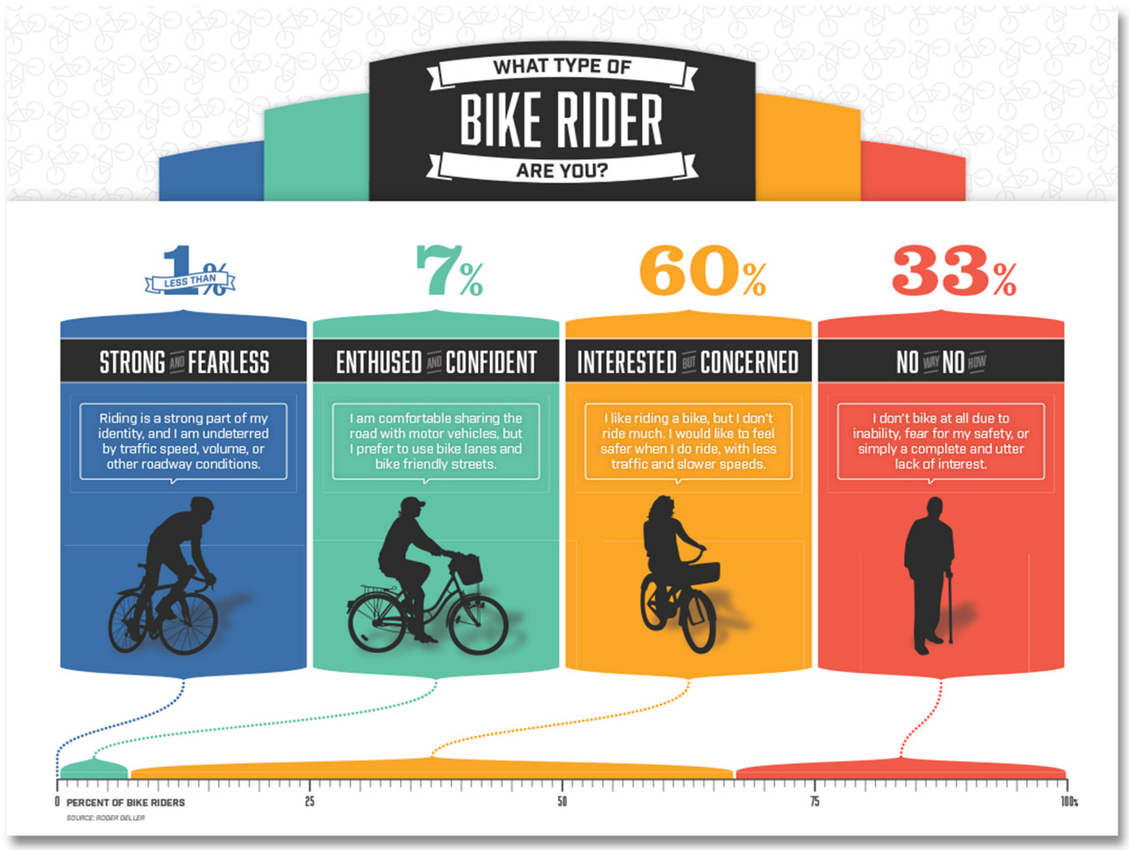

Figure 5.4: Types of Bicycle Riders

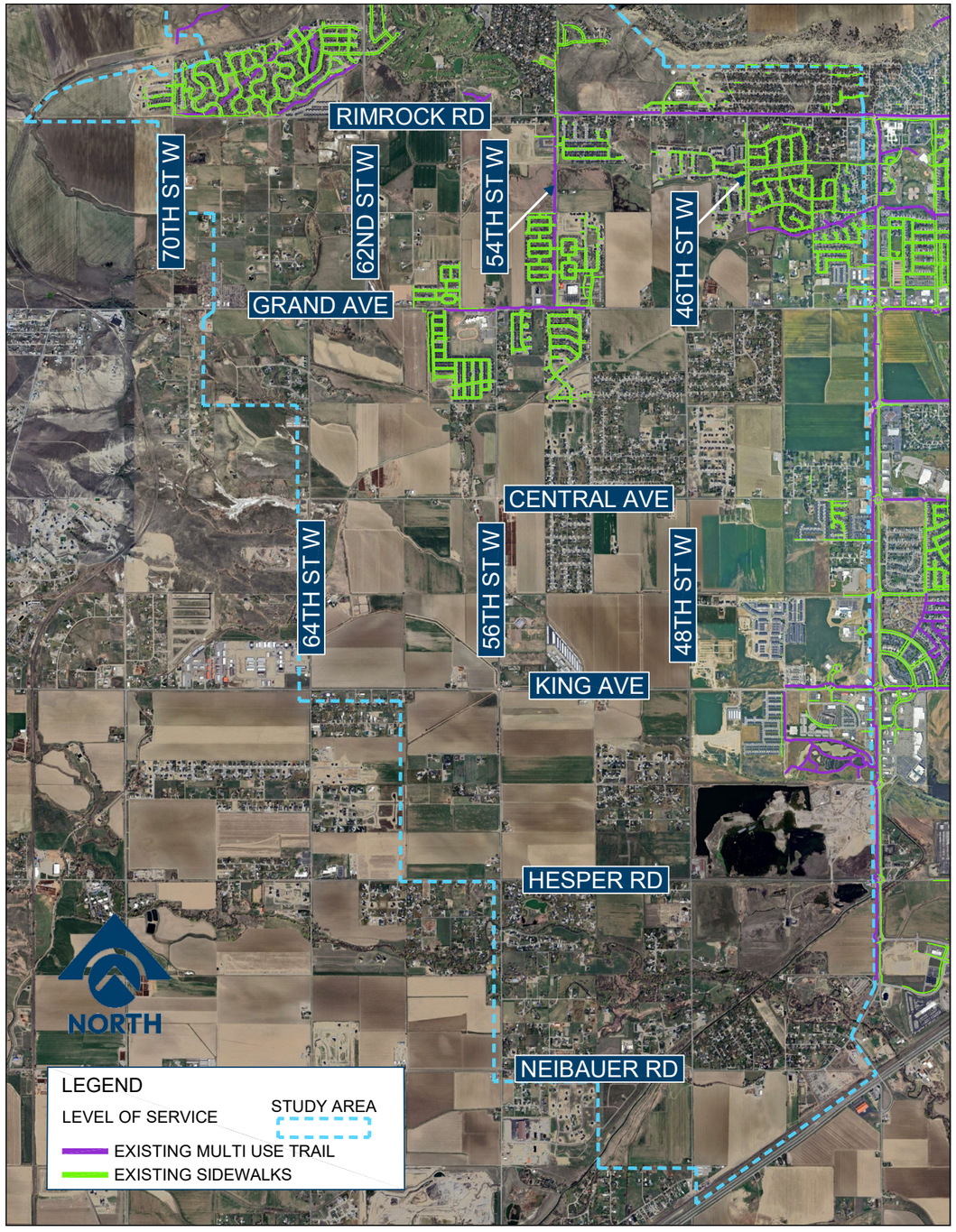

Figure 5.5: Existing Study Area Active Transportation Facilities

Level of Traffic Stress

Level of Traffic Stress (LTS), developed by Mekuria, Furth, and Nixon (2012), is a modern method for evaluating how roadway characteristics influence the stress experienced by bicyclists and, in turn, where they are likely to ride. Under this approach, roadway segments are classified into four stress levels—LTS 1 through LTS 4. Cyclists are grouped based on how much traffic stress they are willing to tolerate in different environments:

- 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 5.6 summarizes the variables used to assign LTS scores to the roadway network. LTS follows a "weakest link" principle, meaning the stress level for a corridor, intersection approach, or crossing is determined by its most stressful segment. As a result, an entire route takes on the score of its highest-stress portion. For example, a cross-town trip may include long stretches of LTS 1 and LTS 2, but a single LTS 3 segment creates a barrier—only riders comfortable with LTS 3 would use the full route.

LTS analysis in this study was limited to minor arterials and arterials because local and collector streets offer limited connectivity, requiring most bicyclists to travel on the arterial network. Figure 5.6 shows the resulting LTS classifications.

The analysis indicates that most arterials in the study area fall into LTS 4. Rimrock Road east of 54th Street West and 54th Street West are rated LTS 3. Grand Avenue between Wilderness Drive and 52nd Street West, and 56th Street West between Grand Avenue and Stockman Avenue, are rated LTS 2. The primary factors contributing to high stress levels are vehicle speeds above 35 mph and the absence of bike lanes or rideable shoulders.

Table 5.6: 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?	Calculated based on land use
Adjacent parking	Field review
Number of lanes in analysis direction	Number of lanes 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 is not available)	Speed limit from Centerline file
Bike Lane + Parking Width (if bike lane is present)	Field review
How oftern do bike lane blockages occur?	Estimate

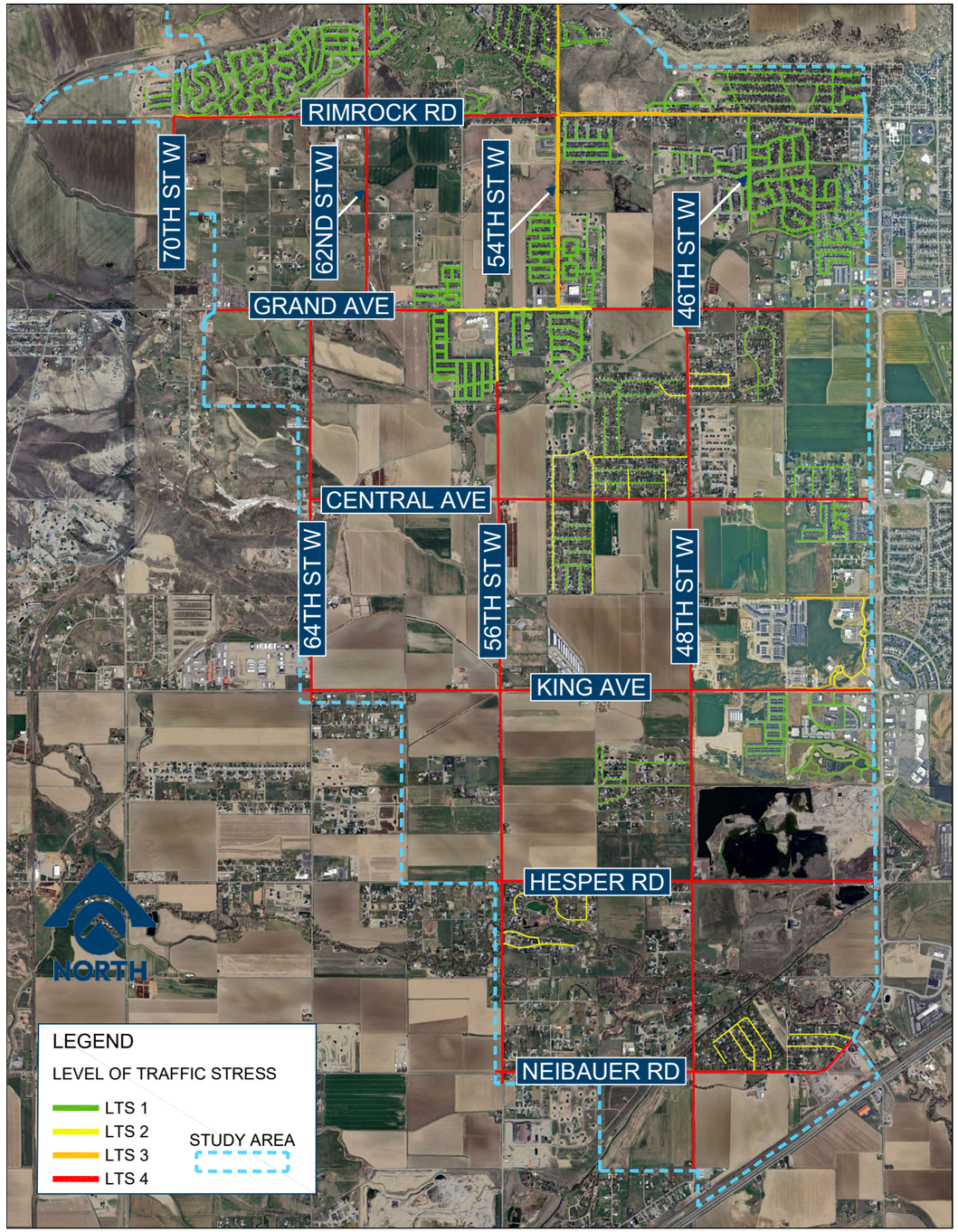

Figure 5.6: Existing Condition (2024) Level of Traffic Stress (LTS)

Land Development Forecasting

The Sanbell team collaborated with the City of Billings to evaluate every parcel in the study area and estimate the probability of future development. After the draft Future Land Use Map (FLUM) was updated to reflect public input, multimodal transportation forecasting began. Trip generation for already developed areas was based on observed traffic counts. For undeveloped areas, traffic volumes were estimated by applying industry-standard trip rates to the projected number of dwelling units and the anticipated commercial square footage for each future land use category.

This process, described in the following section, also incorporated historic development trends, zoning allowances, height and building coverage limits, and dwelling-per-structure standards. In categories permitting both residential and commercial uses, the mix of each was estimated using patterns observed in the plan area and the broader Billings metro region.

Because the FLUM shows substantially more potential development than the plan area's projected population growth is likely to create, a reduction factor was applied to trip-generation estimates (as detailed in the following section). This factor was based on each parcel's designation in the City of Billings Limits of Annexation Map. City/ County Planning staff reviewed and approved all assumptions used to estimate future residential and commercial development within the study area. These assumptions, along with the traffic generation calculation workflow, are provided in Appendix E. Figure 5.7 identifies the undeveloped FLUM parcels.

Trip-generation estimates were developed using the Institute of Transportation Engineers' Trip Generation Manual, 11th Edition—the industry standard for evaluating development impacts. For this study, the land use categories listed below were used to calculate projected trips, and the results are summarized in Table 5.7.

- Land Use 140 – Manufacturing
- Land Use 150 – Warehousing
- Land Use 210 – Single-Family Detached Housing
- Land Use 215 – Single-Family Attached Housing
- Land Use 220 – Multifamily Housing (Low- Rise)
- Land Use 230 – Low-Rise Residential with Ground-Floor Commercial
- Land Use 525 – High School
- Land Use 630 – Clinic
- Land Use 710 – General Office Building
- Land Use 820 – Shopping Center (>150K)
- Land Use 822 – Strip Retail Plaza (<40K)
- Land Use 850 – Supermarket
- Land use 912 – Drive-in Bank

Full buildout of the project area is projected to generate 114,224 gross average weekday

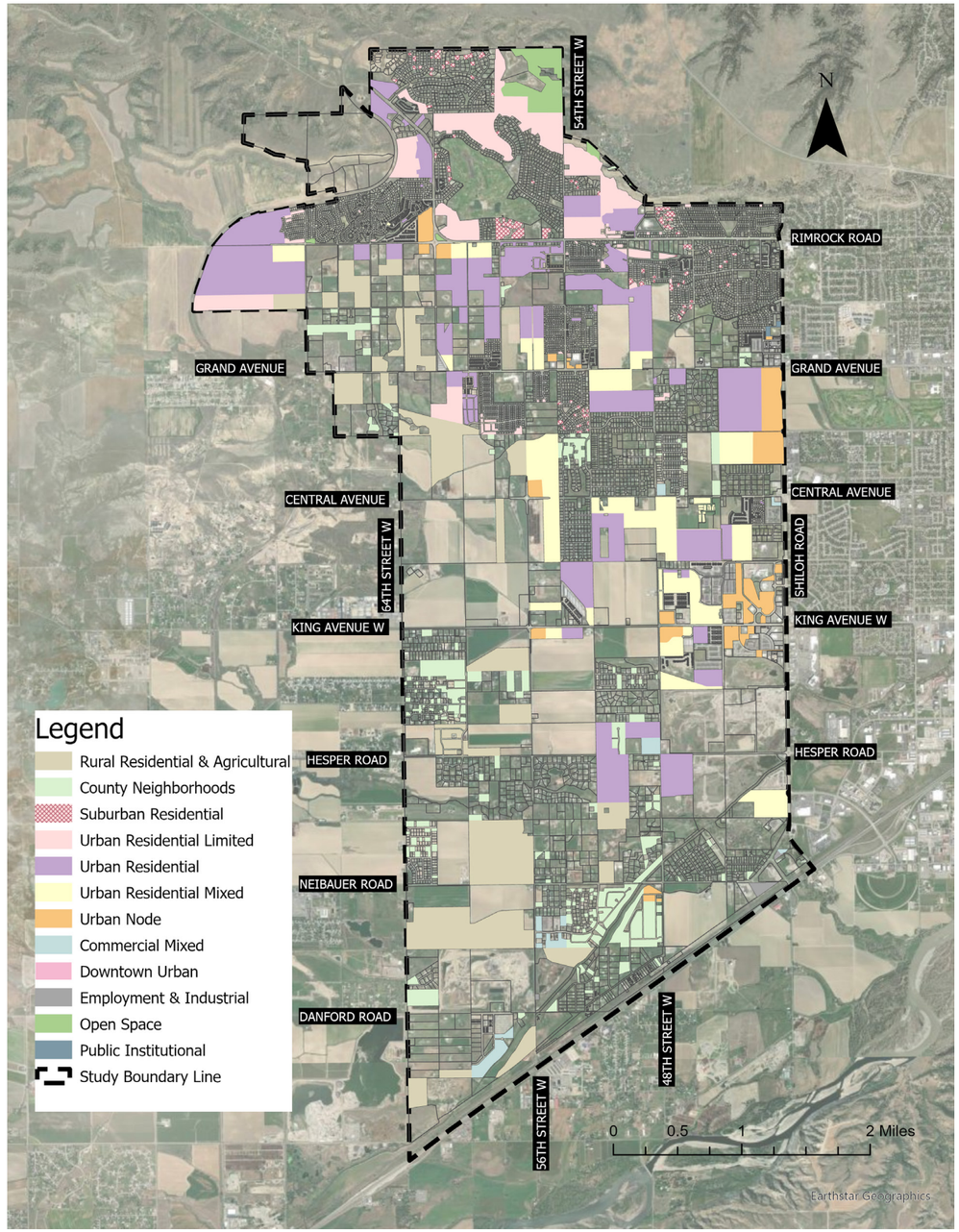

Figure 5.7: FLUM- Undeveloped Parcels

trips, including 7,775 trips (4,122 entering / 3,653 exiting) during the AM peak hour and 11,309 trips (5,543 entering / 5,766 exiting) during the PM peak hour.

Trip-generation estimates reflect the total number of trips associated with future development, but adjustments are needed to determine the number of external vehicle trips. These adjustments account for internal capture trips, pass-by trips, and trips made by alternate modes.

Internal capture (IC) trips occur entirely within the development and therefore do not affect external traffic. They are most common in mixed-use areas. For this study, all trips exchanged within future development areas were treated as internal. The study area is expected to generate 24,228 internal weekday trips, including 533 AM peak-hour trips (269 entering / 264 exiting) and 2,209 PM peak-hour trips (1,104 entering / 1,105 exiting).

Pass-by trips—intermediate stops made along a driver's primary route—were not calculated because these trips are typically associated with commercial sites and are not expected to be significant in this location.

Alternate mode trips (walking, biking, transit) are also expected to be limited due to the size of the study area, although some internal trips near schools may occur by bicycle or on foot. To remain conservative, trip-generation estimates were not reduced for alternate modes. A separate analysis of potential active transportation trips is provided later in this report.

After accounting for internal capture, the study area is projected to generate 89,996 new external weekday trips, including 7,242 AM peak-hour trips (3,853 entering / 3,389 exiting) and 9,100 PM peak-hour trips (4,439 entering / 4,661 exiting)

Growth Projections

Because the Future Land Use Map accommodates more growth than is projected for the plan area, future traffic projections were adjusted down using the methods described in Chapter 3. This resulted in traffic projections that are roughly consistent with the projected population growth rate arrived at in Appendix B, Future Land Use Map Production Methods.

The Billings Metropolitan Planning Organization (MPO) Long Range Transportation Plan (LRTP) assumes an annual traffic growth rate of 1.5%, based on historic trends in the MPO planning area. After coordinating with City staff and comparing the annexation-based results with the LRTP forecast, the project team selected the 3.1% rate for projecting traffic volumes for the Future (2044) scenario.

Committed and Planned Projects

Several projects aimed at improving multimodal operations and safety have been committed through the City, County, and MDT capital improvement programs, or are tentatively planned for the near future. The following paragraphs summarize these committed or planned projects based on

Table 5.7: Trip Generation Summary

Trip-generation estimates were developed using the Institute of Transportation Engineers' Trip Generation Manual, 11th Edition—the industry standard for evaluating development impacts. Each land use category has an average rate of trips per associated with it, and this average rate is used as a multiplier for the number of quantity of each type of unit produced. For example, the average rate of daily trips for single-family detached housing is 9.43. In the RRA zone, the projection is 43 dwelling units. 43 x 9.43=405.49 trips, which is rounded to 405 trips per day. The list of average rates can be viewed in Appendix E.

Land Use	Independent Variable		Average Weekday
	Quantity	Units	total
Rural Residential & Agriculture - RRA			
Single-Family Detached Housing[3]	43	Dwelling Units	405
Internal Capture Trips**			67
Total RRA New External Trips			338
County Neighborhoods - CN			
Single-Family Detached Housing[3]	96	Dwelling Units	905
Internal Capture Trips**			151
Total CN New External Trips			754
Urban Residential Limited - URL			
Single-Family Detached Housing[3]	1103	Dwelling Units	10401
Internal Capture Trips**			1737
Total URL New External Trips			8664
Urban Residential - UR			
Single-Family Attached Housing[4]	196	Dwelling Units	1411
Low-Rise Residential with Ground-Floor Commercial[6]	754	Dwelling Units	2594
Multifamily Housing (Low-Rise)[5]	1781	Dwelling Units	12004
Internal Capture Trips**			2673
Total UR New External Trips			13336
Urban Residential Mixed - URM			
Multifamily Housing (Low-Rise)[5]	1381	Dwelling Units	9308
General Office Building[9]	524	1000 SF GFA	5683
Clinic[8]	72	1000 SF GFA	2724
Strip Retail Plaza (<40K)[11]	454	1000 SF GFA	24743
Internal Capture Trips**			10189
Total URM New External Trips			32269
Urban Node - UN			
Multifamily Housing (Low-Rise)[5]	1561	Dwelling Units	10521
General Office Building[9]	192	1000 SF GFA	2084
Shopping Center (>150K)[10]	382	1000 SF GFA	14154
Clinic[8]	197	1000 SF GFA	7407
Supermarket[12]	38	1000 SF GFA	3536
Drive-in Bank[13]	9	1000 SF GFA	854
Internal Capture Trips**			8989
Total UN New External Trips			29567
Commercial Mixed - CM			
Multifamily Housing (Low-Rise)[5]	31	Dwelling Units	209
Warehousing[2]	118	1000 SF GFA	202
General Office Building[9]	128	1000 SF GFA	1385
Internal Capture Trips**			422
Total CM New External Trips			1374
Employment & Industrial - EI			
Manufacturing[1]	67	1000 SF GFA	318
Total EI New External Trips			318
Public Institution - PI			
High School[7]	1740	Students	3376
Total PI New External Trips			3376
Total Buildout Gross Trips			114224
Total Buildout Internal Capture Trips			24228
Total Buildout New External Trips			89996

current information.

Street and Intersection Projects

The City of Billings has approved three safety-focused projects within the study area:

- Rimrock Road Improvements (62nd St W to Clearview Dr) – Scheduled to begin in 2025, this project will reconstruct Rimrock Road to full arterial and complete streets standards, including new multi-modal facilities along the corridor.
- Grand Avenue Improvements (43rd St W to 62nd St W) – Planned for 2028, this project will upgrade Grand Avenue to an arterial standard, incorporate multi-modal elements, and install a traffic signal at 56th Street West to improve safety near Ben Steele Middle School.
- 54th Street West Reconstruction (Grand Ave to Rimrock Rd) – Expected to start in 2028, this project will reconstruct the corridor to arterial and complete streets standards and may include auxiliary turn lanes, shoulders, multi-modal features, and storm drain upgrades.

Sanbell is also under contract with Yellowstone County to reconstruct the Hesper Road/56th Street West intersection. Due to long-standing safety concerns, the intersection has been redesigned as a single-lane roundabout with street lighting. Pedestrian facilities are not included. Construction timing depends on right-of-way acquisition.

Because right-of-way negotiations have delayed the Hesper/56th roundabout, its funding has been reassigned to reconstruct the Central Avenue/48th Street West intersection. This project will include a new traffic signal and auxiliary turn lanes on all approaches, with construction scheduled for 2026.

Sanbell and HDR are additionally under contract with MDT to design single-lane roundabouts at King Avenue West/64th Street West and King Avenue West/48th Street West to maintain consistency along the corridor.

The City of Billings has also noted concerns with periodic closures of Zimmerman Trail, a key connection between West Billings and Montana Highway 3. These closures can overload alternate routes. While no project is currently programmed, a new connection from Molt Road to Montana Highway 3—known as the Molt Connector—has been identified as a critical link. In addition to improving access to Highway 3 and the top of the Rimrocks, it would create another ingress/egress point for the study area. The Billings Roadway Functional Classification Map already identifies the Molt Connector as a proposed Minor Arterial.

At this time, the Project Team is not aware of any additional committed or planned street or intersection projects within or immediately adjacent to the study area.

Future 2044 Operations Analysis

Intersection Traffic Operations

Sanbell completed intersection capacity analyses for the Future (2044) scenario at all major intersections within the study area. Future traffic volumes were developed using the Billings MPO Long Range Transportation Plan 3.1% average annual growth rate. Synchro (Version 12) was used to analyze stop-controlled and signalized intersections, while Sidra (Version 10) was used for roundabout analyses.

The analysis assumed existing traffic control and lane configurations for all intersections except the following, which reflect planned improvements:

- King Ave W/64th St W, King Ave W/48th St W, and 56th St W/Hesper Rd, which were modeled as single-lane roundabouts.
- Grand Ave/56th St W and Central Ave/48th St W, which were modeled with traffic signals currently under design as part of committed projects.

Table 5.8 presents the results of the Future (2044) intersection capacity analysis, with detailed calculation sheets provided in Appendix F. Figure 5.8 summarizes the projected 2044 traffic conditions.

For this study, LOS C at the intersection level (not individual approaches) is considered the minimum acceptable performance threshold. Under the Future (2044) scenario, four intersections are projected to operate below LOS C during the AM peak hour, and two are projected to fall below LOS C during the PM peak hour. Among intersections that remain acceptable, five are expected to experience LOS D conditions on one or more approaches during the AM peak hour, and one during the PM peak hour.

The following intersections are projected to fall below LOS C during one or both peak periods:

- 54th St W & Rimrock Rd – AM Peak
- 56th St W & Grand Ave – AM Peak
- 48th St W & Grand Ave – AM and PM Peak
- Autumn Ln/Neibauer Rd/Shiloh Rd – AM and PM Peak

Figure 5.8: Future (2044) Intersection Capacity Calculation Results

Intersection	Approach	Future (2044) 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		*One-Way Stop-Control (NB)*					
70th Street West & Rimrock Road	WB	0.0	A	0	0.0	A	0
	NB	0.0	A	0	0.0	A	0
	SB	9.0	A	1	9.1	A	1
	Intersection	6.3	A	--	2.8	A	--
Intersection Control		*Roundabout*					
62nd Street West & Rimrock Road	EB	43.2	E	10	6.7	A	2
	WB	5.4	A	2	18.6	C	16
	NB	13.8	B	2	8.2	A	2
	SB	15.4	C	15	9.2	A	3
	Intersection	21.0	C	--	13.0	B	--
Intersection Control		*Signalized*					
54th Street West & Rimrock Road	EB	147.5	F	41	21.3	C	10
	WB	48.5	D	11	22.9	C	26
	NB	40.6	D	6	33.7	C	7
	SB	117.7	F	11	40.1	D	7
	Intersection	104.2	F	--	26.3	C	--
Intersection Control		*One-Way Stop-Control (NB)*					
46th Street West & Rimrock Road	EB	0.0	A	0	0.0	A	0
	WB	1.0	A	1	0.7	A	1
	NB	62.8	F	4	24.8	C	2
	Intersection	3.1	A	--	1.2	A	--
Intersection Control		*One-Way Stop-Control (NB)*					
64th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	5.7	A	1	3.4	A	1
	NB	16.3	B	2	22.4	C	5
	Intersection	6.0	A	--	8.8	A	--
Intersection Control		*One-Way Stop-Control (SB)*					
62nd Street West & Grand Avenue	EB	1.3	A	1	2.5	A	1
	WB	0.0	A	0	0.0	A	0
	SB	53.9	F	11	29.0	D	4
	Intersection	22.3	C	--	5.2	A	--
Intersection Control		*Signalized*					
56th Street West & Grand Avenue	EB	26.1	C	48	12.7	B	16
	WB	72.2	E	7	16.1	B	14
	NB	83.7	F	4	41.2	D	7
	SB	0.0	A	3	0.0	A	0
	Intersection	47.8	D	--	20.8	C	--

Intersection	Approach	Future (2044) 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		*Signalized*					
54th Street West & Grand Avenue	EB	16.7	B	27	10.2	B	8
	WB	17.1	B	14	17.0	B	35
	SB	35.7	D	22	33.0	C	11
	Intersection	23.1	C	--	18.3	B	--
Intersection Control		*Signalized*					
48th Street West & Grand Avenue	EB	131.2	F	46	9.9	A	15
	WB	81.1	F	24	422.2	F	54
	NB	29.9	C	5	27.5	C	6
	SB	24.1	C	2	24.1	C	1
	Intersection	104.6	F	--	250.0	F	--
Intersection Control		*One-Way Stop-Control (WB)*					
64th Street West & Central Avenue	WB	13.5	B	1	15.0	C	2
	NB	0.0	A	0	0.0	A	0
	SB	2.4	A	1	0.7	A	1
	Intersection	3.0	A	--	3.3	A	--
Intersection Control		*Roundabout*					
56th Street West & Central Avenue	EB	7.4	A	1	4.8	A	1
	WB	5.8	A	2	7.6	A	2
	NB	7.2	A	2	6.2	A	3
	SB	8.3	A	3	6.2	A	2
	Intersection	7.3	A	--	6.5	A	--
Intersection Control		*Signalized*					
48th Street West & Central Avenue	EB	8.3	A	7	6.0	A	4
	WB	6.3	A	3	10.0	A	10
	NB	7.5	A	2	9.7	A	3
	SB	8.1	A	2	9.5	A	2
	Intersection	7.7	A	--	9.0	A	--
Intersection Control		*Roundabout*					
64th Street West & King Avenue	EB	15.9	C	15	8.5	A	4
	WB	9.1	A	3	11.5	B	7
	NB	13.7	B	3	7.3	A	1
	SB	6.6	A	2	10.0	A	3
	Intersection	12.7	B	--	9.8	A	--
Intersection Control		*Roundabout*					
56th Street West & King Avenue	EB	31.2	D	21	8.4	A	3
	WB	9.2	A	3	16.2	C	10
	NB	14.4	B	3	10.9	B	3
	SB	12.3	B	5	10.4	B	3
	Intersection	19.4	C	--	12.0	B	--

Intersection	Approach	Future (2044) 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		*Roundabout*					
48th Street West & King Avenue	EB	15.0	C	11	12.1	B	8
	WB	8.4	A	3	18.8	C	23
	NB	10.1	B	1	8.6	A	2
	SB	7.6	A	2	12.4	B	2
	Intersection	11.4	B	--	15.0	B	--
Intersection Control		*Roundabout*					
56th Street West & Hesper Road	EB	8.5	A	3	4.8	A	1
	WB	5.8	A	1	7.3	A	3
	NB	8.0	A	2	5.5	A	2
	SB	6.6	A	2	5.2	A	1
	Intersection	7.4	A	--	6.0	A	--
Intersection Control		*Two-Way Stop-Control (NB/SB)*					
48th Street West & Hesper Road	EB	0.5	A	1	0.5	A	1
	WB	0.6	A	0	0.6	A	1
	NB	19.6	C	2	34.7	D	3
	SB	52.8	F	6	71.4	E	5
	Intersection	12.8	B	--	9.9	A	--
Intersection Control		*Two-Way Stop-Control (NB/SB)*					
56th Street West & Neibauer Road	EB	16.9	C	3	13.3	B	1
	WB	16.7	C	2	14.5	B	3
	NB	0.7	A	0	0.4	A	0
	SB	2.0	A	1	1.3	A	0
	Intersection	10.2	B	--	9.3	A	--
Intersection Control		*Two-Way Stop-Control (NB/SB)*					
48th Street West & Neibauer Road	EB	0.4	A	0	0.3	A	0
	WB	0.9	A	1	1.2	A	1
	NB	13.7	B	1	13.6	B	1
	SB	21.4	C	1	18.5	C	1
	Intersection	3.9	A	--	4.1	A	--
Intersection Control		*One-Way Stop-Control (WB)*					
Autumn Lane & Neibauer Road & Shiloh Road	WB	146.8	F	19	726.6	F	91
	NB	0.0	A	0	0.0	A	0
	SB	1.1	A	1	3.7	A	1
	Intersection	46.8	E	--	378.9	F	--

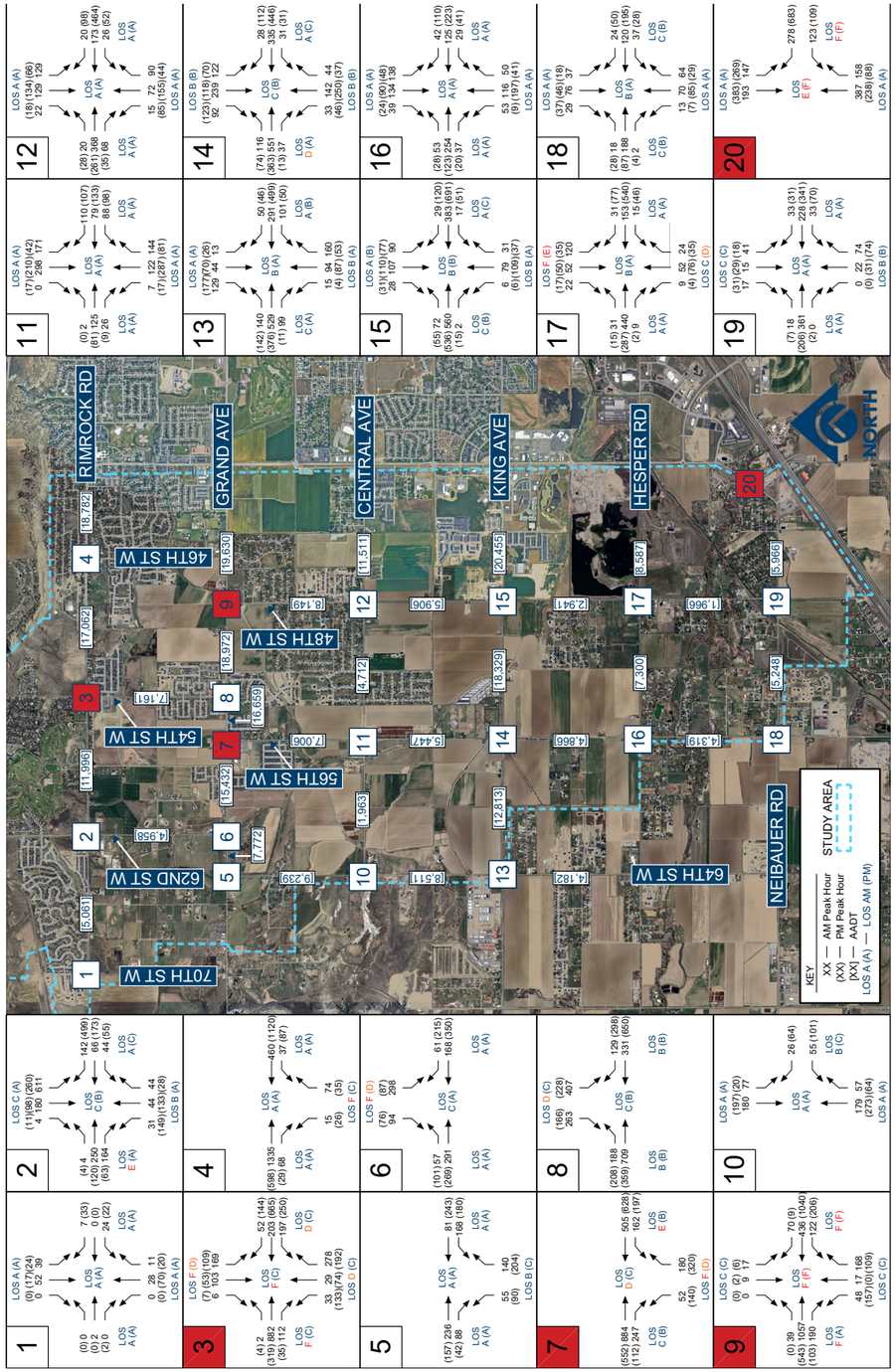

Figure 5.8: Future (2044) Traffic Volumes

Corridor Traffic Operations

Sanbell reassessed corridor level of service (LOS) for all arterial streets within the study area. As noted previously, LOS D is the minimum acceptable corridor performance threshold for this planning study. In addition to peak-hour intersection analysis, the Project Team evaluated daily corridor LOS to identify potential capacity issues and determine whether roadway widening, or other improvements may be needed.

Future (2044) corridor capacity calculations assumed completion of the planned transportation projects in the study area, including:

- Grand Avenue (43rd St W to 62nd St W)
- Rimrock Road (Clearview Dr to 62nd St W)
- 54th Street West (Rimrock Rd to Grand Ave)

Future (2044) AADTs were developed using the Future Land Use Map (FLUM) and the Billings MPO's 3.1% average annual traffic growth rate.

As illustrated in Figure 5.9, most corridors are projected to operate at LOS D or better. However:

- Rimrock Road is expected to operate at LOS E between 54th St W and 46th St W, and LOS F east of 46th St W.
- King Avenue is projected to operate at LOS F east of 56th St W and to be oversaturated between 56th St W and Shiloh Road, with volume-to-capacity ratios exceeding 1.0—conditions typically associated with long delays, queuing, and reduced travel speeds.

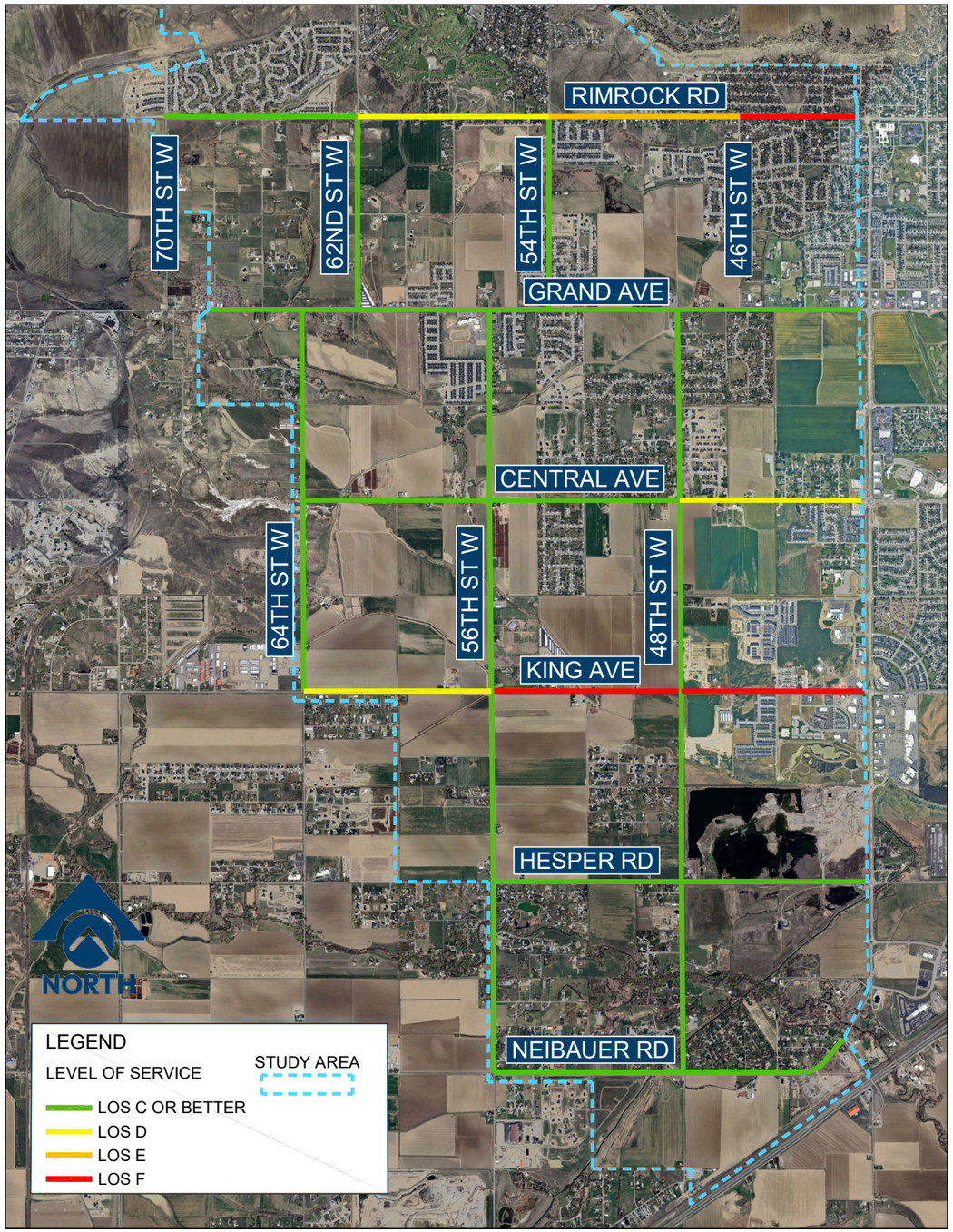

Figure 5.9: Future (2044) Corridor Level of Service (LOS)

Active Transportation Modeling

Instead of estimating the exact volume of bicycle and pedestrian activity, Sanbell used a methodology that identifies the relative demand for walking and biking within the study area. The Latent Demand Model evaluates economic, demographic, land use, and built environment factors to pinpoint active transportation "hot spots" and offers a clear framework for prioritizing investment and planning efforts.

Latent Demand Variables

Active transportation—bicycling and walking—is influenced by several factors. This analysis incorporates both existing and newly developed GIS data from the FLUM that relate to walking and biking conditions. Variable weighting is informed by prior research and refined for this project using FLUM planning analyses and engineering judgment. Tables 5.9 and 5.10 summarize the selected variables and their associated scoring criteria.

Table 5.9 & 5.10: Latent Active Transportation Demand Variables & Scoring

Built Environment Factors	
Dwelling Unit 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 (6 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

Active Transportation Demand Analysis

The Latent Demand Model identifies locations where there is underlying demand for active transportation—areas where walking or bicycling would likely occur if supportive conditions were in place. These favorable conditions typically include the presence of sidewalks, shared-use paths, and dedicated bicycle facilities.

The demand analysis was developed using GIS layers representing existing and planned built environments. Socio-economic projections for a fully built scenario were derived from the FLUM, which was developed by Sanbell and approved by the City of Billings. Future retail and school locations were estimated using local land use plans, zoning information, and input from City staff.

Figure 5.10 presents the results of the analysis, with blue tones indicating lower-demand areas and red/orange tones highlighting areas with higher demand. Under the FLUM's fully built scenario, the northern portion of the study area is expected to exhibit the greatest demand for active transportation. Most areas north of King Avenue and east of 56th Street West are projected to generate higher levels of demand, with the strongest concentrations along Grand Avenue, King Avenue West, and near Shiloh Road. This pattern aligns with planned higher-density development in these locations. In contrast, much of the remaining study area shows minimal demand due to low-density residential patterns, limited commercial or employment destinations, and predominantly agricultural land uses.

Overall, the analysis indicates that investments in active transportation infrastructure should be prioritized in the northern and eastern parts of the study area.

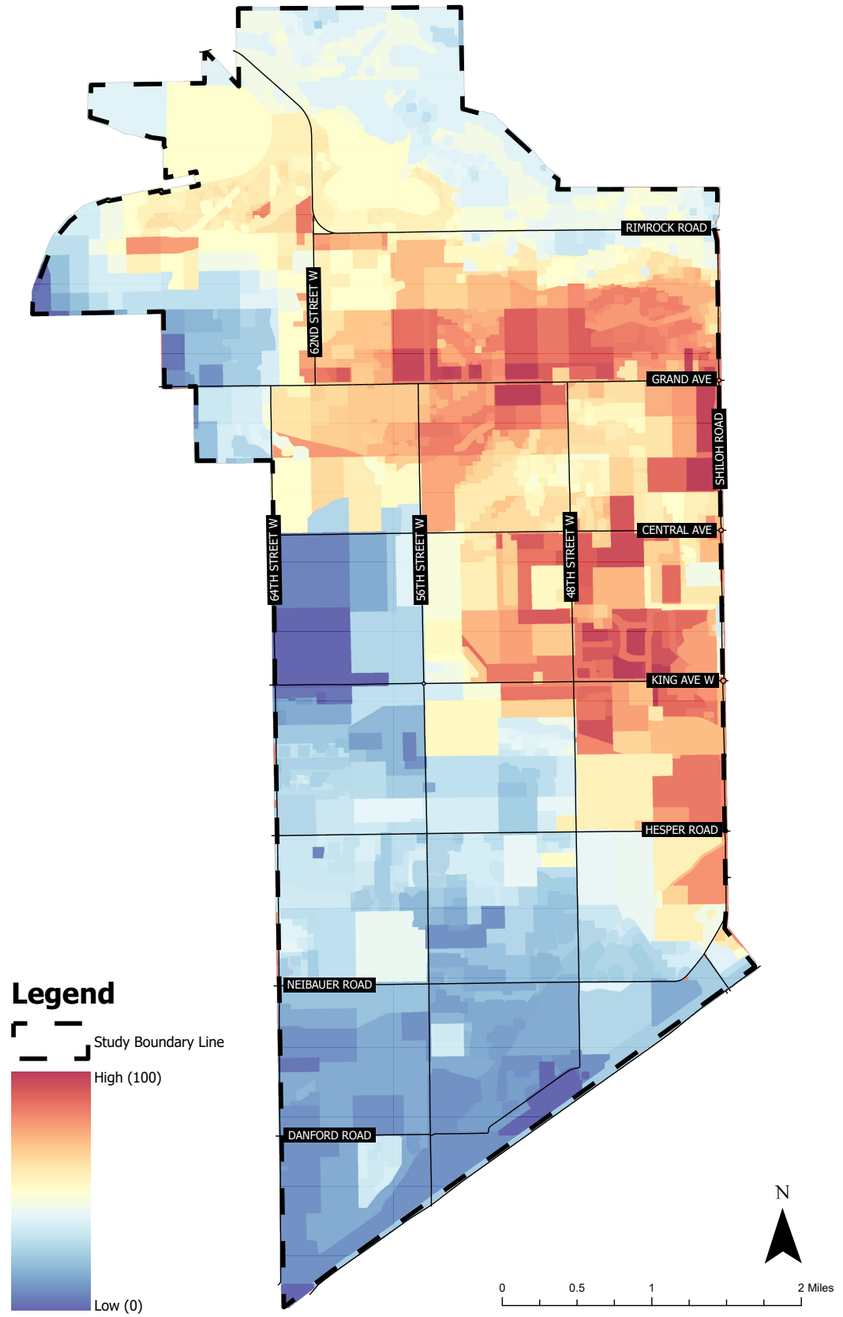

Figure 5.10 FLUM Full Built- Active Transportation Latent Demand Heat Map

Recommended Network Improvements and Mitigation Strategies

The previous section of this report identified the major study area intersections, street corridors, and active transportation facilities that are anticipated to need improvement or expansion to accommodate projected traffic demands under the Future (2044) growth scenario. This section presents recommended improvements along with mitigation alternatives to address the identified deficiencies. It also provides a summary of the analysis results for each alternative, illustrating the relative effectiveness of the proposed measures in meeting future transportation needs.

Intersections

Based on the intersection LOS deficiencies identified for the Future (2044) scenario, Sanbell evaluated a range of mitigation measures and recommended improvements to address those deficiencies. The purpose of this evaluation was to identify the minimum level of enhancement needed for each intersection to achieve an acceptable LOS C. The Project Team did not assess MUTCD Traffic Signal Warrants; instead, the analysis focused solely on operational performance.

The Future (2044) scenario was analyzed under an "improved" condition that applies recommended changes to intersection traffic control and lane configurations, along with any necessary mitigation strategies, to meet LOS objectives. Sensitivity analyses were performed using Synchro (Version 12) for stop-controlled and signalized intersections and Sidra (Version 10) for roundabout alternatives. Table 5.11 presents the results of the Future (2044) peak hour intersection capacity analysis for this "improved" condition.

Where signalization was identified as necessary to achieve acceptable performance, a roundabout option was also evaluated as both a mitigation strategy and a potential recommended alternative to a traffic signal. Results for each comparison are included in Table 5.11. Detailed capacity analysis worksheets for all improved alternatives under the Future (2044) scenario are provided in Appendix G.

54th Street West/Rimrock Road

The analysis indicates that the existing configuration at the 54th Street West and Rimrock Road intersection will not adequately accommodate Future (2044) traffic volumes, particularly during the AM peak hour. To address these deficiencies, several improvement strategies are recommended.

Recommended Improvements and Mitigation Activities/Alternatives:

Signalized Intersection Improvements:

Mitigation action:

- To maintain acceptable operations under future conditions, the signalized intersection would require an added eastbound shared through/right-turn lane

Mitigation benefits and considerations:

- This improvement is expected to reduce average eastbound delay by approximately 65% and lower overall intersection delay by 50% during the AM peak period

Outcomes:

- Despite these benefits, all approaches and the overall intersection would still operate at LOS D, indicating continued but manageable congestion

Roundabout Alternative:

Mitigation action:

- A multi-lane roundabout

Figure 5.11: Future (2044) Intersection Capacity Calculation Results - Mitigations

Intersection	Approach	Future (2044) with Improvements											
		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		*Signalized - EB Shared TR/RT Lane*						*Double-Lane Roundabout*					
54th Street West & Rimrock Road	EB	51.2	D	24	19.4	B	5	23.9	C	19	6.1	A	2
	WB	47.2	D	13	22.9	C	21	4.8	A	2	13.9	B	15
	NB	37.1	D	4	27.6	C	6	17.6	C	4	8.0	A	2
	SB	53.6	D	13	31.3	C	6	6.6	A	2	10.9	B	2
	Intersection	48.3	D	--	24.0	C	--	16.4	C	--	11.1	B	--
Intersection Control		*One-Way Stop-Control (NB) NB RT/LT Lanes*						*Single-Lane Roundabout - EB RT Slip Lane*					
46th Street West & Rimrock Road	EB	0.0	A	0	0.0	A	0	18.5	C	51	6.8	A	3
	WB	1.0	A	1	0.7	A	1	5.3	A	3	13.1	B	24
	NB	48.3	E	3	22.2	C	1	15.2	C	1	5.8	A	1
	Intersection	2.4	A	--	1.1	A	--	15.0	C	--	10.8	B	--
Intersection Control		*Signalized - EB LT & EB RT Lanes*						*Single-Lane Roundabout*					
62nd Street West & Grand Avenue	EB	10.1	B	5	6.7	A	4	6.9	A	2	5.3	A	2
	WB	8.4	A	3	6.2	A	5	4.4	A	1	7.1	A	3
	SB	10.9	B	8	11.8	B	3	6.3	A	2	5.2	A	1
	Intersection	10.0	B	--	7.2	A	--	6.1	A	--	6.2	A	--
Intersection Control		*Signalized - EB/WB LT, Thru, Shared RT/Thru, NB RT Lanes*						*Turbo Roundabout - 2 EB/WB Lanes*					
56th Street West & Grand Avenue	EB	22.3	C	13	19.2	B	7	11.3	B	10	7.1	A	3
	WB	12.6	B	7	11.1	B	6	5.9	A	3	7.8	A	4
	NB	23.0	C	2	22.3	C	4	13.1	B	2	11.3	B	4
	SB	0.0	A	0	0.0	A	0	4.7	A	0	5.7	A	0
	Intersection	19.2	B	--	16.5	B	--	9.7	A	--	8.3	A	--
Intersection Control		*Signalized - EB/WB LT, Thru, Shared RT/Thru Lanes*						*Turbo Roundabout - 2 EB/WB Lanes*					
48th Street West & Grand Avenue	EB	17.4	B	13	11.8	B	7	15.9	C	22	7.0	A	3
	WB	13.3	B	5	7.5	A	7	6.1	A	3	14.9	B	20
	NB	29.4	C	3	14.9	B	5	14.6	B	2	7.1	A	2
	SB	20.4	C	2	12.9	B	1	4.5	A	1	8.3	A	1
	Intersection	17.6	B	--	9.7	A	--	12.8	B	--	11.6	B	--
Intersection Control		*Signalized*						*Single-Lane Roundabout*					
48th Street West & Hesper Road	EB	8.6	A	10	4.9	A	4	7.9	A	3	5.2	A	2
	WB	6.4	A	4	7.6	A	15	4.5	A	1	8.1	A	4
	NB	10.4	B	2	14.7	B	3	6.6	A	1	4.7	A	1
	SB	11.6	B	5	14.3	B	3	4.7	A	1	6.2	A	1
	Intersection	8.9	A	--	8.1	A	--	6.4	A	--	6.9	A	--
Intersection Control		*Signalized - SB LT, NB RT & WB RT Slip Lanes*						*Single-Lane Roundabout*					
Autumn Lane & Neibauer Road & Shiloh Road	EB	0.0	A	0	0.0	A	0	4.4	A	0	5.6	A	0
	WB	16.3	B	4	16.0	B	6	9.9	A	3	15.0	C	13
	NB	11.2	B	14	13.4	B	10	8.6	A	4	6.7	A	2
	SB	12.1	B	7	9.9	A	8	6.2	A	2	8.3	A	4
	Intersection	12.1	B	--	11.8	B	--	8.4	A	--	11.0	B	--
Intersection Control		*Roundabout - EB RT Slip Lane*						*No Alternative Analysis Required*					
62nd Street West & Rimrock Road	EB	10.5	B	3	4.7	A	1						
	WB	5.4	A	2	18.6	C	16						
	NB	13.5	B	2	8.2	A	2						
	SB	14.7	B	14	9.2	A	3						
	Intersection	12.0	B	--	12.8	B	--						
Intersection Control		*Roundabout - EB RT Slip Lane*						*No Alternative Analysis Required*					
56th Street West & King Avenue	EB	19.0	C	13	7.4	A	3						
	WB	9.2	A	3	16.2	C	10						
	NB	14.4	B	3	10.9	B	3						
	SB	12.3	B	5	10.4	B	3						
	Intersection	14.6	B	--	11.7	B	--						

configuration—featuring dual entering and exiting lanes on all approaches—would provide the highest operational benefit

Mitigation benefits and considerations:

- Projected delay reductions include an 84% decrease during the AM peak hour and a 57% decrease during the PM peak hour

Outcomes:

- This alternative offers substantial performance improvements and addresses long-term capacity needs more effectively than a signalized layout

Supportive Network Mitigation:

Mitigation action:

- Construct a dedicated eastbound right-turn lane at the Rimrock Road and 54th Street West intersection

Mitigation benefits and considerations:

- The right turn lane will facilitate traffic redistribution by improving access to Grand Avenue, which will be able to accommodate the additional demand after the corridor is reconstructed as planned.

Outcomes:

- Enhanced access encourages drivers to use Grand Avenue as an alternate route, helping reduce congestion east of the study area

Summary:

Sanbell is currently under contract with the City of Billings to redesign the intersection as part of the Rimrock Road Improvements Project (54th Street West to 62nd Street West). Funding for design and construction has been planned in the City's 2026 Capital Improvements Plan (CIP). These programmed improvements serve as the primary mitigation steps toward addressing long-term operational needs at the intersection.

48th Street West/Grand Avenue

Future (2044) traffic projections show that the existing traffic signal at the 48th Street West and Grand Avenue intersection will fail without significant improvements. Several mitigation strategies are recommended to support acceptable operations and to complement planned upgrades along the Grand Avenue corridor.

Recommended Improvements and Mitigation Activities/Alternatives:

Upgrade the Traffic Signal with Auxiliary Turn Lanes:

To achieve acceptable levels of service, the signalized intersection should be upgraded with additional turn lanes.

Mitigation Actions:

- Add auxiliary left-turn lanes on both the eastbound and westbound approaches
- Provide dedicated through lanes on the eastbound and westbound approaches

Mitigation Benefits:

- LOS C or better for all approaches in both peak periods
- Maximum 95th-percentile queue of 13 vehicles (eastbound AM)
- Intersection average delay reduced by up to 80% (AM) and 96% (PM)

Outcome:

- This configuration provides substantial operational improvement and restores acceptable performance

Consider a Turbo Roundabout:

Mitigation action:

- Installation of a turbo roundabout

Mitigation Benefits and considerations:

- Operational performance similar to the signalized upgrade
- Improved circulation for turning movements
- Longer projected queues on the major road (up to 22 vehicles eastbound AM and 20 vehicles westbound PM)

Outcome:

- While functional, the roundabout alternative may introduce higher queueing on Grand Avenue and creates trade-offs

Widen Grand Avenue

Mitigation action:

- Widen Grand Avenue to a five-lane section at this location to support either intersection control option

Mitigation benefits:

- Reduction in average approaches delay by up to 87%
- Reduction in overall intersection delay by up to 96% during the PM peak hour

Outcome:

- These improvements provide the necessary capacity to meet Future (2044) traffic demands

Summary :

To ensure long-term operational effectiveness, the City should:

1. Pursue signal upgrades or evaluate a turbo roundabout, comparing their operational performance and corridor compatibility.
2. Include widening of Grand Avenue to five lanes at this intersection as a key supporting mitigation measure.
3. Coordinate intersection improvements with the broader Grand Avenue corridor project to maintain consistent operations.

62nd Street West/Grand Avenue

Future (2044) traffic projections indicate that the current traffic control at the 62nd Street West and Grand Avenue intersection will not accommodate expected southbound demand and would fail without improvements. Several mitigation strategies are recommended to ensure acceptable long-term operations.

Recommended Improvements and Mitigation Activities/Alternatives:

Signal and turn lanes

Mitigation action:

- Installation of signalized intersection with added turn lanes is recommended as a primary mitigation option
- Add an eastbound auxiliary left-turn lane
- Add a westbound auxiliary right-turn lane

Mitigation benefits and considerations:

- Intersection operates efficiently under Future (2044) AM and PM peak volumes 95th percentile queues remain under 10 vehicles in both peak periods Southbound delay reduced by nearly 80% during the AM peak hour

Outcome:

- This treatment provides reliable performance with manageable queuing

Roundabout

Mitigation action:

- Installation of a single-lane roundabout is a viable alternative that would also offer strong operational performance

Mitigation benefits and considerations:

- Minimal queuing during AM and PM peak surges
- Southbound average delay reduced by approximately 88% during the AM peak hour

Outcome:

- Comparable or slightly better operational results than a signalized option, particularly for southbound movements

Summary:

Although both alternatives provide substantial operational improvements, their physical footprints differ, and right-of-way needs should be evaluated prior to final selection. This will ensure that the selected control method aligns with site constraints and minimizes impacts to adjacent properties.

48th Street West/Central Avenue

Future (2044) traffic projections indicate that the existing stop-controlled intersection at 48th Street West and Central Avenue will operate at unacceptable levels, particularly during the PM peak hour. To address these deficiencies, several improvements are planned, and additional mitigation actions are recommended. Sanbell is currently under contract with Yellowstone County to redesign the intersection; funding for design and construction has been programmed in the County's 2026 budget.

Recommended Improvements and Mitigation Activities/Alternatives:

Traffic signal with Auxiliary Turn Lanes:

Mitigation actions:

- Install a traffic signal
- Add auxiliary left-turn lanes on the major approaches

Mitigation Benefits:

- Provides LOS B or better during both peak periods
- Produces manageable 95th-percentile queues

Outcome:

- This improvement would significantly enhance traffic flow and ensure acceptable long-term operations

Summary:

Given the projected substandard operations, a traffic signal is recommended as the primary mitigation measure. A traffic signal with auxiliary left-turn lanes should be constructed at the 48th Street West and Central Avenue intersection to mitigate future congestion and maintain acceptable operations under 2044 traffic volumes. Yellowstone County's programmed activities position the project for timely implementation and support the recommended signal installation.

Autumn Lane/Neibauer Road/Shiloh Road

Future (2044) traffic projections indicate that the Autumn Lane, Neibauer Road, and Shiloh Road intersection will fail under its existing one-way stop-controlled configuration and will require substantial improvements to achieve acceptable operations .

Recommended Improvements and Mitigation Activities/Alternatives:

Signal and turn lanes

Mitigation action:

- Installation of a traffic signal
- Installation of auxiliary turn lanes, including:
  - A southbound left-turn lane
  - A northbound right-turn lane
  - A westbound right-turn bypass (slip) lane

Mitigation benefits and considerations:

- LOS B or better during both peak periods
- Maximum 95th-percentile queue of 14 vehicles (AM peak)
- Over 90% reduction in westbound approach delay
- 97% reduction in overall intersection delay during the PM peak

Outcome:

- A traffic signal would significantly improve operations, provided that auxiliary lanes are added to accommodate turning movements
- Provides substantial performance improvement while maintaining compatibility with adjacent corridor operations

Roundabout

Mitigation action:

- Single-Lane Roundabout

Mitigation benefits and considerations:

- LOS C or better on all approaches during both peak hours

- Reduces overall intersection delay by 97% during the PM peak
- Reduces westbound approach delay by more than 90%
- May require additional right-of-way, which should be evaluated during design

Outcome:

- Delivers strong operational benefits with consistent and predictable traffic flow

Summary:

Given existing PM peak congestion and future failure of the current configuration, construct either a traffic signal with auxiliary turn lanes or a single-lane roundabout, based on right-of-way needs, constructability, and cost. Both would provide excellent operational performance under 2044 traffic volumes.

56th Street West/Grand Avenue

Future (2044) traffic projections show that the existing configuration at the 56th Street West and Grand Avenue intersection will not operate acceptably without improvements. Several mitigation strategies have been identified to address anticipated congestion and support the planned Grand Avenue reconstruction.

Recommended Improvements and Mitigation Activities/Alternatives:

Traffic signal and roadway reconstruction

Mitigation action:

- Implementation of a Traffic Signal with Auxiliary Turn Lanes (Planned Improvement). The City of Billings intends to install a traffic signal at this intersection as part of the Grand Avenue – 43rd Street West to 62nd Street West reconstruction project
- Add an auxiliary right-turn lane on the northbound approach
- Provide additional dedicated through lanes on the eastbound and westbound approaches
- Widen Grand Avenue to a five-lane section to meet operational needs

Mitigation benefits and considerations:

- LOS C or better on all approaches during both peak hours
- iMaximum 95th-percentile queue of 13 vehicles (eastbound AM)
- Up to 60% reduction in overall average delay
- 82% reduction in westbound approach delay during the AM peak

Outcome:

- With the 5-lane widening, signalization, and turn lanes, the configuration provides reliable and efficient operations under Future (2044) conditions.

Turbo Roundabout

Mitigation action:

- A turbo roundabout with two circulating lanes on the eastbound and westbound approaches may offer additional benefits

Mitigation benefits and considerations:

- Lower delays than the signalized alternative
- Shorter queues during both AM and PM peak periods
- Improved traffic flow on all approaches

Outcome:

- This option may provide superior operational performance but must be evaluated in the context of corridor coordination needs.

Signal Coordination

Mitigation action:

- Coordination of operations with adjacent signals. The intersection must operate cohesively with the planned traffic signal at Grand Avenue and 54th Street West
- Evaluate corridor-wide signal timing and spacing needs before selecting a preferred intersection control option

Mitigation benefits and considerations:

- Ensures that the selected treatment supports the overall performance of the Grand Avenue corridor

Summary:

Both alternatives require additional roadway footprint, with the magnitude of impacts varying by design. The City should conduct a right-of-way and cost assessment to determine the most feasible long-term solution.

62nd Street West/Rimrock Road

While the overall intersection is expected to function at an acceptable LOS with the recently constructed single-lane roundabout, the eastbound approach is projected to operate at LOS E during the AM peak hour due to conflicting high southbound volumes.

Recommended Improvements and Mitigation Activities/Alternatives:

Slip Lane

Mitigation action:

- An eastbound right-turn slip lane at this roundabout is recommended to enhance operations under Future (2044) traffic volumes

Mitigation benefits and considerations:

- Would allow right-turning vehicles to bypass the heavy southbound left-turn demand

Outcomes:

- Reduction of the average delay on the eastbound approach by approximately 74 percent during the AM peak hour

Summary:

With additional development anticipated in the area, implementing this slip lane is recommended to maintain acceptable operations and mitigate future congestion on the eastbound approach.

56th Street West/King Avenue

The existing single-lane roundabout at this intersection is projected to operate LOS D at

the eastbound approach with Future (2044) volumes during the AM peak hour.

Recommended Improvements and Mitigation Activities/Alternatives:

Slip Lane

Mitigation action:

- An eastbound right-turn slip lane

Mitigation benefits and considerations:

- Would allow right turning vehicles to bypass the heavy southbound through and left-turn demand

Outcomes:

- Reduction of the average delay at the eastbound approach by 40 percent in the AM peak hour

Summary:

This intersection is expected to operate with acceptable LOS under Future (2044) traffic volumes with the existing single-lane roundabout configuration. However, the eastbound approach is projected to operate at LOS D during the AM peak period. It is recommended that traffic continues to be monitored at this intersection to determine whether a right- turn slip lane is needed.

46th Street West/ Rimrock Road

The Future (2044) traffic analysis indicates that heavy eastbound through volumes on Rimrock Road will result in very limited gaps for northbound vehicles entering the corridor. Several improvement strategies are recommended to mitigate these projected operational challenges.

Recommended Improvements and Mitigation Activities/Alternatives:

Dedicated turn lanes

Mitigation action:

- Add Dedicated Northbound Left- and Right-Turn Lanes

Mitigation Benefits and considerations:

- These lanes would help relieve pressure created by continuous eastbound traffic and reduce average northbound approach delay by more than 20%

Outcome:

- This improvement provides near-term relief but may not fully address long-term operational needs as traffic demands continue to increase

Roundabout

Mitigation Action:

- Evaluate a Single-Lane Roundabout: A single-lane roundabout would further enhance northbound access to Rimrock Road.

Mitigation benefits and considerations:

- Reduction of average northbound delay by approximately 75% during peak hours, greatly improving access

Outcome:

- While beneficial to the northbound approach, a roundabout would reduce overall intersection LOS from A to C during the AM peak hour, requiring careful weighing of trade-offs between movement-specific and systemwide performance

Summary:

Under projected 2044 volumes, even with dedicated turn lanes, northbound operations remain constrained due to the dominance of eastbound traffic. The intersection should be monitored over time to track changes in volumes and delays. If operational conditions deteriorate, signalization may be needed to provide controlled access for northbound drivers and maintain acceptable levels of service.

48th Street West/Hesper Road

Future (2044) traffic projections show that high volumes along Hesper Road will limit opportunities for minor-road drivers to enter the intersection at 48th Street West. Although minor-road queues are expected to remain relatively short, several mitigation options would improve overall operations and reduce delays.

Recommended Improvements and Mitigation Activities/Alternatives:

Traffic Signal:

Mitigation action:

- Installation of a traffic signal without the need for auxiliary turn lanes

Mitigation benefits and considerations:

- LOS B or better during both peak hours
- Reduces southbound average delay by approximately 80%
- Manageable 95th-percentile queues, with a maximum of 15 vehicles during the PM peak on the major approaches

Outcome:

- Provides reliable control and improved access for minor-road drivers under future demand.

Roundabout:

Mitigation action:

- A single-lane roundabout would also function well at this location.

Mitigation benefits and considerations:

- LOS A on all approaches throughout the day
- Smooth traffic flow and low delay for all movements

Outcome:

- Offers excellent performance, comparable to the signal option, with consistently high levels of service

Summary:

Although both a traffic signal and a roundabout would effectively serve the intersection under 2044 conditions, immediate changes may not be necessary. This intersection should continue to be monitored for traffic volumes, delay patterns, and queue lengths over time to determine when an upgrade becomes warranted. This will ensures a data-driven decision on future traffic control, allowing improvements to be implemented when operational needs justify them.

Corridors

Several major streets within the study area are projected to operate below the acceptable Level of Service (LOS D) in the Future (2044) scenario. This section stratifies those corridors into individual segments and identifies potential mitigation strategies to address corridor capacity deficiencies.

To quantify the benefit of adding two-way left-turn lanes (TWLTL) or auxiliary left-turn lanes, the project team assumed an added capacity of 3,600 vehicles per day—equivalent to a 20 percent increase in capacity for a typical two-lane principal arterial. For a five-lane cross section, the same 3,600-vehicle capacity increase was applied by converting additional lanes using a factor of 0.2. The added capacity of the center turn lane remains consistent whether applied to a three-lane or five-lane section.

Figure 5.9 illustrates projected corridor LOS conditions for the Future (2044) scenario, and Table 5.12 demonstrates how center turn lanes or additional through lanes improve the volume-to-capacity (V/C) ratio and, in some cases, the overall LOS.

Key Findings and Recommended Mitigation

King Avenue West Corridor

Future (2044) traffic projections indicate that the existing two-lane configuration of King Avenue West will fail to provide adequate capacity east of 56th Street West without improvements. Several mitigation strategies are recommended to support acceptable operations.

Recommended Improvements and Mitigation Activities/Alternatives:

Corridor widening

Mitigation action:

- Corridor widening to a four-lane or five-lane section

Mitigation benefits and considerations:

- LOS C or better

Outcome:

- Additional lanes would significantly improve operations
- Additional capacity would allow for the redistribution of traffic through the network

Summary:

Given the projected failure of the current configuration, widen the corridor to either a four- or five-lane section, based on right-of-way needs, constructability, and cost. Both would provide acceptable operational performance under 2044 traffic volumes and would allow for better redistribution of traffic volumes throughout the network.

Figure 5.12: Future (2044) Corridor Capacity Calculation Results - Mitigations

Segment	Future (2044) - Planned			Future (2044) - Mitigations		
	Lanes	V / C Ratio	LOS	Lanes	V / C Ratio	LOS
Rimrock Road - 54th Street West to 46th Street West	3	0.862	E	4	0.474	A-C
Rimrock Road - East of 46th Street West	3	0.949	F	4	0.522	A-C
King Avenue West - 56th Street West to 48th Street West	2	1.018	F	4	0.509	A-C
King Avenue West - East of 48th Street West	2	1.136	F	4	0.568	A-C

Grand Avenue Corridor

Grand Avenue is planned to be improved to arterial standards, with either a four- or five-lane section. Funding for design and construction improvements has been programmed in the City's 2027 Capital Improvements Plan.

Recommended Improvements and Mitigation Activities/Alternatives:

Corridor Widening

Mitigation action:

- Corridor widening to a five-lane section

Mitigation benefits and considerations:

- LOS C or better

Outcome:

- A five-lane section would significantly improve corridor and intersection operations
- Additional capacity would allow for the redistribution of traffic through the network

Summary:

Although a four-lane section would sufficiently serve the corridor under 2044 traffic volumes, a five-lane section would provide a better driving experience, especially near intersections. Additionally, a five-lane section would better distribute traffic throughout the network. Therefore, this corridor should be widened to a five-lane section.

Rimrock Road Corridor

Rimrock Road is planned to be improved to full arterial and complete streets standards with a three-lane section. Funding for design and construction improvements has been programmed in the City's 2027 Capital Improvements Plan. However, Rimrock Road is projected to operate at unacceptable conditions with this improvement alone.

Recommended Improvements and Mitigation Activities/Alternatives:

Traffic redistribution

Mitigation action:

- Redistribute traffic to other collectors and arterials

Mitigation benefits and considerations:

- North-south corridors are projected to have enough capacity to carry the volume shift
- East-west arterials are projected to be able to carry higher volumes, particularly after the expansion of Grand Avenue and King Avenue West
- LOS D or better

Outcome:

- Redistributing traffic volumes would significantly alleviate and improve operations of the Rimrock Road corridor and remove the need to expand Rimrock Road to a four-lane section.

Summary:

Right-of-way constraints limit the expansion of Rimrock Road to a four-lane section east of the project limits. This makes expanding Rimrock Road to a four- or five-lane section impractical. The corridor is projected to operate at LOS E or

worse with a three-lane section if no traffic is diverted under 2044 traffic volumes. After the expansion of Grand Avenue to a five-lane section and King Avenue West to a four-lane section, under 2044 traffic volumes, the two corridors could support roughly an additional 16,000 daily trips combined before operating in LOS E. The north-south corridors also have available capacity to help redistribute traffic throughout the network. All arterial and collectors would operate with LOS D or better if 20 percent of the 2044 projected traffic volumes for Rimrock Road are shifted to other corridors. North-south corridor should be monitored as traffic is shifted from Rimrock Road.

Access Management

The West Billings transportation system could be improved by a more robust implementation of access management on arterial roads.

Recommended Improvements and Mitigation Activities/Alternatives:

Access Management

Mitigation action:

Regulate public access to and from properties adjacent to arterial roads

Mitigation benefits and considerations:

- Reduce frequency and severity of crashes
- Help improve traffic operations

Outcomes:

- Safer transportation network
- Improved travel reliability

Summary:

Access management would help create a safer, more reliable transportation network in West Billings. Traffic congestion could also be improved by regulating access to main routes.

Corridor Connectivity

The existing West Billings network lacks collector connections, which forces drivers to rely primarily on the arterial road system.

Recommended Improvements and Mitigation Activities/Alternatives:

Create a connected network of collectors and local streets

Mitigation action:

- Create collector and local streets connections between subdivisions

Mitigation benefits and considerations:

- Help redistribute traffic
- Minimize the number of accesses to arterial roads

Outcomes:

- Allow drivers to rely on roads that aren't arterials and balance regional mobility
- Alleviate traffic on arterial roads

Summary:

Create collector and local street connections to provide a more balanced transportation network and help alleviate traffic on arterial roads. Figure 5.11 provides a graphical representation of the location and features associated with the priority street and intersection project recommendations from this study.

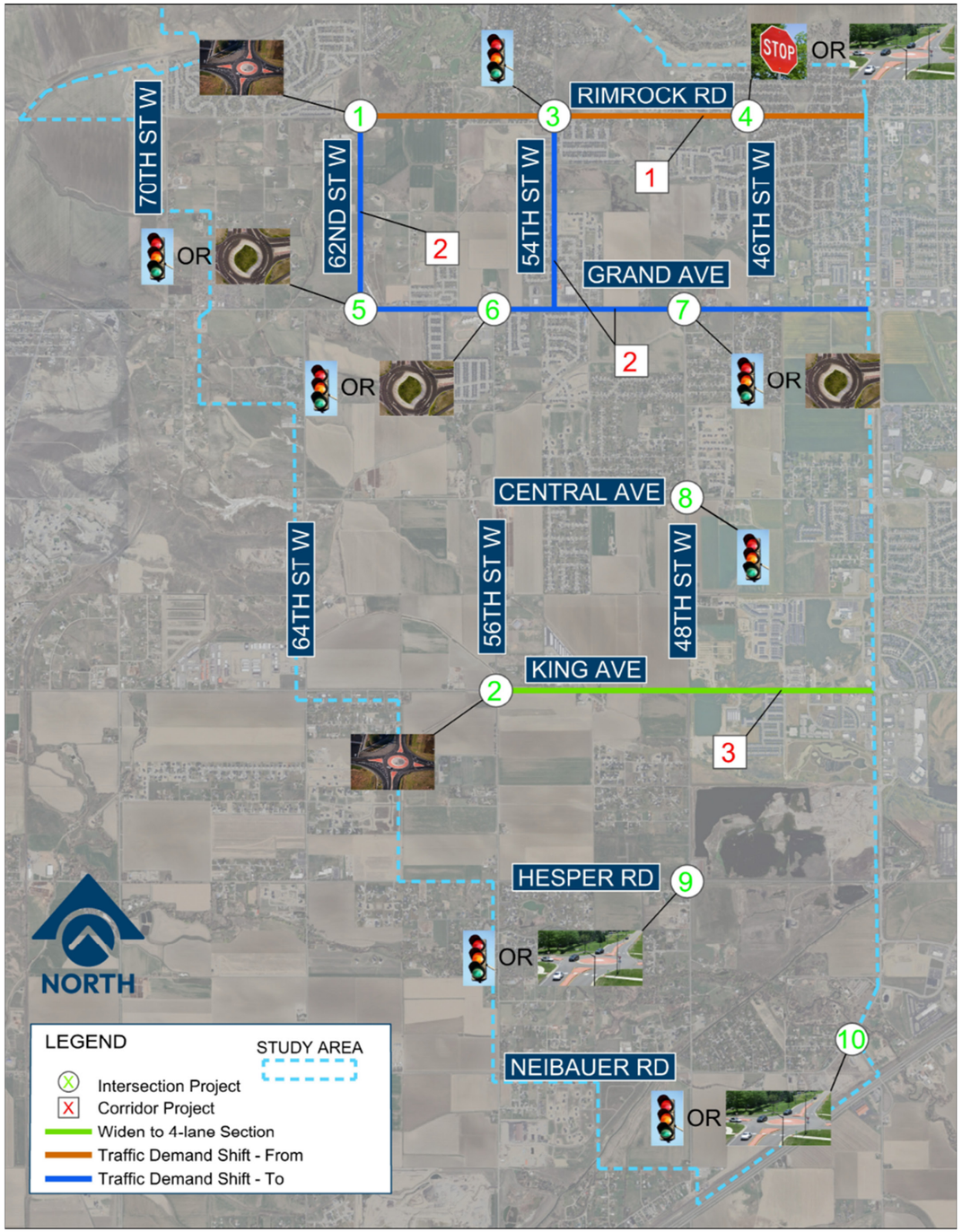

Figure 5.11: Street & Intersection Recommendations

Active Transportation Recommendations

The Existing Conditions (2024) and Future (2044) Level of Traffic Stress (LTS) analyses, combined with the Latent Demand Model, reveal a significant gap between projected active transportation demand and the availability of existing and planned facilities. The northeastern portion of the study area—particularly around Grand Avenue, King Avenue West, and Shiloh Road—shows the highest latent demand due to planned higher-density development and proximity to schools, commercial areas, and residential growth.

The Future (2044) LTS analysis indicates that most corridors within the study area will continue to operate at high stress levels for pedestrians and cyclists. High vehicle speeds, limited shoulders, and the absence of dedicated bicycle facilities will make these corridors inaccessible to most potential users unless substantial improvements are made.

Recommended Active Transportation Improvements

Prioritize Investment in High-Demand Areas

The Latent Demand Model provides a framework for directing infrastructure funding where it will have the greatest impact. Areas north of King Avenue West and east of 56th Street West are expected to generate the highest volumes of walking and biking trips and should be prioritized for improvements. Investments in these zones will support mode shift, enhance safety, and improve accessibility. Improvements, when located in City limits, should be consistent with the City of Billings Complete Streets standards and include sidewalks, side paths, protected bicycle facilities, and enhanced crossings. Improvements in the County should follow adopted subdivision regulations. While final facility locations will depend on subdivision design and FLUM-consistent land uses, the following recommendations identify improvements that should be incorporated into future development and capital projects.

Redesign Arterial Corridors to Reduce Traffic Stress

Most arterial corridors are projected to remain high-stress environments without substantial redesign. To make these roads usable for the broader public, complete street design elements must be implemented to achieve LTS 2 or better. This includes providing side paths or other forms of physical separation required under the City's Complete Streets policy. Planned reconstruction projects on Rimrock Road and Grand Avenue are expected to reduce stress to LTS 2, and similar design standards should be extended to remaining arterial corridors.

Develop a Connected Network of Low-Stress Streets

A functional active transportation system cannot rely solely on arterials. A connected network of collector and local streets—designed with multimodal considerations—is needed to provide safe alternatives to high-speed corridors. Such a network will allow users to move between neighborhoods, schools, parks, and commercial areas without entering high-stress environments and will help distribute traffic more evenly across the system. Future subdivisions should be required to maintain inter-neighborhood connectivity for active modes rather than relying exclusively on reconstructed arterial corridors.

Improve Arterial Road Crossings

High-volume, high-speed arterials often create significant barriers for pedestrians and cyclists. Although roundabouts and signals are planned at major intersection points, these locations are typically spaced a mile or more apart. As development patterns evolve, additional mid-block or intermediate crossings will be needed at intervals of roughly one-quarter mile. Enhanced treatments such as Pedestrian Hybrid Beacons, Rectangular Rapid Flashing Beacons, and refuge islands should be used to provide safe and frequent crossing options.

Integrate Active Transportation Requirements into Land Development Standards

To ensure that multimodal infrastructure keeps pace with growth, new developments should be required to incorporate active transportation facilities. Future land development should include:

- Installation of sidewalks and bicycle facilities within new subdivisions.
- Dedication of right-of-way for future multimodal corridors.
- Direct connections to existing and planned trail systems.

These strategies together will help close the gap between future demand and available facilities, creating a safer, more connected, and more accessible active transportation network for the study area.

City of Billings

The City of Billings has adopted a Complete Streets policy to ensure its transportation network safely and efficiently serves all users. This policy guides the design of roadways to accommodate pedestrians, cyclists, transit riders, and drivers.

Across all roadway types, Billings applies a consistent principle: every street project must consider the needs of all users from the outset. This approach creates a safer, more inclusive, and better-connected network citywide. All future intersection, corridor, and active transportation projects should continue to implement Complete Streets standards.

Note: The Complete Streets policy is specific to the City of Billings; it does not apply to transportation projects or facilities in Yellowstone County.

CHAPTER SIX

IMPLEMENTATION

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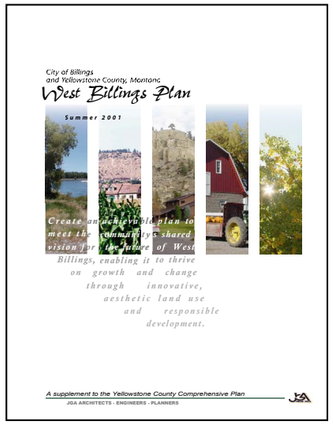
Overview

Implementation of the West Billings Neighborhood Plan will be guided by numerous influencing factors including state statute and existing local development regulations like zoning code, subdivision regulations, annexation policy and municipal approval processes. In the event of any inconsistencies between this plan and the city-wide, Billings 2045 plan, the Billings 2045 plan shall supersede this plan. Factors beyond the control of state and local governments will also contribute to the implementation of the West Billings Plan, including land use decisions of private landowners and economic market factors.

Land Use and Zoning Recommendations

The future land use map created by this plan will be integrated into the larger Billings 2045 plan future land use map which will be adopted as the City of Billings Future Land Use Plan, per requirements of the Montana Land Use Planning Act. The future land use categories established in this plan will be applied throughout the city and its projected 20-year growth area as part of the Billings 2045 plan. Should the future land use categories be amended as part of the Billings 2045 plan, the Billings 2045 plan shall prevail. The categories are based on existing zones that were adopted by the City of Billings and Yellowstone County during the 2020 Re:Code process.



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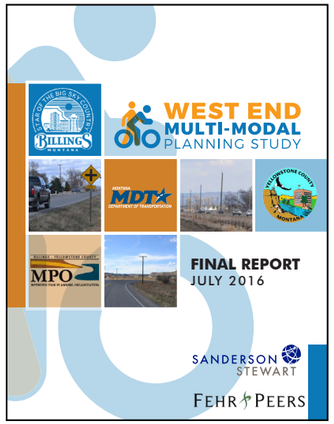

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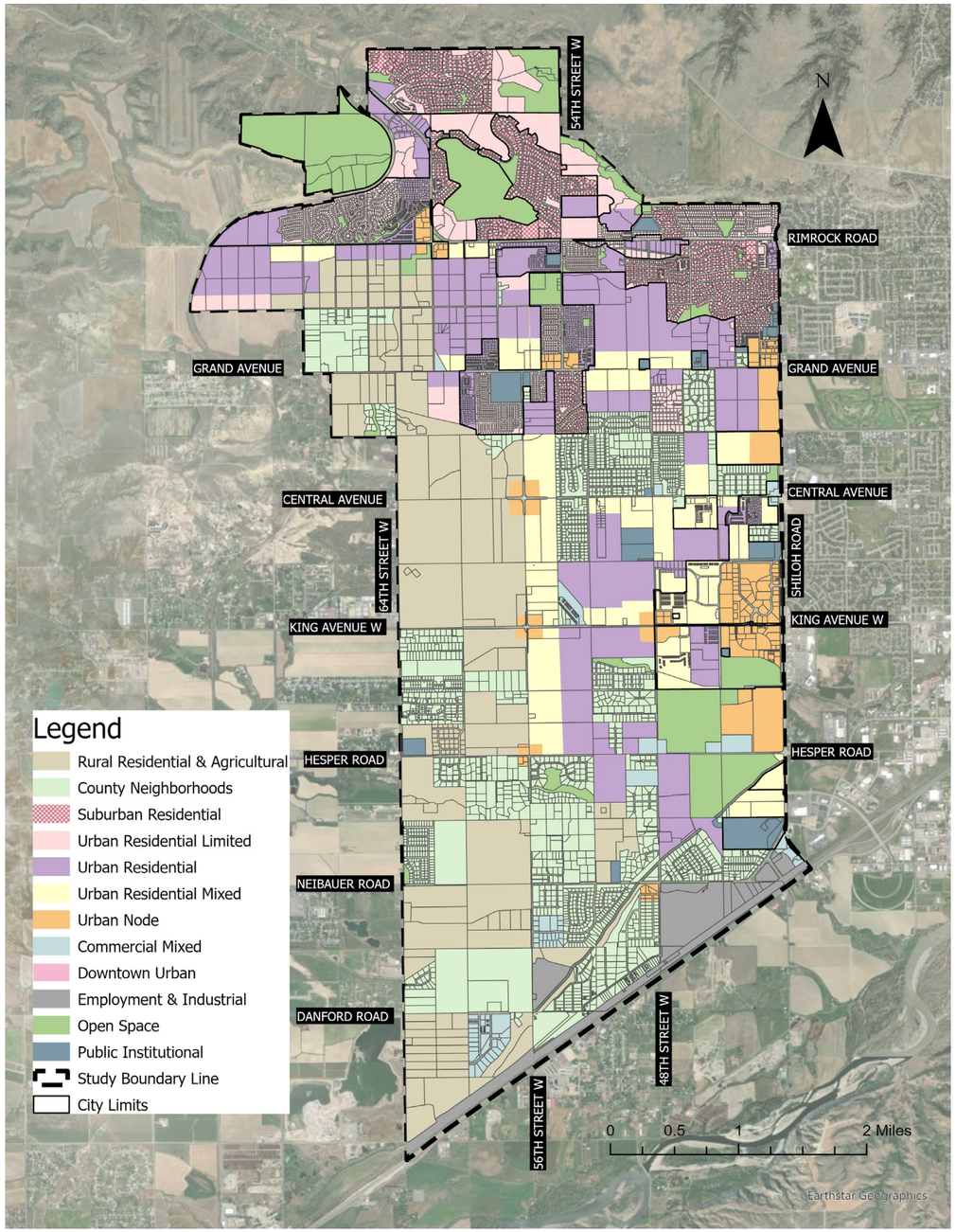

Figure 6.1 Future Land Use Map

Policy Recommendations

This plan and the Billings 2045 Future Land Use Plan will become what, before the Montana Land Use Planning Act, was referred to as Billings' Growth Policy. Therefore, all development approvals that require conformity with the Future Land Use Plan will be judged against the intent and metrics of the future land use map adopted by this Plan and the Billings 2045 Plan. Other policy documents like the City of Billings Subdivision Regulations, Annexation Policy, and Municipal Code will also guide development within the Plan Area.

Intergovernmental Cooperation

In practice, the future land use map established in this Plan only applies to land within the City of Billings zoning jurisdictional area. While County zoning exists and property are assigned future land uses these land uses only apply when annexed into the City.

During creation of this Plan, representatives of City of Billings, Yellowstone County, and local School Districts were included in the plan's steering committee and provided with weekly project updates. Members of the steering committee were given advanced opportunities to provide feedback on the future land use map, which was drawn to incorporate existing policy documents from each governmental entity.

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CHAPTER SEVEN

MONTANA LAND USE PLANNING ACT COMPLIANCE

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Introduction

In 2023 the Montana Legislature passed Senate Bill 382, the Montana Land Use Planning Act (MLUPA), and later amended it in 2025 through Senate Bill 121. The purpose of MLUPA is to coordinate and streamline planning and development review processes. It establishes that a Growth Policy, such as the City of Billings' 2016 Growth Policy will now be referred to as a Land Use Plan. MLUPA lists criteria for these plans and how they shall be adopted and amended in Part 2 of the statute.

This chapter documents how this plan, the West Billings Neighborhood Plan, as an update to the 2001 West Billings Plan, complies with section 76-25-201 of the Montana Land Use Planning Act.

76-25-201. Adoption or Amendment of Land Use Plan and Future Land Use Map

(1) The local governing body shall adopt or amend by resolution a land use plan and future land use map in accordance with this part only after consideration by and on the recommendation of the planning commission.

(2) Prior to making a recommendation to the governing body to adopt or amend a land use plan and future land use map, the planning commission shall:

(a) provide public notice and participation in accordance with 76-25-106; and

(b) (b) accept, consider, and respond to public comment on the proposed land use plan and future land use map. All public comment must be part of the administrative record transmitted to the governing body.

City/County staff completed all public meeting notices in accordance with section 76-25-106. Sanbell, in its capacity as consultant to Yellowstone County, posted materials presented during public and the City of Billings meetings on the project website. Public comment received in meetings, surveys and maps were analyzed and integrated into the plan document. Questions and comments received during public meetings were responded to by staff and consultants at that time. All comments received during the public input process are included in Appendix A.

(3) After meeting the requirements of subsection (2), the planning commission shall make a final recommendation to the governing body to adopt, modify, or reject the proposed land use plan and future land use map or any amendment to the proposed land use plan and future land use map.

(4) The governing body shall incorporate any existing neighborhood, area, or plans adopted pursuant to Title 76, chapter 1, that meet the requirements of this chapter into the land use plan and future land use map.

(5)

(a) The governing body shall consider the recommendation of the planning commission to adopt, modify, or reject the proposed land use plan and future land use map or any amendment to the proposed land use plan and future land use map.

(b) After providing public notice and participation in accordance with 76-25-106, the governing body may adopt, with any revisions the local governing body considers appropriate, or reject the land use plan and future land use map or any amendment to the proposed land use plan and future land use map proposed by the planning commission.

(6) An amendment to a land use plan or future land use map may be initiated:

(a) by majority vote of the governing body;

(b) on petition of at least 15% of the electors of the local government jurisdiction to which the plan applies, as registered at the last general election; or

(c) by a property owner applying for a zoning, subdivision, or other land use permit.

(7)

(a) After the initiation of an amendment to a land use plan or future land use map allowed in subsection (6), the planning commission shall make a preliminary determination of whether the proposed land use plan or future land use map amendment results in new or increased impacts to or from local facilities, services, natural resources, natural environment, or natural hazards from those previously described and analyzed in the assessment conducted in the development of the land use plan.

(b) If the planning commission finds new or increased impacts from the proposed land use plan or future land use map amendment, the local government shall collect additional data and conduct additional analysis necessary to provide the planning commission with the opportunity to consider all potential impacts resulting from the amendment before proceeding under subsection (2).

(8) The governing body may not amend the land use plan or future land use map unless:

(a) the amendment is found in substantial compliance with the land use plan; and

(b) the potential impacts resulting from development in substantial compliance with the proposed amendment have been made available for public review and comment and have been fully considered by the governing body.

The City of Billings City Council and the City Planning Commission will follow the statutory amendment adoption requirements set forth in 76-25-201.

The West Billings Neighborhood Plan Update was initiated by majority votes of Billings City Council and the Yellowstone Board of County Commissioners.

The themes of the West Billings Neighborhood Plan Update were directly adapted from the themes of the 2001 West Billings Plan and the goals of the 2016 City of Billings Growth Policy with input provided by members of the public, ensuring that the plan update is in substantial compliance with those documents. Adequate time for public review of this plan will be provided, and the City of Billings and Yellowstone County will follow statutory requirements regarding a complete review of this plan as part of the adoption process.

Analysis of natural resources, natural environment and natural hazards was

limited to inclusion of floodplain in future land use map drafting process.

76-25-202. Update of Land Use Plan or Future Land Use Map

(1) After a local government adopts a land use plan and future land use map in accordance with 76-25-201, the land use plan and future land use map must be reviewed by the planning commission every fifth year after adoption to determine whether an update to the land use plan and future land use map must be performed. The planning commission shall:

(a) make a preliminary determination regarding the existence of new or increased impacts to or from local facilities, services, natural resources, natural environment, or natural hazards from those previously described and analyzed when the land use plan and future land use map were previously adopted;

(b) provide public notice and participation in accordance with 76-25-106; and

(c) accept, consider, and respond to public comment on the review of the land use plan and future land use map. All public comment must be part of the administrative record transmitted to the governing body.

(2)

(a) If the planning commission finds new or increased impacts under subsection (1), the planning commission shall recommend an update to the land use plan, future land use map, or both.

(b) If the planning commission finds no new or increased impacts under subsection (1), the planning commission shall make a recommendation to the governing body that no update to the land use plan or future land use map is necessary.

(3) After receiving the recommendation of the planning commission, the governing body may direct that an update of the land use plan, future land use map, or both be completed or may readopt the current land use plan, future land use map, or both.

(4)

(a) In developing, drafting, and considering an update to the land use plan or future land use map, the planning commission shall follow the process set forth in 76-25-201 with respect to the changes proposed to the land use plan or future land use map.

(b) If the planning commission finds new or increased impacts resulting from the land use plan or future land use map, the local government shall collect additional data and conduct additional analysis necessary to provide the governing body and the public with the opportunity to comment on and consider all potential impacts resulting from an update to the land use plan or future land use map.

(5) At any time before an update is required after a review under subsection (1), the local governing body may direct that an update to the land use plan or future land use map be prepared for consideration by the planning commission and for recommendation to the governing body.

(6) Once an update to the land use plan or future land use map is adopted or the land use plan or future land use map is readopted, the information and analysis contained within the land use plan and future land use map must be considered accurate for the purposes of making site-specific development decisions in substantial compliance with the land use plan and future land use map.

The City of Billings City Council and the City Planning Commission will follow the statutory Land Use Plan and land Use Map update requirements set forth in 76-25-202.

The West Billings Neighborhood Plan will be reviewed in conjunction with the overall 5-year review cycle of the Land Use Plan and the subsequent creation of a community-wide future land use map.

76-25-203. Existing Conditions and Population Projections

(1) The land use plan must include, at a minimum, inventories and descriptions of existing conditions of housing, local services and facilities, economic development, natural resources, environment, and hazards, and land use within the jurisdictional boundaries of the land use plan.

(2) As set forth in 76-25-206 through 76-25-209 and 76-25-213 through 76-25-216, the land use plan must include, at minimum, a description, map, and analysis of how the jurisdiction will accommodate its projected population over the next 20 years and the expected impacts of the development in the areas of housing, local services and facilities, economic development, natural resources, environment, and hazards.

(3) The inventories and descriptions in the plan must be based on up-to-date surveys, maps, diagrams, charts, descriptive material, studies, and reports necessary to explain and supplement the analysis of each section of the land use plan.

(4)

(a) A jurisdiction shall use demographics provided by:

(i) the most recent decennial census or census estimate of the United States census bureau; and

(ii) population projections for a 20-year period based on permanent and seasonal population estimates: (A) provided by demographics published by the department of commerce; (B) generated by the local government; or (C) produced by a professional firm specializing in projections.

(b) When a population projection is not available, population projections for the jurisdiction must be reflective of the area's proportional share of the total county population and the total county population growth.

The West Billings Neighborhood Plan incorporates by reference the demographic information contained in the 2023 LRTP Billings Urban Area Long Range Transportation Plan. Details of demographic trends and housing demand projections used in this plan are included in Chapter 4, Future Land Use. Existing conditions of the plan area's land use, zoning, and public infrastructure were sourced from Yellowstone County GIS data. Analysis of natural resources, environment and hazards were not included in this plan and will be

analyzed as part of the overall Billings 2045 plan.

76-25-206. Housing

(1) A local governing body shall identify and analyze existing and projected housing needs for the projected population of the jurisdiction and provide regulations that allow for the rehabilitation, improvement, or development of the number of housing units needed, as identified in the land use plan and future land use map, including:

(a) a quantification of the jurisdiction's existing and projected needed housing types, including location, age, condition, and occupancy required to accommodate existing and estimated population projections;

(b) an inventory of sites, including zoned, unzoned, vacant, underutilized, and potential redevelopment sites, available to meet the jurisdiction's needed housing types;

(c) an analysis of any constraints to housing development, such as zoning, development standards, and infrastructure needs and capacity, and the identification of market-based incentives that may affect or encourage the development of needed housing types; and

(d) a detailed description of what actions the jurisdiction may take to accommodate the projected needed housing types identified in subsection (1)(a).

(2) The housing section of the land use plan and future land use map may incorporate by reference any information or policies identified in other housing needs assessments adopted by the governing body.

(3) If, after performing the analysis required in subsection (1), the local government determines that the total needed housing types may not be met due to lack of resources, development sites, infrastructure capacity, or other documented constraints, the local government shall establish the minimum number of housing units that may be rehabilitated, improved, or developed within the jurisdiction over the 20-year planning period and the actions the local government may take to remove constraints to the development of those units over that period.

(4) Progress toward the construction of the housing units identified as needed to meet projected housing needs during the 20-year planning period of the land use plan must be documented at each fifth year review of the land use plan as required in 76-25-202.

(5) The amount of detail provided in the analysis beyond the minimum criteria established in this section is at the discretion of the local governing body.

During production of the West Billings Neighborhood Plan several sources were referenced to assess the plan area's current housing inventory and future housing demand for the 2045 plan horizon. These sources include the 2023 LRTP Billings Urban Area Long Range Transportation Plan, the Billings-Yellowstone Metropolitan Planning Organization, the 2020 decennial Census, and the Montana Department of Commerce. A detailed explanation of the methods used to project population growth in the plan area is included in Chapter 4, Future Land Use. Recommendations for policy changes are included in Chapter 6, Implementation. The plan incorporates the themes and goals of the 2001 West Billings Plan and the 2016 City of Billings Growth Policy as they relate to housing choice and affordability.

76-25-207. Local Services and Facilities

(1) The land use plan must:

(a) determine the existing and anticipated levels of public safety and emergency services necessary to serve the projected population of the jurisdiction, including law enforcement, fire protection, emergency management system agencies, and local health care organizations;

(b) contain an inventory and map of existing fire protection, law enforcement, and emergency service jurisdictional areas and anticipated response times, a description of mutual aid or cooperative service agreements, and the location of hospitals or clinics in the jurisdiction;

(c) identify capital and service improvements for fire, law enforcement, emergency services, and health services for the jurisdictional area necessary to meet the projected population;

(d) determine the existing capacity, existing deficiencies, planned expansion, and anticipated levels of utility services necessary to serve the projected population in the jurisdiction, including water, wastewater, and storm water systems, solid waste disposal, and other utility services, as identified by the local government;

(e) contain an inventory and map of all utility service areas, system networks, and facilities;

(f) identify local utility capital and service improvements for the jurisdictional area necessary to meet the projected population;

(g) determine the existing capacity, existing deficiencies, planned expansion, and anticipated improvements to the transportation network serving the jurisdictional area necessary to serve the projected population in the jurisdiction;

(h) contain an inventory and classification map of all existing and planned roads within the jurisdictional area, including major highways, secondary highways, and local routes, all non-motorized routes, including bike lanes and pedestrian thoroughfares, and all public transit systems and facilities; and

(i) identify planned capital and service transportation improvements necessary to serve the projected population.

(2) The local government shall:

(a) coordinate with school districts within the jurisdiction to determine the existing capacity of, planned expansion of, and anticipated improvements necessary for the local K-12 school system to serve the projected population in the jurisdiction; and

(b) request that the local school district provide any inventory and maps of existing K-12 educational facilities within the jurisdictional area and identify any capital and service improvements necessary to meet the projected population.

(3) The local government may include an analysis of existing capacity and service levels, planned expansions of, and anticipated improvements necessary to provide other services to the projected population in the jurisdiction.

(4) The local government may incorporate by

reference any information or policies identified in other relevant local services or facilities assessments adopted by the local governing body, such as a capital improvements plan or an impact fee study.

(5) The amount of detail provided in the analysis beyond the minimum criteria established in this section is at the discretion of the local governing body.

The West Billings Neighborhood Plan incorporates, by reference, the local services and facilities analysis of the 2023 Billings Urban Area Long Range Transportation Plan (LRTP). Inventories of facilities like schools, roadways and utilities were also included for analysis in Chapter 34, Future Land Use. Future provision of transportation infrastructure is included in the Multi-modal Transportation Chapter 4 of this plan.

76-25-208. Economic Development

(1) The land use plan must:

(a) assess existing and potential commercial, industrial, small business, and institutional enterprises in the jurisdiction, including the types of sites and supporting services needed by the enterprises;

(b) summarize job composition and trends by industry sector, including existing labor force characteristics and future labor force requirements, for existing and potential enterprises in the jurisdiction;

(c) assess the extent to which local characteristics, assets, and resources support or constrain existing and potential enterprises, including access to transportation to market goods and services, and assess historic, cultural, and scenic resources and their relationship to private sector success in the jurisdiction;

(d) inventory sites within the jurisdiction, including zoned, unzoned, vacant, underutilized, and potentially redeveloped sites, available to meet the jurisdiction's economic development needs;

(e) assess the adequacy of existing and projected local facilities and services, schools, housing stock, and other land uses necessary to support existing and potential commercial, industrial, and institutional enterprises; and

(f) assess the financial feasibility of supporting anticipated economic growth in the jurisdiction.

(2) The local government may incorporate by reference any information or policies identified in other relevant economic development assessments.

(3) The amount of detail provided in the analysis beyond the minimum criteria established in this section is at the discretion of the local governing body.

The West Billings Neighborhood Plan incorporates, by reference, the economic development and commercial land use needs analysis of the 2023 Billings Urban Area Long Range Transportation Plan (LRTP). Analysis of job growth in the plan area is included in the existing conditions overview of in Chapter 1.

76-25-209. Natural Resources, Environment, and Hazards

(1) The land use plan must:

(a) include inventories and maps of natural resources within the jurisdiction, including but not limited to agricultural lands, agricultural water user facilities, minerals, sand and gravel resources, forestry lands, and other natural resources identified by the local government;

(b) describe the natural resource characteristics of the jurisdictional area, including a summary of historical natural resource utilization, data on existing utilization, and projected future trends;

(c) include an inventory, maps, and description of the natural environment of the jurisdictional area, including a summary of important natural features and the conditions of and real and potential threats to soils, geology, topography, vegetation, surface water, groundwater, aquifers, floodplains, scenic resources, wildlife, wildlife habitat, wildlife corridors, and wildlife nesting sites within the jurisdiction; and

(d) include maps of, identify factors related to, and describe natural hazards within the jurisdictional area, including flooding, fire, earthquakes, steep slopes and other known geologic hazards and other natural hazards identified by the jurisdiction, with a summary of past significant events resulting from natural hazards that includes:

(i) a description of land use constraints resulting from natural hazards;

(ii) a description of the efforts that have been taken within the local jurisdiction to mitigate the impact of natural hazards; and

(iii) a description of the role that natural resources and the environment play in the local economy.

(2) The local government may incorporate by reference any information or policies identified in other relevant assessments of natural resources, environment, or hazards.

(3) The amount of detail provided in the analysis beyond the minimum criteria established in this section is at the discretion of the local governing body.

The West Billings Neighborhood Plan incorporates, by reference, the environmental analysis of the 2023 Billings Urban Area Long Range Transportation Plan (LRTP) and the 2025 Yellowstone County Community Wildfire Protection Plan. Floodplain data provided by Yellowstone County was incorporated into production of the future land use map of the West Billings plan area. Further analysis of environmental constraints and hazards as well as natural resources will be completed as part of the Billings 2045 plan.

76-25-213. Land Use and Future Land Use Map

(1) A land use plan must include a future land use map and a written description of the proposed general distribution, location, and extent of residential, commercial, mixed, industrial, agricultural, recreational, and

conservation uses of land and other categories of public and private uses, as determined by the local government.

(2) The future land use map must reflect the anticipated and preferred pattern and intensities of development for the jurisdiction over the next 20 years, based on the information, analysis, and public input collected, considered, and relevant to the population projections for and economic development of the jurisdiction and the housing and local services needed to accommodate those projections, while acknowledging and addressing the natural resource, environment, and natural hazards of the jurisdiction.

(3) The future land use map may not confer any authority to regulate what is not otherwise specifically authorized in this chapter.

(4) The future land use map and the written description must include:

(a) a statement of intent describing the jurisdiction's applicable zoning, subdivision, and other land use regulations;

(b) descriptions of existing and future land uses, including:

(i) categories of public and private use;

(ii) general descriptions of use types and densities of those uses;

(iii) general descriptions of population; and

(iv) other aspects of the built environment;

(c) geographic distribution of future land uses in the jurisdiction, anticipated over a 20-year planning period that specifically demonstrate:

(i) adequate land to support the projected population in all land use types in areas where local services can be adequately and cost-effectively provided for that population;

(ii) adequate sites to accommodate the type and supply of housing needed for the projected population; and

(iii) areas of the jurisdiction that are not generally suitable for development and the reason, based on the constraints identified through the land use plan analysis;

(d) a statement acknowledging areas within the jurisdiction known to be subject to covenants, codes, and restrictions that may limit the type, density, or intensity of housing development projected in the future land use map; and

(e) areas of or adjacent to the jurisdiction subject to increased growth pressures, higher development densities, or other urban development influences.

(5) To the greatest extent possible, local governments shall create compatibility in the land use plans and future land use map in those areas identified in subsection (4)(e).

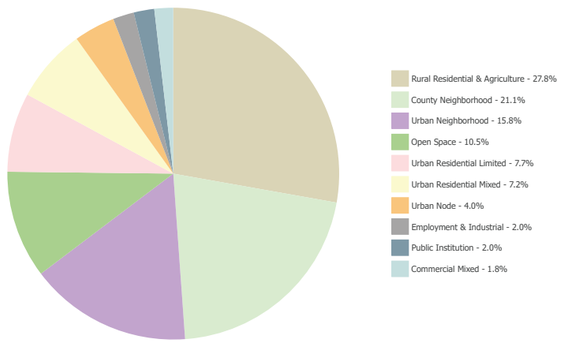

Figure 7.1 - Future Land Use Categories

(6)
The land use plan may:

(a) provide information required by a federal land management agency for the local governing body to establish or maintain coordination or cooperating agency status; and

(b) incorporate by reference any information or policies identified in other relevant assessments adopted by the local governing body, such as a pre-disaster mitigation plan or wildfire protection plan.

(7) The amount of detail provided in the analysis beyond the minimum criteria established in this section is at the discretion of the local governing body.

The West Billings Neighborhood Plan creates a future land use map for the West Billings plan area. The details of the methods of production, land use categories, and final map are included in Chapter 4 of this document: Future Land Use.

76-25-214. Area Plans

(1) A local governing body may adopt area plans for a portion of the jurisdiction to provide a more localized analysis of all or any part of a land use plan. An area plan may include but is not limited to a neighborhood plan, a corridor plan, or a subarea plan.

(2) The adoption, amendment, or update of an area plan must follow the same process as a land use plan provided for in this part and may be adopted as an amendment to the land use plan.

(3) The area plan must be in substantial compliance with the land use plan. To the extent an area plan is inconsistent with the land use plan, the land use plan controls.

Figure 7.2 - Themes to Principles

The West Billings Neighborhood Plan creates a future land use map for the West Billings plan area and will be adopted concurrently with the Billings 2045 plan, which will include a future land use map for the entirety of the Billings MPO jurisdiction. The West Billings Neighborhood Plan is built upon five themes adapted from the 2001 West Billings Plan, ensuring that the update is consistent with the previous area plan.

76-25-216. Implementation

(1) The land use plan and future land use map is not a regulatory document and must include an implementation section that:

(a) establishes meaningful and predictable implementation measures for the use and development of land within the jurisdiction based on the contents of the land use plan and future land use map;

(b) provides meaningful direction for the content of more detailed land use regulations and future land use maps; and

(c) requires identification of those programs, activities, actions, or land use regulations that may be part of the overall strategy of the jurisdiction for implementing the land use plan.

(2) The implementation section of the land use plan must include:

(a) if the local jurisdiction does not have current zoning regulations, a schedule by which zoning regulations and a zoning map will be adopted in accordance with the deadlines set forth in 76-25-105;

(b) if the local jurisdiction has current zoning regulations, an analysis of whether any inconsistencies exist between current zoning regulations and the land use plan and future land use map, including a map of the inconsistencies. If inconsistencies exist, the local government shall identify:

(i) specific implementation actions necessary to amend the zoning regulations and the zoning map to bring the zoning regulations and zoning map into substantial compliance with the land use plan and future land use map;

(ii) a schedule for amending the zoning regulations and zoning map to be in substantial compliance with the land use plan and future land use map, in accordance with the deadlines set forth in 76-25-105;

(iii) a schedule for adopting a capital improvements program or for amending an existing capital improvements program to be in substantial compliance with the land use plan and future land use map;

(iv) a schedule for expanding or replacing public facilities and the anticipated costs and revenue sources proposed to meet those costs, which must be reflected in a jurisdiction's capital improvement program;

(v) if applicable, a schedule for updating the plan for extension of services required in 7-2-4732 to be in substantial compliance with the land use plan; and

(vi) a schedule for implementing any other specific actions necessary to achieve the components of the land use plan, including a timeframe or prioritization of each specific public action; and

(c) procedures for monitoring and evaluating the local government's progress toward meeting the implementation schedule.

The West Billings Neighborhood Plan proposes strategies for implementation in Chapter 6 of this document, Implementation.

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Project Website

The website for the West Billings Neighborhood Plan is an online platform designed to inform and engage residents, interested community members, and City and County officials about the ongoing planning process for West Billings. It provides a central hub for accessing project updates, documents, maps, and resources related to the development of the plan and provides a space for the community to engage in online interactive activities.

Two surveys were created initially to gather perspectives on plan priorities, themes, and goals. Survey questions focused on individual perceptions of success of the 2001 plan and whether the goals and themes set forth in that plan are still relevant for the community today. In addition, an interactive map was available for individuals to place pins and routes on a map to indicate various landmarks and gathering spaces that make West Billings special. Survey 1 was available from March 3 through June 30. Survey 2 and the online map was available from March 20th through June 30. Survey and map results can be found in detail in Appendix C.

Engagement Website Statistics

March 3 - July 1, 2024

2102 | Unique Sessions

218 | Completed Surveys

2m 34 sec | Avg. Session Duration

In-person Events

An open house, held on March 20, 2024, provided residents, interested community members, and City and County officials an opportunity to learn about and contribute to the plan development for West Billings. It offered a casual and interactive setting where attendees engaged with project materials, shared their perspectives, and interacted with the project team. 11 Informational boards were set up around the room and manned by project team members. The boards provided detailed information about what a neighborhood plan is, a contextual map of the area, the four major themes from the 2001 plan, land use and transportation, effects of transportation on land use and community character, transportation improvements map, and a next steps timeline for the project.

West Billings Website - Sanbell

Public Open House - Sanbell

Public Open House - Sanbell

Survey Number One

Two online surveys were available to the general public during the initial phase of the project. Survey number one, “West Billings Plan Issues Survey” was available from February 15 2024 until June 30, 2024. 186 surveys were recorded for Survey number one. Survey number two, “Themes and Goals Survey,” was available from March 20, 2024 until June 30, 2024. 32 surveys were recorded for survey number two. Both surveys were available on the “Be Heard Today” page of the project website and had both closed and open ended questions. The following paragraphs provide the detailed questions and responses from each of the surveys.

Plan Issues Survey

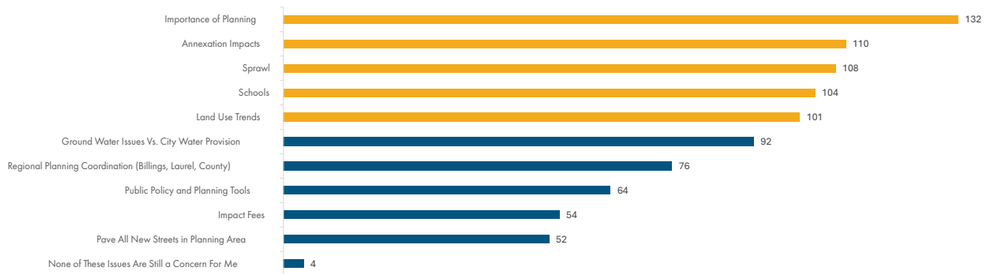
Question #1

During the creation of the 2001 West Billings Plan, 1,900 members of the public made the list of issues below and ranked them based on priority. We now want to see if those priorities are still relevant to you!

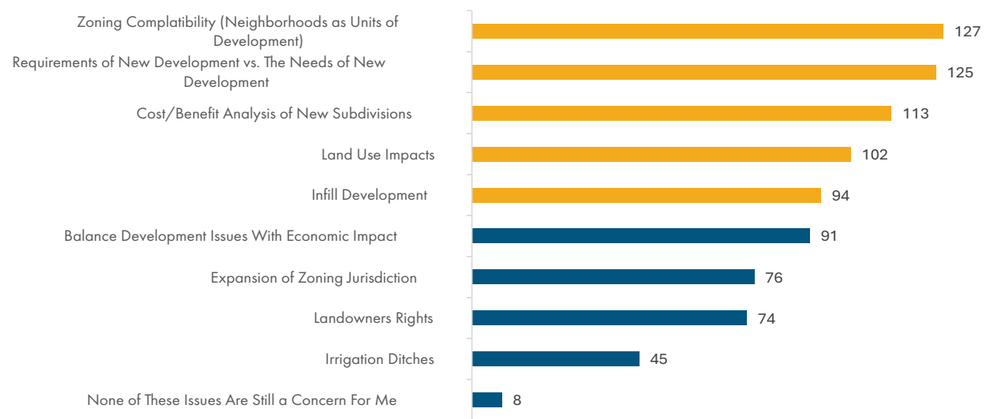
Below are 4 themes that were developed based on public feedback during the 2001 Plan. Each theme has a list of issues or areas of opportunity the community wanted the plan to address.

Select all items that are still important to you or need to be addressed in the 2024 Plan.

Theme 1: Planned Growth

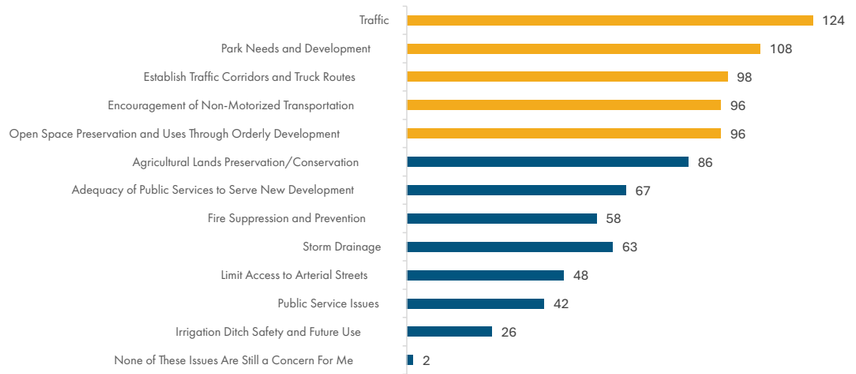


Theme 2: Appropriate Land Use



Theme 3: Distinctive Community Character

Theme 4: Public Safety, Open Space, Waterways and Scenic Resources



Question #2

Looking forward to the 2024 Plan, are there additional areas of concern you would like to add?

Survey respondents expressed concerns about traffic safety and infrastructure. Many emphasize the need for improved traffic control, including roundabouts, reduced speeds, and better crosswalks. There’s a strong call for more bike paths, pedestrian-friendly areas, and public parks. Water conservation and sustainable growth, with an emphasis on mixed-use development and higher density housing, are also highlighted. The community wants a balanced approach to development that considers public input, addresses traffic congestion, and prioritizes non-motorized transportation options.

Question Two Theme Summary

Frequency Count	*Theme*
44	Vehicle Transportation, Public Transportation
28	Business Growth, Planning Process, Density, Growth Impacts
27	Non-motorized Paths, Open Space, Amenities
11	Pedestrian Safety, Public Safety
6	Resources
6	Affordable Housing, Cost
4	Schools
2	Public Input

Theme	*Description*
Vehicle Transportation, Public Transportation	Concerns about infrastructure development, traffic congestion and road sufficiency. Desire for improved traffic management and alternative transportation options. Interest in reducing traffic on major roads and improving traffic flow. Interest in improving traffic patterns and improvement in public transportation.
Business Growth, Planning Process, Density, Growth Impacts	Preference for interconnected neighborhoods with fewer dead-end roads. Focus on family-friendly commercial and public spaces. Concerns about the impact of urbanization on rural lifestyle and environment. Suggestions for better planning and design, including County and City working together. Desire for mixed-use, eco-friendly developments, and complete neighborhoods with diverse amenities.
Non-motorized Paths, Open Space, Amenities	Desire for more multi-use paths and off-road cycling areas. Need for more non-motorized infrastructure, parks, and recreational facilities. Access to paths, trails, and facilities.
Pedestrian Safety, Public Safety	Concerns about pedestrian safety. Importance of public safety and crime management.
Resources	Concerns about resource availability, including water.
Affordable Housing, Cost	Developing affordable housing options Concerns about rising property taxes and cost of living.
Schools	Emphasis on schools and safe transportation for future growth.
Public Input	Importance of public input in park development and urban planning.
Tourism	Interest in tourism-related projects such as lakes, trails, and

Detailed comments:

- Theme 4 is very important. Trees need to be planted and maintained on street development. Trees need to be part of infrastructure not just amenities. Trees slow traffic and help prevent accidents.
- Rimrock road is very narrow and dangerous at such high speeds. Grand Avenue from 70th the 54th is too narrow and dangerous at such high speeds.
- I want to live in an area where I can walk and/or ride my bike to local grocery stores.
- More bike paths/trails!
- promote public safety through street design. no roads or strouds! prioritize non-vehicle transport. narrow streets and create places to visits. needs trees along streets for safety and beauty.
- As we move forward, please include development of shared use paths and non-motorized transportation as integral parts of the planning....not as a secondary afterthought. Thank you!
- Do not connect main streets(Grand, Central, Rimrock, etc) through residential neighborhoods.
- Speed limits are too high with additional apt. and subdivisions. Roads with no shoulders or turn lanes but more traffic. Noise and speed leads to road rage incidents and fatalities.
- Forced annexation of current rural land; creation of new traffic flow in relation to private land owner rights.
- Water conservation - landscaping less water intensive than KY bluegrass (reasonable lawn sizes, use of lower demand lawn species (e.g., buffalo grass). GW quality & quantity.
- Continued dependence on the groundwater resource as a primary driver of subdivision placement and growth is ill advised. The City/County must find a way to support aquifer recharge.
- Encouragement of mixed-use development within walk-able and bike-able neighborhoods - controlling sprawl so that municipal services are not spread over a wider area than the tax base can support
- City Parks and family recreation must be a top priority as opposed to trail development
- Emphasis on transportation and traffic. Rimrock Road east of Shiloh is a nightmare for residents, motorists, and other foot and cycle traffic. Consideration MUST be given to traffic flow.
- Please listen to and consider the legitimate concerns of the residents who chose to purchase and live out here away from many of the things we believe you intend to (directly or indirectly) bring
- COMMUNITY, town centers, movie theater, restaurants. ACCESS to hiking trails, especially along the rims
- COMMUNITY, town centers, movie theater, restaurants
- I would need more space then this. The County does not work in collaboration with the Cities, let's start with that. Ask anyone about an SID after they are annexed.
- Public parks and access to them via trails.
- Widening rimrock road to at least 3 lanes btwn 54th & 50th; dangerous in winter months during icy weather & shaded by tall trees. Also install side road to limit residential access vs driveways.
- To summarize my concerns, West Billings needs to be more dense and not be so sprawled. The focus needs to be on the communities being built and

making it easier to walk, bike and roll around.

- Before putting more traffic on a road, I would like to see the road improved prior to approving building. I understand its difficult to do without the funding, but make the developer pay up front!
- Something that is realistic so it makes it off the ground.
- I would like to see the final plan to balance the land use and development patterns with the need for more supply of all asset types.
- eliminating parking minimums, creating more bike/walk friendly infrastructure, create more medium to high density housing and mixed use zoning. WAY LESS OBSCENE SINGLE FAMILY HOUSING.
- bus routs extending bus hrs loincume housing bike pathes
- Students walk/bike safely to school; sidewalks & bike paths!; sprawl is costly, should be more dense, esp around Shiloh Crossing & other economic hubs; lack of city/county/school district coordination
- We should grow up, not out. Traffic control. Low cost housing must become a reality.
- emphasis on schools to take care of all the future growth - already crowded walk/bike paths for safe transportation to and from schools
- Developing affordable housing options
- I would love to see neighborhood connected my paved multi-use paths as well as more off-road cycling areas in parks.
- Billings lakes project, more trails, hand cart railroad at new park, monumental western statues, Major Museum on west end, dinosaurs, Museum of Rockies east interesting in assisting ? Tourism
- I lived on Molt road from 2006-2023. I watched Ironwood grow and all the neighborhoods off Rimrock Road be added without new roads. The roads NEED to be made sufficient for the new communities first.
- Release of the west end water study and impacts on growth.
- Small commercial/retail businesses should be allowed in neighborhoods as opposed to pushing all commercial activity to major intersections. Streets should be designed to encourage lower speeds
- Public Input is important when developing parks & new development in general. We are glad your firm is contracted to do this plan. Disappointed in the Cottonwood Park Development Process. Thank you.
- Require that all subdivision have interconnecting side streets, limit the cul-du-sacs and dead end roads as go nowhere neighborhoods are a waste of tax payers money.
- More trails for bikes, protected bike lanes.
- Our community desperately needs more non-motorized infrastructure for cyclists and pedestrians. We also need a west end skatepark! Several cities the size of Billings have 2 or 3.
- The more we focus on the development of family-friendly commercial and public land, the better for everyone. The majority of new development has been for adults. We need activities that include kids
- -Areas where City/County envision Heavy Commercial/Light Industrial zoning -Halt on development north of Canyon Creek/Hogans Slough with depletions from groundwater wells reaching a tipping point.
- Concerns with land use density and future infrastructure maintenance costs - ie land use should be dense enough to provide enough tax dollars to maintain the infrastructure serving it in perpetuity
- Schools, traffic, bike and walking paths, balance of types of housing and commercial, avoid concentration of high density housing zones as is being created between Shiloh and 48th near king
- Traffic and pedestrian safety on Rimrock Road. Cannot cross as a walker
- Multi-use paths need to be considered. Much of the West end area is bike-able but limited safe paths exist to get off very busy streets with no shoulder such as 56th, 48th, Central, Grand, and King.
- bike/walking path needs to be extended West, with connection to Grand/Central west Grand needs widening. It is congested and very dangerous for cyclists
- Allow for safer bike transportation with separate bike paths.
- Traffic control and multi use trail access. Excessive speed and aggressive driving are degrading the quality of life for residence along Rimrock road. Wonderful neigborhoods are at risk of decline.
- The impact this will have on 58th st west between Rimrock Road and Grand Ave. and on Pops Meadow subdivision, which is not in the city limits
- I am concerned about the over population projected into areas where current residents have chosen a rural lifestyle.
- Required cops to manage crime Parks and schools Trails and streets Carve out small commercial areas for good, etc
- Traffic on Rimrock Road
- Before any more construction and new subdivision's, we need to look at the infrastructure. Rimrock road cannot handle 900 additional cars. A roundabout isn't the answer.
- Great improvement to Rimrock Road!
- Impact of increased traffic on Rimrock rd. Limit of weight allowed on Rimrock rd. What is happening to the roadway and infrastructure beneath. Cracks in asphalt is occurring.
- We need the Molt Road Connector. We have been talking about this for years. Traffic, trucks in particular, need an alternative to Zimmerman Trail.
- Traffic! Making sure that the plans adequately handle the increased amount of traffic on Billings roads. It is

nearly impossible to get anywhere in a timely manner during high traffic hours.

- Traffic is my main concern. Followed by public safety and available resources.
- *Traffic, speeding, semi-truck use of roads *Better planning for commercial buildings so there aren't so many "box" looking businesses; require stone exteriors (for example), landscaping, etc.
- Develop plans to reduce traffic on Rimrock Road and improve safety on that roadway. Consider traffic diversion and calming as well as alternate routes. Molt Connector should be considered
- critical that pedestrian & cyclist safety are considered as traffic increases further west. The plan needs to account for increased traffic loads coming from the west impacting incumbent neighborhoods
- Iam 24 and I plan on staying here in Bllings. I would love to see a beautiful Westend but the traffic should flow very nicely with clean water through out all the new development
- Extensive use of sidewalks-walk/bike/skate/run safely on roads. Improved bus service (longer span of hours available, more frequent times per bus stop). Public safety (more visibility of officers).
- Number 1 issue considered should be cost. Property taxes are ever increasing. We are already pushing those on fixed incomes out of their homes.
- Grand west of Shiloh- traffic patterns. Bike lanes
- Construct 4 lane Rd Grand Ave - Shiloh Rd to 56th.
- Every item listed is important.!
- Mixed-use developments that are eco-friendly
- Schools and infrastructure
- Accessing the west side from the heights
- ISO rating maintenance
- Police, Fire are top concerns. Current plans suck!
- Put commercial only on corners (commercial nodes).
- An arterial connector to the new belt loop road.
- Failing county H2O systems and annexiation
- Encourage large lots in city vs county.
- Slower traffic needed in SUBDIVISIONS and main roa
- No "affordable" housing on the West End!
- Complete neighborhoods (retail and residential)

Note: Some public comments were specific to areas outside of the plan area. Those comments have been removed from this summary report. However, all comments have been provided to the City of Billings and Yellowstone County for documentation.

Survey Number Two

Themes and Goals Survey Question #1

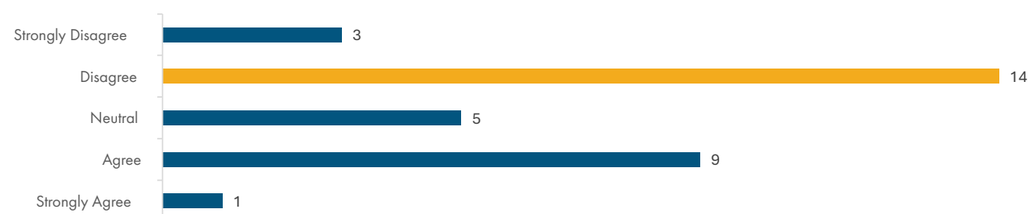
When thinking about growth in West Billings since 2001, do you believe that the growth has matched the intent of the 2001 Plan? Why or why not?

The comments suggest the execution of the 2001 plan has leaned heavily towards sprawl with an emphasis on cars and large houses. There's suggestion of a lack of mixed-use development, leading to separate areas for living, working, and recreation, causing increased traffic and infrastructure strain. While some respondents believe areas like Shiloh Road have seen positive growth with new restaurants and green spaces, overall, there's belief that development has extended westward beyond expectations without adequate infrastructure or public transportation. Some respondents suggest the lack of consistent infill development and coherent public planning has led to fragmented neighborhoods and insufficient public amenities, such as parks and trails. There's also an issue with the annexation of property without sufficient funds to maintain infrastructure, highlighting the need for impact fees. Despite some improvements, such as bike lanes and trails, the rapid population growth and demand have outpaced the original projections and plans, creating challenges in balancing growth and maintaining community integrity.

Detailed Comments:

- Don't know vision of 2001 plan
- There has been too much emphasis on cars and large houses.
- I'm ignorant of the specifics of the plan.
- development is compact but on islands of houses/subdivisions which spreading utilities like sprawl. people only live on the west end and don't have offices as much to prevent driving to downtown. make west end a destination to not only live but work! still need work on public transportation throughout this sector. mixed land use could improve as where people live are different than their work or eat or visit.
- I think things have filled in pretty well up to Shiloh Road and a good deal of development has been done right off of that as a main street. I would encourage additional development of two things in those neighborhoods in particular: restaurants and green spaces.
- Too much property annexed in without enough funds to properly care for the infrastructure. Impact fees are a must!
- The key strategies seem to have been

Do you believe that the growth has matched the intent of the 2001 Plan?



considered, but our west end expansion has blurred the intent of the strategies.

- Zoning changes occur that are contradictory to the projected zoning of 2001.
- West Billings has become a mess of sprawl and high-speed traffic with way too little infrastructure to support walkable and bikeable neighborhoods.
- The development of new apartments and the sprawl of the apartment footprint doesn't seem to reflect the infill development and coordinated growth.
- The plan anticipated growth fairly well; however, the rapid population increase in the last 4 years has sped up the timetable so many of the 2035 goals need to be implemented much sooner.
- As I recall, the plan was to not develop irrigated farm land and that has happened.
- It does not feel like we have seen a lot of infill since 2001; rather it seems like more and more subdivisions are being built out further west (64th Street and beyond). This feels like the Developers are more apt to build out in the county (which I assume to be cheaper) and then dump the traffic and infrastructure problems on the city eventually. This isn't super great. Also rarely do we see any attempt to rehabilitate downtown or other areas that are becoming eye sores. I suspect, but could not prove, that a lot of this comes from the fact that downtown landowners are wanting too much for their properties compared to simply building out further west. What amazes me, is that downtown would be the perfect place for high density development (for example the empty lot on the corner of 6th and 27th across from the Library) yet we have not seen attempts to build large apartment complexes down there, you have to ask yourself "why?".
- Growth has exceeded the 2001 projections.
- The interface between large lot county subdivisions and city development is an issue. Through a combination of market forces, local policy bodies, and strong demand, the end result has been challenging to work with.
- Very little of the west end development over the last 20 years could be described as "compact". All development has increased reliance on automobiles. Lack of County support has continued deterioration of west end aquifer.
- growth continues to sprawl far west (not dense infill of existing), creating traffic issues for cars, cyclists and pedestrian access Park development has not occurred, especially in West end. Land tends to be set aside, but no park developed or park space split up into small useless boulevards that do not allow for public use. Multi-use trails are often not connected or connected haphazardly (changing sides of the street, require crossings at high traffic intersections, etc.) I have not seen any evidence of water supply conservation such as city promoted conservation efforts such as high efficiency appliances, xeriscaping/water wise landscaping initiatives, etc.
- No apparent planning for balanced development as evidenced by lack of neighborhood parks and schools, current concentrated zones of high density housing known to be bad for communities, lack of traffic planning creating unsafe traffic patterns
- Growth in Westend has attempted to mirror 2001 plan as I understand. Success or failure has always been in the eye of the individual citizen.
- Developers have had to respond to official and resident concerns based on the 2001 plan.
- Seems very thought out and purposeful. Access and roads are well done.
- we have more bike lanes and trails than in 2001.
- There has been an OVER abundance of density of development within the west end. There is no dedicated open space for parks or other forms of outdoor entertainment available to the community. There is no mixed use of development, I can only think of 2 areas that have been designated for

Question 1 Theme	*Description*
Lack of Compact and Consistent Development	Development has increased reliance on automobiles. Growth has sprawled far west, creating traffic issues for cars, cyclists, and pedestrians. This has led to a patchwork of city and county parcels with inconsistent zoning and development practices.
Park and Open Space Development	Park development, especially in the west end, has been limited. Multi-use trails are often not connected or connected haphazardly.
Infrastructure and Planning	Lack of balanced development planning, evidenced by a lack of neighborhood parks and schools. Concerns about high-density housing and unsafe traffic patterns. The lack of coordinated effort and strong policy implementation has hindered the effectiveness of the plan. Properties have been annexed without sufficient funds to support necessary infrastructure.
Mixed Opinions on Development	Some perceive the development as thought-out and purposeful, with well-done access and roads. Others criticize the overabundance of density and lack of mixed-use development.
Implementation of Plans	Views on the success or failure of development plans vary among individuals. Some believe developers have responded to concerns based on the 2001 plan, while others doubt the existence of a comprehensive plan.

businesses and the rest is residential since 2001 that has grown, this including the Shiloh center and the more recent development of business on Grand and 54th. Then for coordinating public infrastructure, the best agriculture land is being over taken for it's convenience.

- There does not seem to be good mixed use development other than a couple small instances.
- I am thrilled with new development in Billings. The further development along Shiloh Road and near the zoo is wonderful. At the same time, the integrity of neighborhoods is being protected and preserved. The development of new trails has been wonderful! It is one of the things that we love about Billings. We don't have the best trail system in Montana, but it is improving all the time.
- I disagree because I don't believe there is much of a plan for the subdivisions, traffic and trails. Most everything is developed by the individual landowner and traffic patterns and surrounding development tends to simply adjust.
- We have lived on the far west end of Billings for just over 10 years and when I saw that there was a 2001 plan, my first thought was "well, you could have fooled me." Just a cursory look at the hopscotch nature of city/county parcels surrounding Grand Ave west of Shiloh says that if there was a plan at one time, no one had the fortitude for implementation. Cities with plans that are implemented are easy to spot... Fargo/West Fargo/Mapleton, ND, and Fort Collins/Loveland/Windsor, CO are two prime examples of how to expand into land that was once agricultural use by annexation or incorporation.

Question #2

What are the most important issues related to Planned Growth that the 2024 Plan should address?

The comments suggest opportunities for widening roads with walking and biking paths, preserving open spaces, and conserving water supplies. Respondents would like to create walkable neighborhoods with accessible amenities, reducing reliance on cars. They suggest focusing on infill housing, mixed-use development, and compact growth to control sprawl. There is a request for effective public services, affordable housing for all income levels, and integrated public transportation. Managing increased traffic, ensuring consistent development, and enhancing green spaces and trails are essential. Cooperation between the city and county, respecting landowner rights, and promoting diverse socioeconomic neighborhoods are also critical. The overall vision is to create safe, community-centered areas with efficient infrastructure and minimized sprawl, with some suggesting to use the development model of Bozeman and avoiding issues like casinos and large box stores.

Detailed Comments:

- Widened roads with appropriate walking/biking paths along the major corridors. In addition, NO CASINOS! West end should look like Bozeman
- Water supply conservation, open space preservation, and effective public services
- Neighborhoods where people can walk and access what they need without having to use cars all the time.
- Trails, infill housing
- creating complete and safe streets that would provide wealth, growth, and places for people to visit. No having roads or stroads as people are flocking still to the downtown from the west end.
- 1. Traffic is a big one. As the west end continues to expand, the city needs to keep up or stay ahead of the growing traffic. A couple other cities in the state were not prepared for the growth they've experienced over the past decade, and it shows when you're driving through parts of those towns. Thus far, Billings has been able to keep up on this end of town, but continuing to plan ahead there will be important. 2. Green spaces.

Question 2 Theme	*Description*
Mixed-Use Development	Advocacy for neighborhoods with a mix of residential and commercial/retail activity to promote economic diversity and support local businesses. Desire to avoid concentrating commercial development at major intersections, favoring smaller businesses that contribute to local wealth.
Safety and Connectivity	Emphasis on pedestrian access, trail connectivity, and mixed-use developments to promote walkability and community interaction. Focus on efficient traffic flow, connectivity of multi-use trails, and promotion of public transit to reduce reliance on cars. Calls for streets designed with safety in mind, prioritizing reduced speeding over traffic throughput.
Balanced and Cooperative Planning	Preservation of parks, green spaces, and open areas within neighborhoods to create safe, balanced communities with access to amenities and neighborhood schools. Advocacy for city/county cooperation in land use planning, along with incentives for annexation to promote coordinated development. Recognition of universal goals such as safe neighborhoods, thoughtful expansion, water conservation, and quality of life.
Affordable Housing and Sustainability	Need for more affordable housing and protection of existing neighborhoods from large multiunit apartment developments. Concerns about overgrowth and water conservation, along with the importance of multi-use trails for walking and biking.

Most of Billings has a park within five minutes of any residence, which is terrific. Keeping that trend would be wise. Also, obviously, we have world-class hiking in the state, but you can't always hop in the car and drive an hour or two. A planned walking/biking trail or a forest-centric park on the west end would be great.

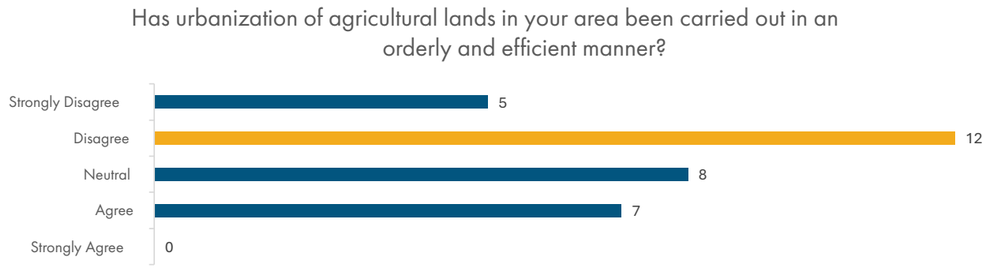
- Water shortages. Infill. Native landscaping. Mixed use spaces. Affordable housing for ALL income levels, not just working class. Public transportation. Parks.
- The management of increased traffic needs to be added.
- Rezoning of land with disregard to current land owner rights.
- Controlling sprawl - encouraging compact, mixed-use development / growth - encouraging walkable and bikeable neighborhoods - discouraging single-occupancy vehicle trips in every way possible
- The architecture and footprint of multi family housing. We need to include low income options on the west end to encourage diverse socioeconomic neighborhoods.
- Expanding Grand Ave btwn Shiloh & 54th as well as rimrock road btwn 50th & 54th. Both of these 2-lane roads are currently dangerous & congest traffic terribly. The recent light at 48th & grand was helpful, thank you!
- Traffic flow, school populations and consistency in development.
- The traffic, and more specifically multi-modal access (paved bike paths) should be required for any new sub-division build or expansion. If you're going to build out that far, you need to only only prove that the road will handle the additional traffic, but that you have given options to those that live out there to avoid driving. In my opinion if you force that issue, you will naturally see in-fill become more attractive because the infrastructure was already built, in addition you would also see more incentive to rebuild in areas that have become blighted.
- Traffic and checkerboarded city/ county development. Billings will not be able to achieve the density needed for obtainable workforce housing if YC development continues requiring 1/2-to-1-acre parcels of land to accommodate water wells and septic systems.
- A greater spirit of cooperation among Yellowstone County and the City of Billings elected officials.
- Development of actual neighborhoods that contain a mix of residential and commercial/retail activity. Stop pushing commercial development to major intersections...this encourages larger box store and franchise type development instead of smaller business that keeps wealth in Billings. Streets should be designed to favor increased safety and reduced speeding over traffic throughput.
- Pedestrian access and trail connectivity Promotion of mixed use developments and walkability
- See above- preservation of parks and green space, planning focused on creating safe balanced communities with neighborhood schools and safe ways for children to walk or bike to those schools, mixed housing, traffic planning
- I don't believe the stated goals of the 2001 Plan have changed that much from the needs, expectations, desires of the Westend population although the "Westend" definition has migrated. Safe neighborhoods, thoughtful planned expansion with an eye on water use, open space (park) integration, traffic flow, new school necessity, and quality of life are still universal goals. How new developments effect property values/ rights need mandatory safeguards.
- transportation including walkability affordable housing consistency within neighborhoods
- Making certain all development is needed, is accessible, has plenty of green space, is in keeping with school and commercial needs.
- Access to trails
- There should be a stop on the growth and a developed plan for improving the mistakes already made. There should be an improvement in the transportation in and out of this area to assist in its over growth and creating more open space.
- Continued development of open space, trails, and parks.
- We need more affordable housing. We need to continue to protect our neighborhoods. Large multiunit apartments should not be allowed in residential areas where it is primarily single family homes. The number of new development outside of the City is of concern. Also of concern are the number of new water wells on the west side of town and the dropping water levels. We really need more multi-use trails for walking and biking. This should be a majority priority for the City.
- Efficient and effective traffic flow, Connectivity of multi-use trails and sidewalks, Areas for public transit and encouragement of the use of public transit. More safe and sensible community spaces, parks, amenities, trails, & sidewalks, Water preservation and water drainage. Let's make West Billings a walkable, community-centered area, instead of accessible only by car.
- City/County cooperation in land use planning. City/County incentives for annexation...the carrots City/County enforced consequences for not submitting to annexation...the sticks.

Question #3

In your opinion, has urbanization of agricultural lands in your area been carried out in an orderly and efficient manner?

Please share your opinion.

The comments highlight concerns about the patchwork development and sprawl in the west end of Billings, leading to increased service costs and traffic congestion. Lack of county oversight and planning makes it challenging for the city to implement infill development effectively. The development pattern is criticized for its lack of focus on creating balanced communities, with examples cited of high-density housing without adequate infrastructure and parks. The conversion of agricultural lands into housing and business areas is seen as unplanned and driven by economic forces rather than thoughtful urbanization. There are also worries about the loss of farmland and the impact on future food production. Additionally, concerns are raised about the threat of future gravel pits and the lack of a coherent plan for preserving agriculture. Overall, there is a sentiment that current urbanization lacks foresight and orderly planning, threatening agricultural viability and community cohesion in West Billings.



Detailed Comments:

- Taking FOREVER to complete the roundabout at 62nd & Rinrock, AND there is no evidence Of walking or biking paths that will be connected
- It is sad to see the loss of agricultural land, and seeing it gobbled up for sprawling pavements, parking lots, and over-sized houses.
- I like how the agricultural lands are being developed but I do not like that taxpayers bear the burden of expansion costs rather than developers who are making a pretty penny of the expansion.
- The next generation of using the agricultural land for crops is not interested in farming the land. Selling it for urban development is their solution.
- Billings has a history of disregarding individual land owner concerns over the financial incentives from developers. City officials and developers do not take into consideration the future water needs of high density population areas.
- Over the past 20 years, housing development in West Billings has proceeded in an uncontrolled and opportunistic manner, driven largely by bottom-line economic concerns of developers, NOT by relevant urban panning considerations. The result has been an intermixing of agricultural and residential land uses that is ugly, inefficient, and chaotic. What a mess!
- The casino & liquor store on grand & 54th is not a welcome sight. Brings tougher crowd & more DUI's to nearby family neighborhoods.
- I still see active cultivation on the west end; and I have never encountered conflict with the development so I cannot speak to this point.
- Again, the checkerboard pattern of City/County doesn't allow for efficient extension of public water or wastewater systems.
- The urbanization of ag lands has been slightly haphazard.
- Patchwork development has resulted in sprawl and increased service costs for city residents. Lack of County interest in orderly/planned development makes city infill development harder.
- West end continues to see far west development, "leapfrogging" over several vacant areas on west end leading to sprawl w/ lots of traffic
- There does not seem to be any real oversight in development that is grounded in creating healthy balanced communities as evidenced by large area of concentrated high density housing being built between Shiloh and 48th south of central, no work on main east/ west road routes to create safe roads with biking/pedestrian paths and reduce congestion, lack of parks on west end
- The development of agricultural lands to housing/business utilization seems to follow a leap frog progression, likely due to economic forces rather than a planned, progressive, infill architecture.
- Far west end is absolutely random. However much is not in city limits. A shame there hasn't been zoning.
- Urbanization appears to be orderly. We will regret the lack of farmland in the future, due to needs for fresh produce.
- What a shame that our ancestors cleared the land for agricultural, putting hard labor into the land to be sold for a low ball dime to build subdivisions. With all the agricultural land being taken away where and how are people going to get their needed food when there is no good fertile agricultural land available any more because all the ugly subdivisions have been put on the best easy convenient agriculture land.
- I disagree because of the actions of Yellowstone County. Several areas are threatened by future gravel pits, which makes the development of those areas difficult. Who wants their home next to a gravel pit.
- There is no plan with respect to preservation of agriculture in West Billings; most developers are cashing in on the opportunity to develop these lands and so agricultural lands are

scattered and inefficient.

- Again, one look at the hopscotch board of city/county parcels west of Shiloh tells the whole story.

Question #4

From your perspective, what improvements or changes would you suggest to enhance the orderly and efficient urbanization of agricultural lands?

The comments emphasize the need for adherence to city standards and annexation requirements for new developments within existing city limits. Concerns about unchecked sprawl westward and traffic safety issues highlight the importance of establishing natural buffers and implementing efficient traffic management. Suggestions include developing family-friendly parks, regulating development density, and fostering community involvement in planning. Preservation of agricultural land is a key concern, alongside dissatisfaction with current County Commissioners and calls for stronger regulations and leadership to address development challenges effectively.

Detailed Comments:

- Widened roads & bike paths for safety and to enhance fitness
- Teach people how to honor the earth.
- City sized lot developments, no septic systems.
- provide more incentive for building closer to the city limits or providing more infill. leave agriculture lands as community gardens, parks, or nature walks for places for people to visit.
- Impact fees for w/s/g, fire and police services. Parks MUST belong to City of Billings with appropriate maintenance agreements that include how all costs will be covered by neighboring properties rather than taxpayers as a whole with an ever-growing PD1 (which is now defunct and should NOT be!)
- Limit huge apartment complexes.
- Allowing current land owners to maintain their current status of land use.
- Do not allow anymore casinos/bars on this end of town nor apartment complexes. Should be family neighborhoods & parks.
- Develop dryland before irrigated land.
- If the desire is to preserve existing farm land, you need to make infill or overbuild/upzoning more attractive (cheaper) or make purchasing the farm land/developing it more expensive. There does not seem to be strong political will to do so, which is a shame!
- Farming is not profitable for most smaller operators. The farm kids don't want to come back in most cases and run the farms. The City of Billings needs to annex YC properties that are no longer viable.
- A greater confidence that any land use entitlements that meet the defining criteria can be secured.
- All development within 1 (2?) miles of existing city services must be developed to city standards with annexation required.
- far west end buffer of natural space that prevents development from continuing to sprawl westward and encourages development of several West end vacant areas prioritize efficient traffic patterns for existing city limits and do not provide high speed corridors to far west end/outside city limits. Currently, the commute is fast because you can drive fast in east-west direction, which not only incentives development further west but the high speed traffic makes it difficult and unsafe for walking and biking.
- Address arterial roads, requirements for developers to designate and develop family/kid friendly community parks and paths within developments, restrictions on how much commercial, industrial, high density vs low density housing can be developed with each square miles in coordination with adjacent square mile plots/zones
- Community involvement in the planning process. Coordination between County/City planning. Cost/benefit analysis of any future development in regard to resource utilization before annexation.
- It's difficult as some owners of closest in land don't want to sell. The best development is fill in from edge.
- Save the farms.
- DON'T URBANIZE THE AGRICULTURAL LAND, find something else where!
- We need new County Commissioners. Those guys just aren't going to do anything to make things better. The County Commissioners are advancing an extreme Republican partisan agenda.
- No subdivision or business development without annexation. Period. Set a standard and follow it. For example, no more than one home per acre on county land.

Question #5

When thinking about West Billings, what contributes most to the character of the community?

The comments reflect diverse perspectives on the character and development of West Billings. Some highlight a desire for the area to match the community feel and amenities of places like Bozeman, emphasizing parks, recreation areas, and mixed-use spaces over large houses and retail chains. Others lament the loss of farmland and express a need for more distinctive landmarks and public gathering spaces to foster community spirit. Concerns are raised about the current character of West Billings, noting its suburban sprawl and lack of cohesive identity beyond retail developments and busy roads. There's a call for more parks, trails, and family-friendly amenities to enhance the livability and appeal of the area beyond its current utilitarian infrastructure.

Detailed Comments:

- New housing, should match Bozeman's efforts
- built environment and parks and

recreation areas

- Cars and large houses.
- The disappearing farmland.
- destination places where people gather create the sense of community
- Honestly, because West Billings has effectively developed over… 50? years… character is a little hard to define. There's kind of a hodgepodge of architectural styles. For prominent places, ZooMontana stands out as a landmark, gathering space, and event spot. I'd say the next three most notable locations on the west end would be Faith Chapel, Costco, and the wetlands preserve.
- Parks Schools Mixed use retail Big box shopping Chain restaurants Casinos and car washes Lack of public transportation options
- West Billings is an extremely large area that has only one small public gathering space: Phipps Park. Although Phipps is fantastic, this large section of Billings needs more public gathering spaces. Development of Cottonwood park or other natural areas would add to the character of the community. The streetscape on Shiloh is also a bonus for this area. It's very attractive.
- Places for community to gather combined with the built environment
- The character, friendliness, and individuality of the Westend citizenry.
- mixed use
- West Billings has little character. Flat, no grand parks or beautiful landmarks. I consider Grand to Rims NW Billings.
- Retail markets
- I don't know
- Clean and well kept neighborhoods, businesses and parks.
- Rural, disperse, historic characteristics of the western lifestyle
- West Billings doesn't have much character. Recently I was in Issaquah WA. The neighborhoods in that city were walkable, friendly and safe. The west end is full of closed off neighborhoods and busy 4 lane roads. The walkability to parks, restaurants and other neighborhood amenities is lacking.
- Safe family neighborhoods, not worrying about DUI's around corner of the area due to casino & liquor stores in middle of family neighborhoods & schools.
- Quiet living.
- I am not sure that this needs character? West Billings, and in fact most modern development in the USA reflects suburbia, one would ask why that's bad? Do we really need a mom and pop shop ripping off the locals? Do we really need another casino, bar, or vape shop in a "neighborhood commercial node"? We had Mayor Bill Cole proudly highlight The Den there at 54th and Grand, did he take a moment to ask himself if everyone really appreciated another bar next to a church and school?
- I don't like the Den and Brew pubs that were approved by prior city councils. The west end is best suited for residential development. Very limited commercial developments are ok.
- Bedrooms and traffic.
- The west Billings area has very little character. It is the same type of generic suburban sprawl we could see almost anywhere.
- Places for community to gather combined with the built environment
- The character, friendliness, and individuality of the Westend citizenry.
- mixed use
- West Billings has little character. Flat, no grand parks or beautiful landmarks. I consider Grand to Rims NW Billings.
- Retail markets
- I don't know
- Great parks. Great trails. (We need more trails). Great shopping like Shiloh Crossing. The Shiloh Conservation Area. The future Shiloh Lakes. Great schools.
- Currently, the west end is a drive community, separated by individual subdivisions.
- Unless you count retail development, there's not much else. The character of Billings screams casinos and big box retail.

Question #6

What areas of community character would you like to see the 2024 Plan address?

The comments emphasize a strong desire for thoughtful development in West Billings, focusing on creating pedestrian-friendly environments with ample walking and biking paths, and aesthetically pleasing architecture similar to Bozeman's standards. There's a call for more parks, cultural events, and community spaces to enhance economic vitality and quality of life. Concerns about over-commercialization with casinos, large signage, and corporate influence are raised, advocating instead for smaller-scale, locally-owned businesses. Retaining the rural character with farming and ranching elements is important, alongside development that integrates natural areas and avoids excessive concrete developments. Overall, there is a consensus for balanced, sustainable growth that prioritizes community needs and environmental stewardship across West Billings.

Detailed Comments:

- Any new development needs walking/biking paths near their development & brick walls around development to avoid junky fences. No casinos, no junky signage, architecture requirements such as Bozeman uses
- parks and recreation areas, culture, economic vitality
- Park land.
- more public events on west end, farmer's markets, community non motorized where you see people out inside of in cars, and well managed parks.
- It feels like recent developments on/around Shiloh have a little more cohesion of style. Encouraging that would be a step. As mentioned above, stressing some green spaces would be a positive. Having good restaurants that sit in or

very close to neighborhoods is also nice... Siam Thai or the restaurants at Shiloh Commons would be good examples on the west end... The Granary or Black Dog (formerly Harper & Madison) would be an example elsewhere.

- Public transportation. More mom and pop restaurants and stores, less out of state corporate influence (unless it's high-demand stores like Trader Joe's we don't already have like Trader Joe's). No more casinos, car washes, or banks!
- Safe biking trails
- Retainment of the rural, farming, ranching characters. With livestock and crops.
- West Billings needs smaller-scale, user-friendly commercial and retail areas -- not more strip malls, storage facilities, and out-of-scale commercial and light industrial buildings.
- I believe we need to focus more on the neighborhood concept of our city. Billings needs more options for shopping, and fewer gas stations, casinos.
- Developing & supporting city park land that was donated and is located off Colton & 54th.
- Continue with quiet, laid back living.
- I think the great focus of this should be walk-able communities in the sense that there are trails to enjoy nature or simply walk the dog. We don't need to have it connect to a commercial node per say. For example, the Big Ditch Trail heads through several neighborhoods without a real connection to anything commercial, rather it connects to schools and parks which are great. People move out to these areas to escape the city and the blight that comes with it.
- We do need more parks on the west end. Cottonwood Park doesn't need a $9M community center. Do some open play space development where the kids can play. Open grass play fields, swales and hills with backstops for baseball play and practice.
- A greater mix of land uses that can meet the demands of the area, not just a neighborhood.
- Development of true neighborhoods, where commercial/retail is integrated instead of pushed away from residential areas. Minimum lot coverage with shared parking on large commercial developments to prevent over-paving and under-utilization of valuable land (e.g., Shiloh & King).
- More parks and natural areas Improved pedestrian access to business developments
- See above
- Affordable housing. Clean, safe, available public transportation.
- consistency within neighborhoods
- Grand to the freeway and Shiloh west.
- Trails linking the shops to neighborhoods.
- parks
- A focus on avoiding large concrete box store developments without intermingled mixed use and natural parks, vegetation, or open space.
- I would like to see more multi-use trails. We ride on and walk on our trails all the time. The trails are one thing that really make Billings a more attractive community. They help us retain and recruit new employees.
- Walkability/multi-usetrails,community spaces, planning for schools, zoning and planning for commercial v. residential locations, and the development of appropriate roadways.
- A large park, like Pioneer Park, west of Shiloh. Trees lining Hwy 3 along the new trails on the rims. The walk is spoiled by the highway traffic. Better beautification projects on major arterials. Planting that are well maintained year-round, with large trees that absorb traffic noise along sidewalks and walking paths. This is specific to Shiloh road, but could apply all over town.

Question #7

Whatarethreeproactivemeasures that can enhance public safety within the plan area?

The comments highlight a strong emphasis on improving infrastructure for walking and biking paths, ensuring adequate drainage to prevent flooding, and managing traffic flow with measures like lower speed limits, roundabouts, and improved road widening. Residents suggest prioritizing the maintenance of parks and public spaces, advocating for well-maintained facilities and increased connectivity through trails and sidewalks. Other suggestions include managing urban density appropriately, addressing homelessness through supportive housing initiatives, and enhancing safety through improved lighting and traffic management. There's also a call for responsible development practices that include water conservation measures and thoughtful integration of stormwater management with park and open space planning.

Detailed Comments:

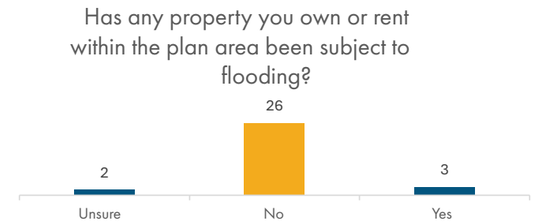
- Walking/biking paths
- constructing drainage corridors and ensure adequate fire flow
- Lower speed limits
- number of local own restaurants and grocery stores
- Ensuring that storm drains are able to manage water flow. While it hasn't flooded homes in our development, a street nearby routinely floods during heavy storms. I helped push two stalled cars out of the water last time
- Development of Permanent Supportive Housing for those who struggle with homelessness
- Park spaces that are well maintained.
- Decrease density
- dedicated bike / walking paths along all thoroughfares
- Put police in office located off grand and 54th.
- No over development
- Encourage Neighborhood Parks that act as meeting places (see "classic"

copper ridge) to know your neighbor
- Widen Grand Ave to 64th or 72nd. Four lanes with a turn lane, quit piecemealing development.
- Higher densities
- Average actual street speed
- Connect trails/bikeways/sidewalks to all neighborhoods <3 miles from Ben Steele Middle school to allow for walking or biking to school
- Traffic planning on main east/west routes
- Ability to enforce traffic laws through electronic/camera monitoring
- safe biking and walking
- A large park
- Require builders to mitigate potential building issues, e.g. those that occurred in Copper Ridge
- Police
- Adequate spacing and setback, including natural landscaping and vegetation
- We could use more areas to hold stormwater runoff. Not every area has storm sewers.
- Widening arterial roads, while narrowing residential road, to encourage safe and effective traffic patterns
- Be hyper-vigilant about graffiti removal. This tells the miscreants what will or will not be accepted in a neighborhood.
- Traffic lights/roundabouts
- joint-use facilities to ensure safe parks, schools, and trails
- Curb-outs at intersections.
- number of bike lanes and sidewalks
- Establishment of a low-barrier shelter option for those who struggle with homelessness
- Water conservation measures should be considered.
- Conservation of open space
- More lighting in neighborhoods or at least down 54th street & around casino.
- Observant neighbors
- Avoid building parks that are unfunded and therefore do not have maintanance, if a space is maintained its unlikely to have vandals move in
- Traffic calming with roundabout at 48th and Central. Also 48th and King.
- Enforcement of current traffic policies
- Number of drive-thru lanes (fewer means more people out of cars and engaged in the space instead of just driving through it)
- Pedestrian tunnels or bridges to cross major roads (King, Central, etc.) on Shiloh path. Current crossing lights are not sufficient
- Parks with playgrounds/ water parks for community use
- Safe, we'll lit, walking/biking paths to
- recreational space for all ages and capabilities
- Your Open Space plan is right on
- Build a trail from Shiloh to 56th St. West
- Dedicated trails and pedestrian access protected from roadways

- Build and develop more parks that can hold stormwater runoff.
- Improving water drainage and developing a plan for water sources for household use and fire suppression
- Street lighting in ALL new subdivisions. Not yard light…streetlights.
- Lighting
- More bike trails.
- number of two-way and only two lane streets
- Planned park developments that are adequately funded
- Don't allow main arterial streets to connect through neighborhoods.
- Limit through streets, encourage through current high volume areas with enhance flow in these current roads
- Lighting
- Add a bike lane.
- Percentage of homes within city limits
- Multi-use path along Grand Ave (west of Shiloh) and Rimrock Rd (west of 54th)
- Restriction of commercial development for sales of alcohol, gambling, pot distribution shops
- Cut traffic congestion with improved public transportation if feasible.
- youth programming
- Finish Cottonwood Park
- Use of water drainage systems in conjunction with open space or parks to consolidate and check multiple boxes
- Adequate lighting, traffic prompts, walking/trail underpasses under arterials.
- Proactive transportation plans… widening roads BEFORE projects are started. Turn lanes, adequate (full vehicle width) shoulders

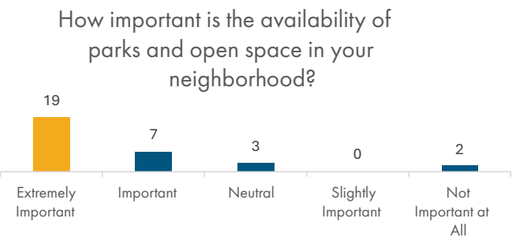
Question #8

Has any property you own or rent within the plan area been subject to flooding?



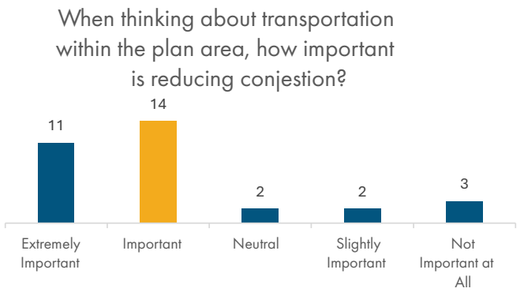
Question #9

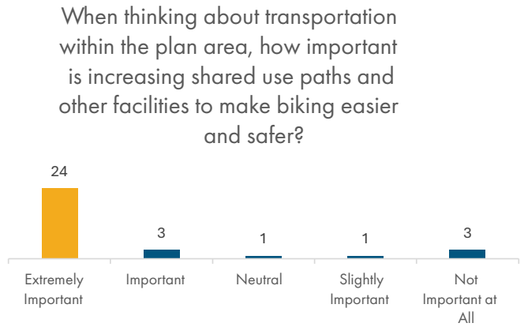
How important is the availability of parks and open space in your neighborhood?

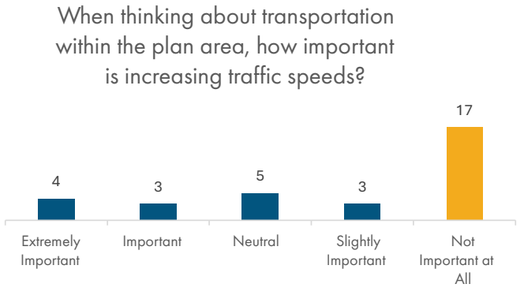


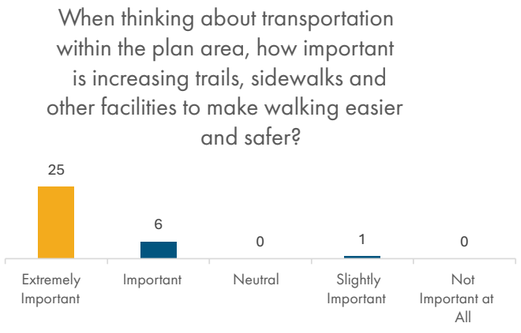
Question #10

When thinking about transportation within the plan area, how important are the following topics?



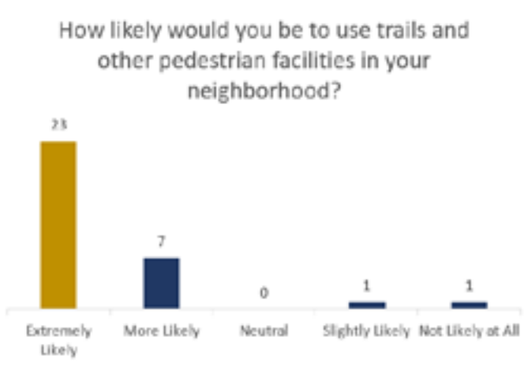






Question #11

How likely would you be to use trails and other pedestrian facilities in your neighborhood?



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Map Comments

1 Great park with beautiful views and lots of space to wander!

I love Phipps Park for its magnificent views of the valley. I'm glad that we've preserved this land as a recreational area for the city & county to enjoy.

2 Pedestrian

Opportunity to create pedestrian paths for safety

3 Opportunity to ensure bike/pedestrian facilities at new intersection

I hope that the city will put in robust wide sidewalks/ paths at this intersection AND connects this sidewalk to the extensive sidewalk network just to the east.

4 Need pedestrian option between 54th & Molt

The walk/bike path on Rimrock Road ends at 54th street. It should continue along this stretch of Rimrock Road between 54th & Molt.

5 Trails on Rims are an asset to Billings

This trail network is robust and I hope it stays that way! People in surrounding neighborhoods use them all the time.

6 Opportunity for dense, multi-family housing near middle school

Areas within a mile of the middle school should have zoning that allows for dense multi-family, so that more families can take advantage of this new middle school (and WALK there!).

7 Diamond X Restaurant / Brewery

We stopped by on a Sunday afternoon because the truffle fries are to die for! They were having a special buffet (Mother's Day?) so we didn't stay. But the place was packed with families and kids. It felt like a real neighborhood gathering place.

8 Extend bike / walking path

The short section of walking / biking path on the south side of Grand Ave near Trails West subdivision and Ben Steele Middle School could -- and should -- be extended east all the way to Shiloh Rd. This would connect up all existing and future residential developments along Grand Ave to the decent walking and biking path network that exists east of Shiloh Rd all the way to downtown Billings.

9 Safety

Dangerous intersection with deep drop offs. Trucks and long vehicles have difficultly navigating turns to avoid catastrophe and shouldn't pass through intersection

10 Bike/ pedestrian pathways needed

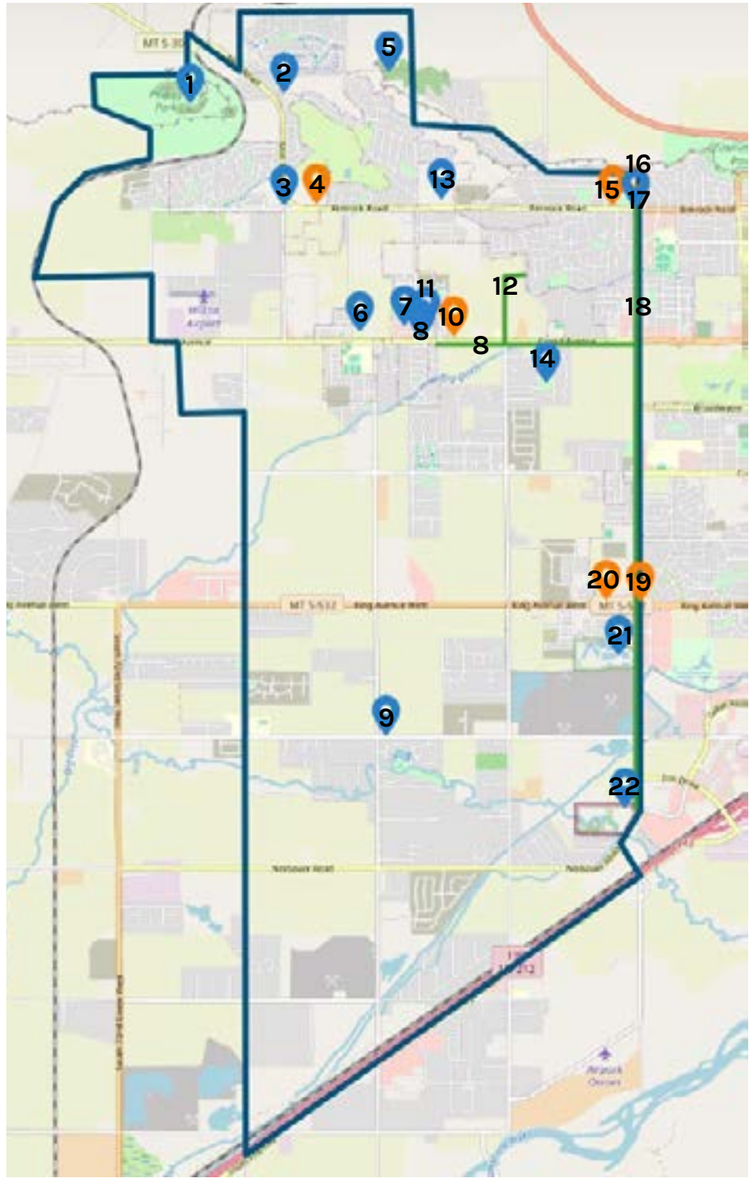


Figure A.1 - Map of Comments

11 Grocery Store

Appreciate having a grocery store here! It would be great to see more neighborhood businesses (cafes, sandwich shops, gyms, etc.) well-integrated into the west-end as development occurs, not just residential construction.

12 48th From Rimrock to Grande

Would love to see Rimrock connected to Grande via 48th/46th somehow someday.

13 Well-used walking path -- need more like this in Billings!

So many people use this walking path along Rimrock Road, and I've love to see more in Billings! It feels safe and comfortable because it's set back and not directly alongside the road & high-speed traffic, and it's wide enough for lots of walkers and bikers to share the path.

14 Great park and gathering space

lots of football and soccer practices going on here

15 Traffic heading into town on Rimrock needs to be slowed down

there's a school just south of RImrock on 38th. We need a way to keep kids and other pedestrians safe on Rimrock between 46th and 38th. Flashing lights to warn that speed limit decreases from 45 to 35; speed humps; school zone on Rimrock. And other good traffic calming ideas should be implemented.

16 Zimmerman Trail

My residence apparently missed being in the "West Billings" area by a few blocks interestingly. The concern is Zimmerman Trail a very significant conduit for the "West Billings" area. The speed limit is 25. No one seems interested in going 25 and if you do, you have a host of vehicles tailgating your rear bumper. Even in ice and snow. Where is law enforcement? Frankly I don't care if the speed limit is 50 but I imagine if it were, there would be tailgating vehicles wanting to go 60...around blind curves, indifferent to potential obstructions such as fallen rocks, indifferent to road conditions...WHERE IS LAW ENFORCEMENT?

17 Need walking path up Zimmerman Trail

This proposed trail would be an incredible opportunity to connect people who live below Zimmerman Trail with all of the beautiful parks & amenities on top of the Rims. People would use this all the time.

18 Bike path

love the bike access here. would love to see more trees/ shade and better cross walk markings since billings drivers don't know how to use pedestrian intersections

19 Pedestrian nightmare

Shiloh Crossing is largely inaccessible for people walking/biking from all neighborhoods. People drive SO FAST through the roundabouts that I would never feel safe crossing there as a pedestrian.

20 Dangerous experience for pedestrians

I have seen people try to walk from the Divide Bar & Grill back to their apartment north of King Ave. They had to sprint across the road and clearly didn't feel safe in the roundabouts. More people should be able to walk from the apartments north of King and west of Shiloh to all of the amenities at that interchange. The roundabouts feel extremely unsafe. Perhaps there can be a pedestrian light somewhere on both Shiloh and well as on King for people to stop traffic & cross?

21 Love this area!

We love walking around this area. We need more places like this in Billings!

22 A Billings treasure!

We love Zoo Montana! It's a gathering space AND a local landmark!

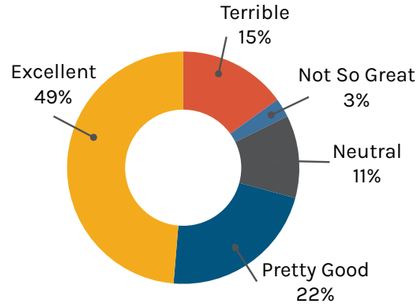
Public Engagement Phase 2: Guiding Principles Survey

The guiding principles survey was available on the project website from XX to XX and was noticed by the project team to the project mailing list and public via XX. Results of the survey showed broad approval of the draft guiding principles, which serve as an update to the 2001 guiding principles. The results of that survey and detailed responses are included here.

LAND USE

Land Use Goal #1

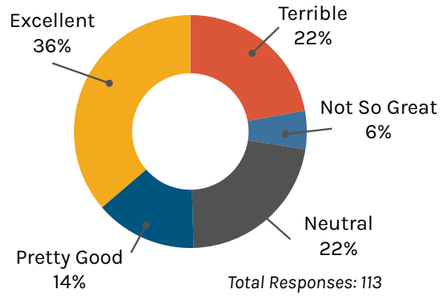
Grow responsibly by encouraging density and pedestrian-oriented development adjacent to existing infrastructure



Total Responses: 113

Land Use Goal #2

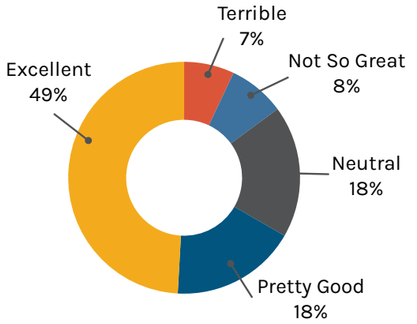
Support diverse housing options for all income levels



Total Responses: 113

Land Use Goal #3

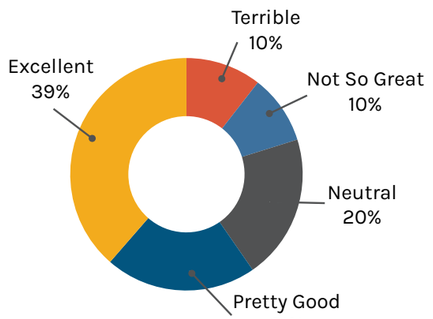
Preserve agricultural lands in the County



Total Responses: 114

Land Use Goal #4

Establish transition areas between urban, suburban, and rural areas



Total Responses: 114

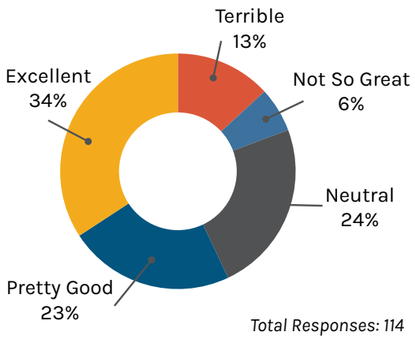
RANKING LAND USE POLICIES BY PRIORITY

Figure A.2 - Land Use Goals

COMMUNITY VITALITY

Community Vitality Goal #1

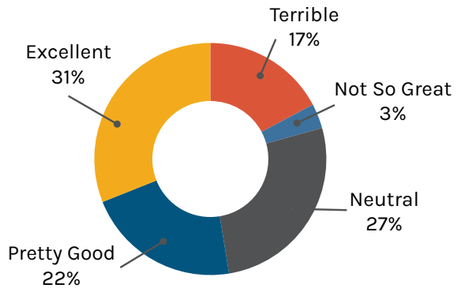
Identify locations and encourage the development of activity centers throughout the neighborhood



Total Responses: 114

Community Vitality Goal #2

Promote mixed-use development where appropriate to strengthen community identity



Total Responses: 116

RANKING COMMUNITY VITALITY POLICIES BY PRIORITY

01 CV 1.1 — Identify areas suitable for community nodes and show locations on the Future Land Use Map

02 CV 1.3 — Discourage strip corridor commercial development

03 CV 1.4 — Use neighborhood parks as anchors in residential areas when appropriate are provided

04 CV 1.2 — Align zoning with node locations to ensure development potential

05 CV 2.1 — Support development of complete neighborhoods that integrate nodes and anchors into the community

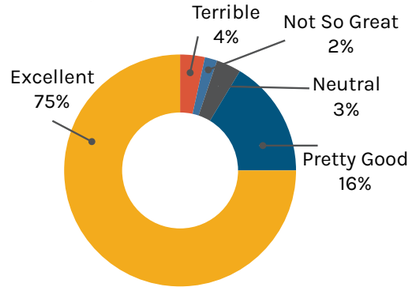
06 CV 2.2 — Support opportunities for mixed-use developments where infrastructure can support it

Figure A.3 - Community Vitality Goals

NATURAL & RECREATION

Natural & Recreational Areas Goal #1

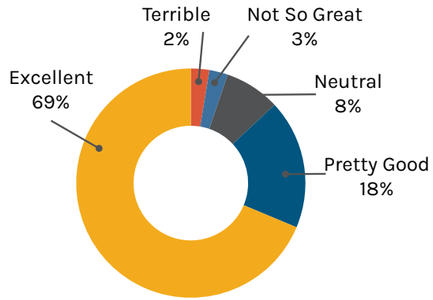
Preserve and protect floodways, waterways, and scenic resources



Total Responses: 116

Natural & Recreational Areas Goal #2

Promote water conservation



Total Responses: 115

Natural & Recreational Areas Goal #3

Connect neighborhoods with interconnecting parks and trails

Total Responses: 117

RANKING NATURAL & RECREATIONAL AREAS POLICIES BY PRIORITY

01 NR 1.1 — Identify and preserve natural areas by limiting development within these areas

02 NR 2.1 — Encourage water conservation through development of landscape irrigation standards and best practices

03 NR 3.1 — Establish an interconnected green space and trail network

04 NR 1.2 — Regularly update and maintain floodplain maps

05 NR 2.2 — Align review of the future land use map with the City of Billings Water Master Plan to ensure that projected growth can be served with municipal water supplies

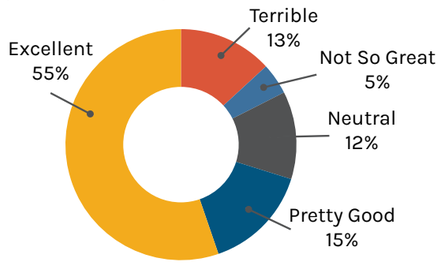
06 NR 3.2 — Support City Parks and Recreation Department in the development of long-range plan for parks and management of those parks

Figure A.4 - Natural and Recreation Goals

TRANSPORTATION

Connected and Multi-Modal Transportation Network Goal #1

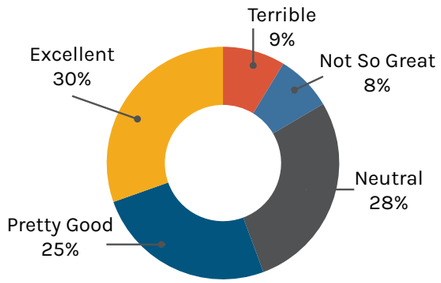
Where appropriate, build a complete pedestrian transport network



Total Responses: 114

Connected and Multi-Modal Transportation Network Goal #2

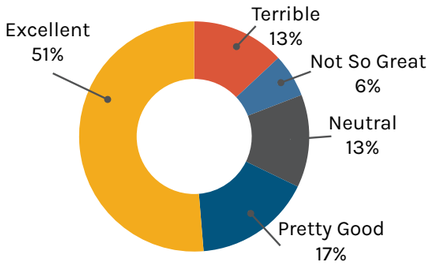
Promote an interconnected street network



Total Responses: 115

Connected and Multi-Modal Transportation Network Goal #3

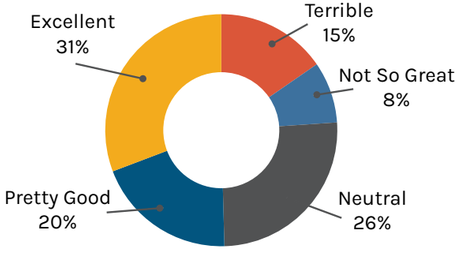
Expand pedestrian and bicycle infrastructure



Total Responses: 115

Connected and Multi-Modal Transportation Network Goal #4

Support transit-oriented development



Total Responses: 117

RANKING CONNECTED AND MULTI-MODAL TRANSPORTATION NETWORK POLICIES BY PRIORITY

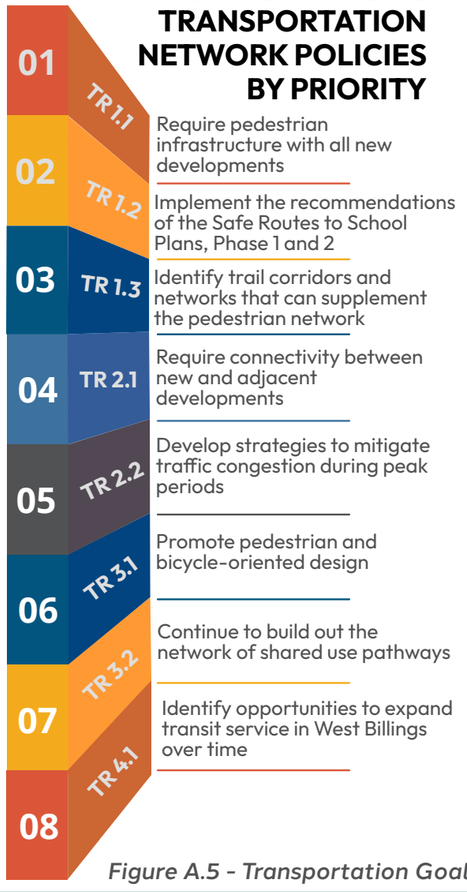
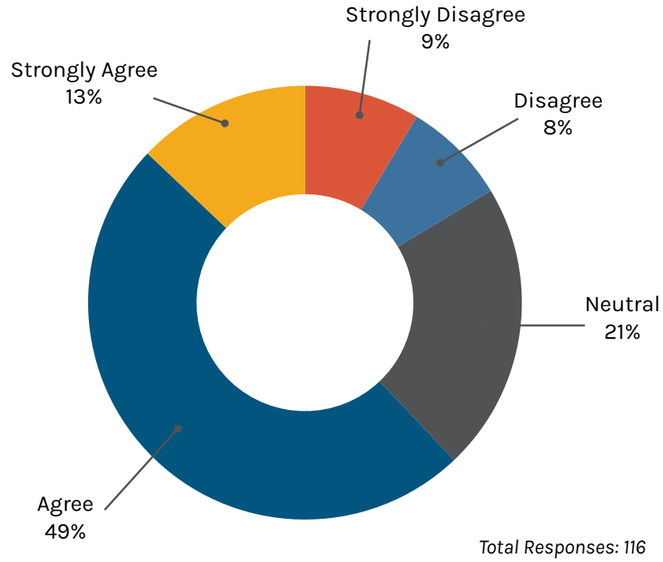


Figure A.5 - Transportation Goals

OVERALL

Do you feel the guiding principles, goals, and policies outlined represent the interests and priorities of the West Billings Community?



Total Responses: 116

Please provide any additional comments or feedback you may have on the guiding principles, goals, and policies.

58 Comments were provided. See following pages for a list of all provided comments.

Figure A.6 - Overall Goals

Detailed Comments:

- I would like to see more storm drainage detention incorporated into open areas and parks. I support trying to narrow up roads so that there is less asphalt and lane width for cars. I support very controlled annexation, not leap frog annexation. There are too many car washes.
- Need to focus more on surrounding areas like Blue Creek and Heights and incorporate more improvements as have been mentioned. Keep developing master plans that focus on outlying ares to relieve stress on Westend. Look to future as to how the merging of Billings and Laurel will look like. Encourage more commercial development around inner belt loop to accommodate the ever growing Heights. MDT and Billings need to finish connecting Highway 3 to Outer Belt Loop system to realize a true truck bypass.
- This was very confusing. When asked ranking on future land map and we don't know what that map looks like. What is a node? We cannot give good feedback if we don't know what you are talking about. Without proper information there is no way we can agree with your recommendations as stated in your survey.
- What Billings needs more than anything else is a plaza where people can gather, eat, drink and relax, this plaza should include public seating, entertainment for the children such as a playful water fountain, possibly converted to ice rink in the winter.
- Where is the update to the west end water study? This will determine where the city needs to grow.
- future improvements to Rimrock, Grand, Broadwater, Central, Monad, King and Hesper should all require complete street standards. the same goes for 48th. 56th. and 64th Stop waiting for the developers to build all the infrastructure. This should be a big enough area to fund major parts of west Billings infrastructure
- Parks and Trails make communities great -- Visited many cities throughout the U.S. and if there is one thing that separates a beautiful city from a not so beautiful city is its Parks and Trails -- People need the outdoors and great access to the outdoors -- Yes, we need police protection but if there were more recreational and open spaces for people to congregate maybe the need for police protection would diminish.
- Plan before you require for all of the above. The city county community has required much of developers without thinking through the next step and that has put us all sorely wanting in many areas. More focus is needed on Bus transportation. Develop bus transportation as an amenity and a benefit. Bus transportation in Billings needs PR work. Currently it has a bad connotation. Start to plan and build, Park and Rides in the west. We certainly need one. Focus locations on those nodal activity centers with mixed use. If you plan it properly, promote it correctly support it effectively with consistent reliable routes and times, then build it. It will be used with favorable experiences, outcomes and can generate revenue and be cleaner for our environment. Best regards, Pat White
- Need to insure that the agricultural sector of what has made this part of Montana great needs to be protected and preserved so that future generations can enjoy.
- All development should require the safety of school children walking to their school!
- I strongly recommend there be mention as a goal some route other than Zimmerman Trail from highway 3 to West Billings! Narrow and fragile Zimmerman Trail cannot continue as the only connector. This issue is out there but apparently not addressed in the west billings plan. Seems like a significant issue that deserves analysis and solutions.
- This survey wasn't always clear - it uses a lot of planning jargon and the untrained citizen taking the survey has to guess at some of the meanings.
- Plans for new subdivisions need to be thoroughly vetted to prevent the build-up of traffic patterns and effects to infrastructure systems. Effects to schools need to be considered as well. There needs to be a new elementary school west of Shiloh. (I do not have elementary children.) I support annexing existing subdivisions before adding new ones.
- Anything that can be done to make Billings less of the personal car-dependent city it is now would be great. Please, no more shopping areas like King Ave W or Shiloh Crossing. How is anyone who doesn't have a car or cannot drive supposed to take care of their commerce needs? And even if one is able to drive to those places, they are ugly and unpleasant to be in - places I go to only when I have to, and leave as soon as I'm done with my business there.
- We need this to also include Western Billings (ie west of Shiloh, and Rimrock)
- Minimize need for private autos for routine school, work, shopping, entertainment
- We need to continue expanding dedicated biking and pedestrian safety access!! Bus transportation ridership is at an all time low! Use smaller buses and use that money for trails!!! Thanks, Jim Sells
- Bicycle and pedestrian trails rate the most important to me.
- It was somewhat difficult to prioritize the policies as they were so interconnected in many cases. It will be important to get buy-in from the City and County planning department the make this a viable and sustainable an. That has been a problem in the past.
- Protect the ability to develop neighborhoods exclusive to single-family homes. Mixed-use is loud, congested, and undesirable for many families.
- The westend needs to rethink intersection type selection. The roundabout at Grand

and Shiloh often has an unacceptable LOS during peak periods. There needs to be a N-S “ring road” constructed before the west end fills in too much (72nd perhaps) with adequate shoulders and clear zones. All new neighborhoods need, at a minimum, a sidewalk along all major roads and the county/city should prioritize adding sidewalk to all road improvement or expansion projects. Water quality on the far west end is poor and should be prioritized in future city water expansion projects. My priority is not community centers, intricate trail networks, or public transportation. My priority is safe roads in all conditions, multiple routes to each neighborhood (redundant access), and simple/straightforward safe pedestrian connection between currently isolated neighborhoods along major roads.

- We have lived off of Niebauer and 45th for 30 years in the Harvest Subdivision - this subdivision and the Wells subdivision were the only two subdivision past Shiloh when we moved there. We moved there to be out of Billings and in the agricultural area. Piece and quiet, minimal traffic - no traffic noise - lots of wildlife. We are sick of the semitruck, contruction pick-ups and rude drivers who go faster that the speed limit. We can barely get out of our subdivision safely due to 20 fold traffic. We can hear cars drag-racing on the weekends on Hesper and Shiloh from our backyard all the way form Niebauer. It was wrong for the county to let developers build 4 story apartment houses by the medical school. I monitored weekly crime reports for a year - we had little or no crime this end of town until they built the apartment houses off 48th and King and developed the hotels/motels by the Holiday station on Gable. I noticed also that the high density apartment developed north of Grand between the Cemetery and Shiloh - the crimes reported are always in the apartments. I realize development is inevitable but I feel Billings should have learned from the western part of the state having commercial development on Shiloh to be similar and standardized. The car wash on King and Shiloh looks like a Disneyland ride. I do want to congratulate the county for the job they did with the Ponds across from the Mall on Shiloh are absolutely wonderful and help make our areas safer from flooding. When we moved to Harvest - there were no trucks allowed on Niebauer from the old Shiloh overpass to 56. They need to return to that.
- Having dedicated bicycle and walking paths is crucial for numerous reasons that impact both individuals and communities positively. Here are some key points highlighting their importance: 1. Promoting Health and Fitness: Bicycle and walking paths encourage physical activity, which is essential for maintaining a healthy lifestyle. Regular walking and cycling can help reduce the risk of chronic diseases such as obesity, heart disease, and diabetes. They provide a safe space for individuals of all ages to exercise without the worries associated with vehicle traffic. 2. Environmental Benefits: Encouraging walking and cycling can significantly reduce the carbon footprint of a community as it decreases dependency on fossil fuel-powered vehicles. Paths through natural areas can foster a deeper appreciation for the environment, encouraging more sustainable lifestyle choices. 3. Enhancing Community Connectivity: Bicycle and walking paths help to connect different parts of a community, making it easier for people to access shops, schools, and other public places without the need for a car. They promote social interactions and build a sense of community as people meet and engage with each other while walking or cycling. 4. Safety and Accessibility: Dedicated paths improve safety by separating cyclists and pedestrians from motor vehicles, reducing the risk of accidents. They make it more accessible for people with disabilities who may use wheelchairs or other mobility aids to navigate public spaces. 5. Economic Advantages: Increased foot and bike traffic can benefit local businesses, as cyclists and pedestrians are more likely to stop and visit shops compared to those in cars. Investment in walking and biking infrastructure can increase property values and attract new residents and businesses to the area. 6. Reducing Traffic Congestion: By providing alternative transportation options, bicycle and walking paths can help reduce the number of cars on the road, thus alleviating traffic congestion and reducing travel times for everyone. Implementing and maintaining bicycle and walking paths is an investment in the future, promoting a healthier, more connected, and environmentally-friendly community.
- Strip malls should not be allowed. Encourage unique small businesses only. Encourage preservation of agricultural lands and natural resources.
- Billings has some great walking and biking paths in place but we need to ensure these are expanded as the city continues to expand westward. It’s crucial to preserve green space an open areas as billings continues to grow.
- Growth in this city generally has been without thought. It has created a city that is difficulty for non-vehicle traffic to navigate for both commuting and recreation purposes. It also has caused the elimination of agricultural lands and green spaces, which provide critical environmental, social, and financial services to the city and individuals. Currently, the city seems to be trying to remedy those issues on the back-end, which is more difficult and expensive. As the city inevitably grows, let us not commit the same errors we did and plan expansion to be people-first rather than commercial profit first.
- Stop overcrowding areas
- This is the same “feel good” legislation hyperbole that I witnessed in Colorado in the 1990s. Typical superfluous wording that addresses noting except the “growth for growth sake’ which is the idealogy of the cancer cell. The Front Range of Colorado is a perfect example of this type of ridiculous guidelines.

And look what a overcrowding disaster of traffic and and endless subdivision growth it has become. My wife and I left Colorado 28 years ago to escape these type on nonsensical guidlines for unlimited growth. And now it is time to leave Billings for how bad the traffic and crime have become. i.e. Rimrock Road during morning and evening commute and the endless building of subdivisions on the west end. Stephen & Cheryl Gies 4041 Pine Cove Rd.

- I don't see the words "safe or safety" in any of the guiding principles, goals, and policies. Safety in everything is and should be the City's number one priority.
- I'm deeply concerned about Billings's direction. Our city should focus on preserving our agricultural heritage and maintaining our unique Montana way of life. However, the rise in crime and the push for developments like 15-minute cities threaten the safety and character of our community. We need to prioritize the needs and values of our residents, not emulate the problems of the East and West Coasts. Let's work together to find solutions that benefit everyone and keep Billings a safe, prosperous place to live.
- Stop building and taking away natural, untouched lands. Billings is too big already.
- West Billings needs to focus on the expansion of roadways and traffic control. Main corridors should have speed reduced, additional traffic control and turn lanes. King Ave, Central, Grand and Rimrock should be expanded to 4 lanes of traffic and the speed limit should not exceed 40 MPH on all roads east of 62nd. Ditches should be covered, and traffic safety should be a high priority to reduce dangerous shoulders. In lieu of extra wide pedestrian trails, a 3' to 4' sidewalk should be encouraged. Road Bicycle traffic should be accommodated on the main roads through dedicated, protected, bike lanes on the shoulders.
- It's critical that development of the West Billings Neighborhood give full consideration to the impacts of increased growth on the adjacent neighborhoods to the east. In particular, the City must develop a safer and more pedestrian-friendly transportation plan.. Rimrock Road for instance is already over-burdened during commuting hours.
- Add Beauty... There is no beauty in Billings. There is no plan to add BEAUTY in Billings. We add parks, but with no beauty. Look at Centennial. It was built NOT as citizens requested, but as a couple of guys wanted. Big dog park and big athletic fields. Take a hard look at progressive cities. They have parks with huge flower gardens, children's recreation, trees, benches, paths, open spaces for fun activities, not organized jocks sports so that old guys can coach and re-live their youth.
- We need more cafes and restaurants on the west end.
- To extent possible encourage development of housing on smaller lots. Walking and biking need to be top priorities. I've met and friended most of my neighbors out walking. Need safe walking and biking corridors to connect corridors and keep children safe. More speed bumps and other design features such as mini traffic circles should be encouraged to slow automobile traffic to safe speeds. To many people driving +40 MPH on side streets in existing sub-divisions.
- You folks have a difficult job. Each and every subdivision and development has its own set of challenges so attempting to come up with a one size fit all approach will be impossible. It would seem that providing some guidelines for developers would be beneficial but each submission will need its own review and oversight. Should there be additional requirements on developers requiring additional expenses, trail development, park maintenance, there should be some financial relief in another part of the process. This is almost headed toward new subdivisions becoming HOA's so as to be able to make the requirements affordable to the property owner and the City. It all, eventually, boils down to cost. Please be mindful of the fact that additional development costs will result in additional property acquisition costs. Not that it can't be done but it will require a good deal of flexibility when reviewing submissions. Higher value development, higher cost of improvements, lower value, lower cost. Without this kind of approach there might only be one type of developed offering. Maybe 2, middle and upper.
- I disagree with the notion of smooth transitions between urban, suburban and rural. The city should have a "hard edge" as annexations and developments are built out. Thankfully our economy and community continue to grow. The alternative is to contract and die. Therefor today's edge will soon be one, five, even ten miles inside the city's border in the future. A smooth transition locks us into a sprawling suburban city that is very expensive to serve and protect. How vibrant will our neighborhoods be when the city's population is 175,000, 250,000 and 350,000?
- I think a better question would be whether the West Billings guiding principles, goals and policies are supportive of the rest of Billings. In other words, does this plan help or hurt, support or undermine, the overall city infrastructure, parks, public safety services, transportation networks, schools? Will these goals support a fair and inclusive community? or create a wider gap in quality of life between neighborhoods that are not in "West Billings"?
- We currently sell parks established n new builds as money isn't available to establish, maintain, or provide safety; why would we designate more for sale?
- Thanks for this opportunity to comment on Billings future. I look forward to receive new communication.
- Planning for growth is essential, maps and zoning leading the way. Infill should be given priority to limit sprawl , mixed housing, safe avenues (cars, bikes,

pedestrian) incorporated in future expansions are essential, green spaces (parks, recreational areas, and trails) planned/enforced in new developments, and public transport options available to decrease traffic congestion if feasible.

- I'm not sure if this is within your wheelhouse, but I don't think that further development should be considered until we have addressed adding in schools to the mix. Billings' continued growth will not be sustainable if families do not have schools to send their children. Thank you for all of your hard work!
- Really want to see more density and more mixed use areas for west billings
- I am aware that Transportation, roadways, arterials, etc, are considered under the auspices of a different group BUT development impacts the neighborhoods along Rimrock Road, a neighborhood street and arterial. To have a meaningful plan I believe it necessary to address Transportation issues with West End Planning. Bike trails and recreational responsibility revert to the Recreation and Parks Department, a maliciously underfunded department. If these amenities are wanted, there should be a way to have residents receiving the benefits bear the cost.
- The trail system in Billings is used by a very small percentage of th population. We don't need all of these neighborhood parks. They are also used by a small percentage of the population.
- Main concern is the inevitable increase in crime while providing additional parks and pedestrian access to neighborhoods as is the case found with existing parks, trails, etc...as well as the lack of funding and resources to police these areas or make arrests
- Too much concern about trails, bike paths, and parks. Concentrate on too much traffic on too few street, too many traffic violations, and too much unpunished crime in Billings. With our record of being the 17th most dangerous place to live in the U.S. , we should stop spending time on trail, bike paths, and parks. Safety and law enforcement should be the priorities!
- Dense population cause water shortages. Respect the West.
- This master plan is excellent. Carrying it out might not be possible due to limited funding.
- develop a large regional park on west end, the size and quality of PIONEER PARK. one section\ show agriculture , and urban forest Billings Lakes and Zoo Montana should have a park adjacent. include rail handcars for exercise and to relate to City railroad history perhaps two parallel for races, on rims or large west end FRONTIER park. see Monterey Bay Railroad handcars, revolution trail rail cars, velocipede, or even on rimrocks ! draisibe railexplorers.net
- Billings is growing way too fast, and it appears Montana planning is not able to handle it. For example, our taxes were raised yet new buildings/homes taxes were not even billed. The state is still trying to figure that one out. Planning is not conducive to the lifestyles Billings natives have lived here for and kept all our lives. Billings natives are being forced to give up our lifestyles that we have kept for years to the greed of developers wanting to fill every space of land in our town with buildings/apartments/ crowed homes/car washes. We do not speed. The fast drivers are here and were not here before. When it says 35 mph it does not mean 50. When a light is red it means STOP, not go ahead fast. Yellow lights mean to slow down not speed up. I would encourage the city to employ more police to sit on our main streets and ticket these guys before any more money is put into our infrastructure. Take care of what has been developed before continuing on with what you are doing unless your goal (whoever you are that is doing this) is another California freeway life. Do not pile home projects into land that will destroy our natural way of life. The traffic is insane. And now developers want to put more housing past Copper Ridge. The Zimmerman apartments are an example of how developers are destroying our west end. When is it going to start being realistic and actually look at what kind of lifestyles need to be preserved, rather than running over and destroying ours, catering to the rich and those who do not give a damn about our community values. A bike path is not going to take care of that. Paths are great, but they do not address the problems of heavy traffic, speeding cars, water shortages/ increasing costs, Water shortage needs to be addressed. Building more houses is not an answer right now. It appears new residents in the past 2 years need to be educated on our traffic expectations just like we had to learn the rules of how to manage round abouts. Although there are still many who think the faster you go around it the best way to do it. Please stop the madness and just start controlling what has already been developed, keeping long time citizens in mind while doing it.
- Speed limits on the west Billings area are from 20 years ago. 45 mph on King, Rimrock, Cental are ridiculous for the amount of traffic we have now. Safety is a thing of the past. Hopefully roads and speed limits in the new developments and current are changed to reflect the current times.
- There have been several long range plans over the last 40 yrs which in large part have been ignored or were non-specific/non-enforceable. There have been some good things--trail system, Shiloh roundabouts and mixed use development, housing development in downtown, E-Bird improvements; however the inability of the County/ City/School Dist to coordinate and the concentration of LG apartment development--ie King Ave w of Shiloh, the current similar situation between Grand & Poly w of Zimmerman.
- Please, please prioritize walkable, bikeable development that doesn't rely on cars as a means for mobility
- prioritize the safety of our kids, schools, neighborhoods--restrict commercial and multi use commercial--no more 3 story apartments w/ retail on the bottome. No more projests where 8 4-plexes and 32 condos are planted 5' from my fence and property line.

Public Engagement Phase 3: FLUM

FLUM Workshops, November 2024

In November of 2024 city staff and consultants noticed and held public meetings at the regularly scheduled West End Neighborhood Task Force meeting on November 12 at Connections Church and on November 13 at a special open house at Ben Steele Middle School. At both meetings, consultants gave a presentation on the purpose of the Future Land Use Map (FLUM) and the statutory requirements of the FLUM. Examples of maps adopted in other cities of differing scales including Georgetown, TX; Overland Park, KS; and Bozeman, MT were also presented. Consultants also explained the land use categories that had been reviewed and approved by the steering committee at that stage in the project and the GIS suitability analysis described in the Future Land Use Chapter. Attendees were also directed to boards where they could give input on the draft guiding principles that were included in survey 2. Images of those boards with the comments that were written on them are included later in this appendix.

FLUM Game - Sanbell

Members of the Public participate in the FLUM workshop at Connections Church, Nov 12, 2024

FLUM Game - Sanbell

Members of the Public participate in the FLUM workshop at Ben Steele Middle School, Nov 13, 2024

Attendees then broke into small groups to collaboratively create Future Land Use Maps of their own using the FLUM game created by the consultant team. This game included a basemap showing developed lands, the suitability map, and a 25-acre grid as shown in the completed workshop maps in this appendix. Participants were then given paper tiles of each land use category and the corresponding number of dwellings in that area to fill in the gridded map and meet the minimum requirements of MLUPA for accommodation of projected population growth. Those maps are included below.

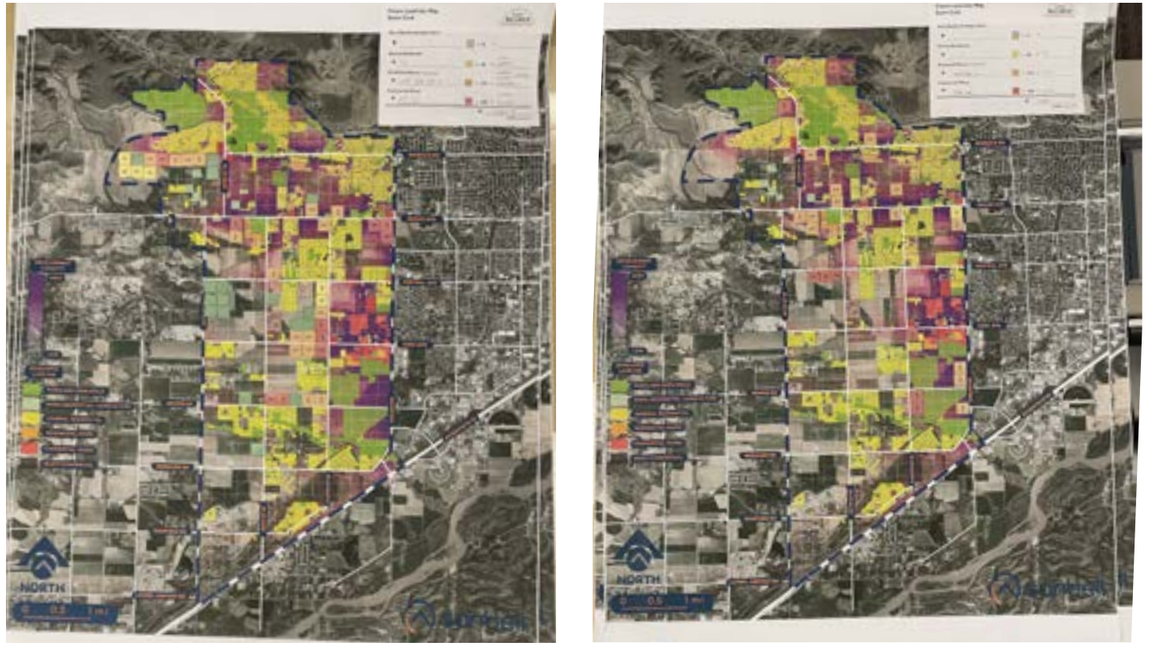
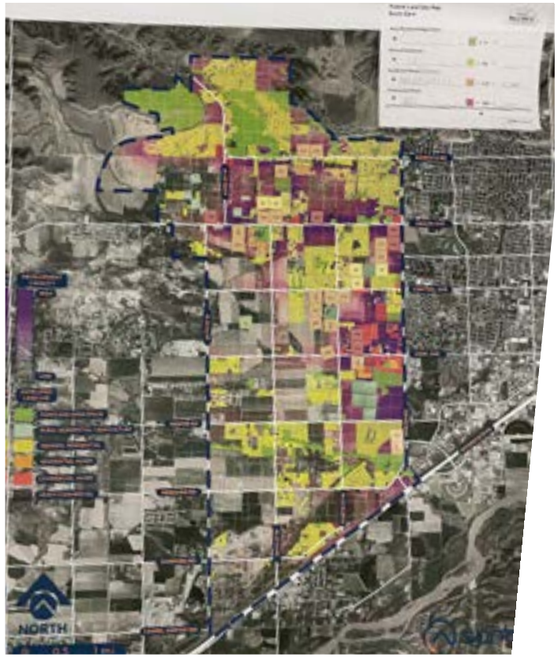


Figure A.7 - FLUM Workshop Maps



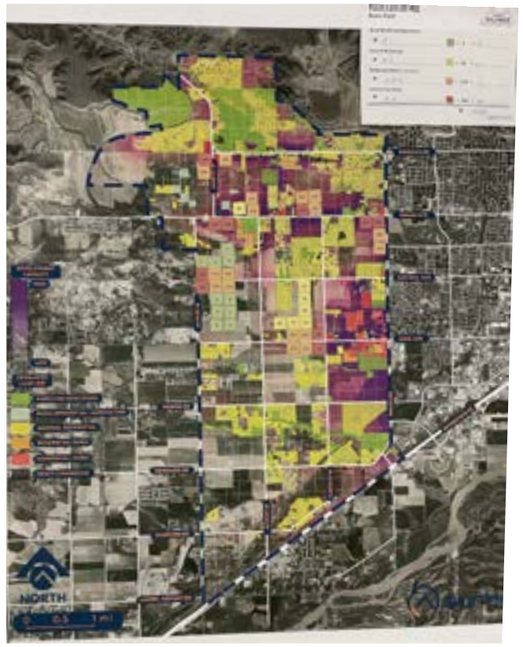


Figure A.7 - FLUM Workshop Maps (Continued)

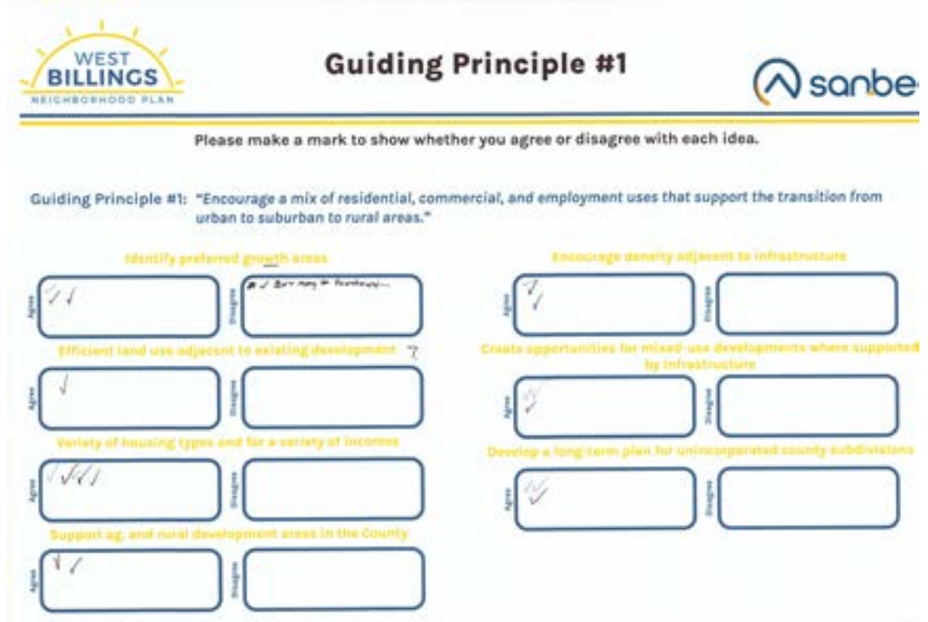
Draft Future Land Use Map

The project team then analyzed the maps created during the workshop sessions and merged them into a draft future land use map, which was reviewed and revised by the steering committee. Public notice for the comment period on the draft FLUM and the August 14 open house was provided via an email blast to the project email list and distribution fliers at several public events in Billings. The draft map was hosted on the project website from July 20 to September 01 of 2025. The webmap received 105 comments, which are included in this appendix along with the project team's responses to each comment.

Draft Future Land Use Map Open House

On August 14, 2025 the project team held an open house at Ben Steele Middle School. Before the meeting began, the project team distributed writing utensils and materials including a copy of the draft FLUM and future land use category descriptions. Attendees were encouraged to write comments on boards which displayed the Draft FLUM, guiding principles, and introductory information presented at the March 2024 open house. The project team gave a presentation introducing the project and recapping the work completed to that date, including the methods used to create the draft FLUM and next steps.

Guiding Principle comments from FLUM workshop Events



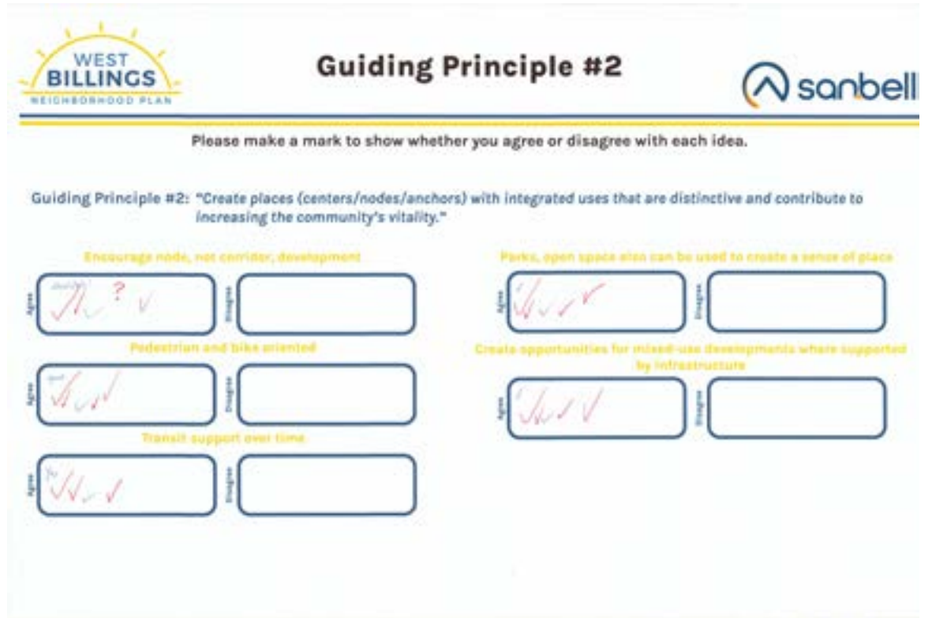
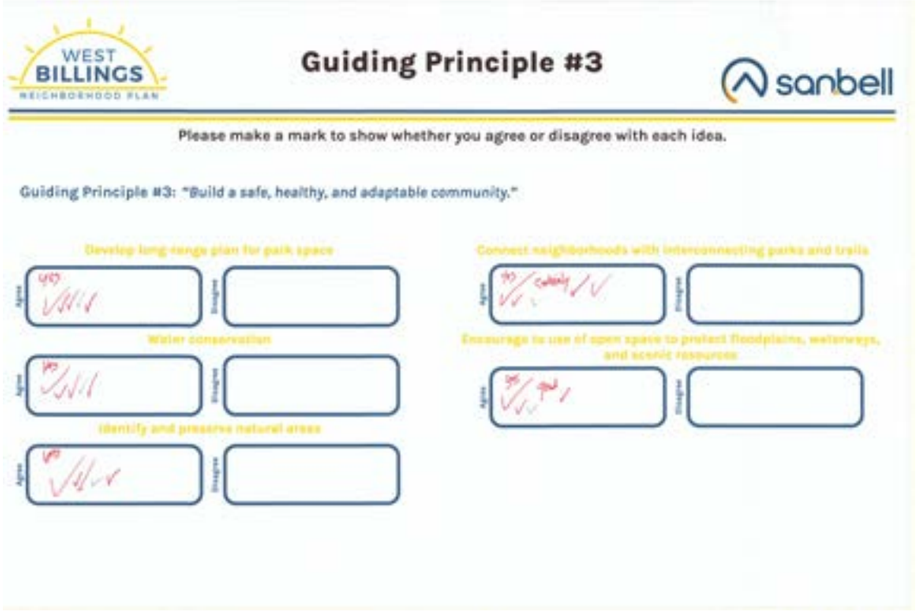


Figure A.8 - Guiding Principle Comments



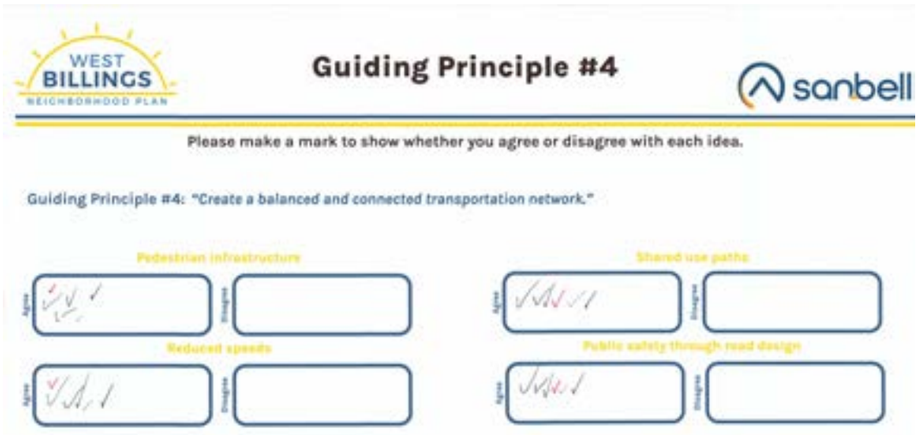


Figure A.8 - Guiding Principle Comments (Continued)

Figure A.9 - Draft Guiding Principles

Draft FLUM Comments and Responses Map Key

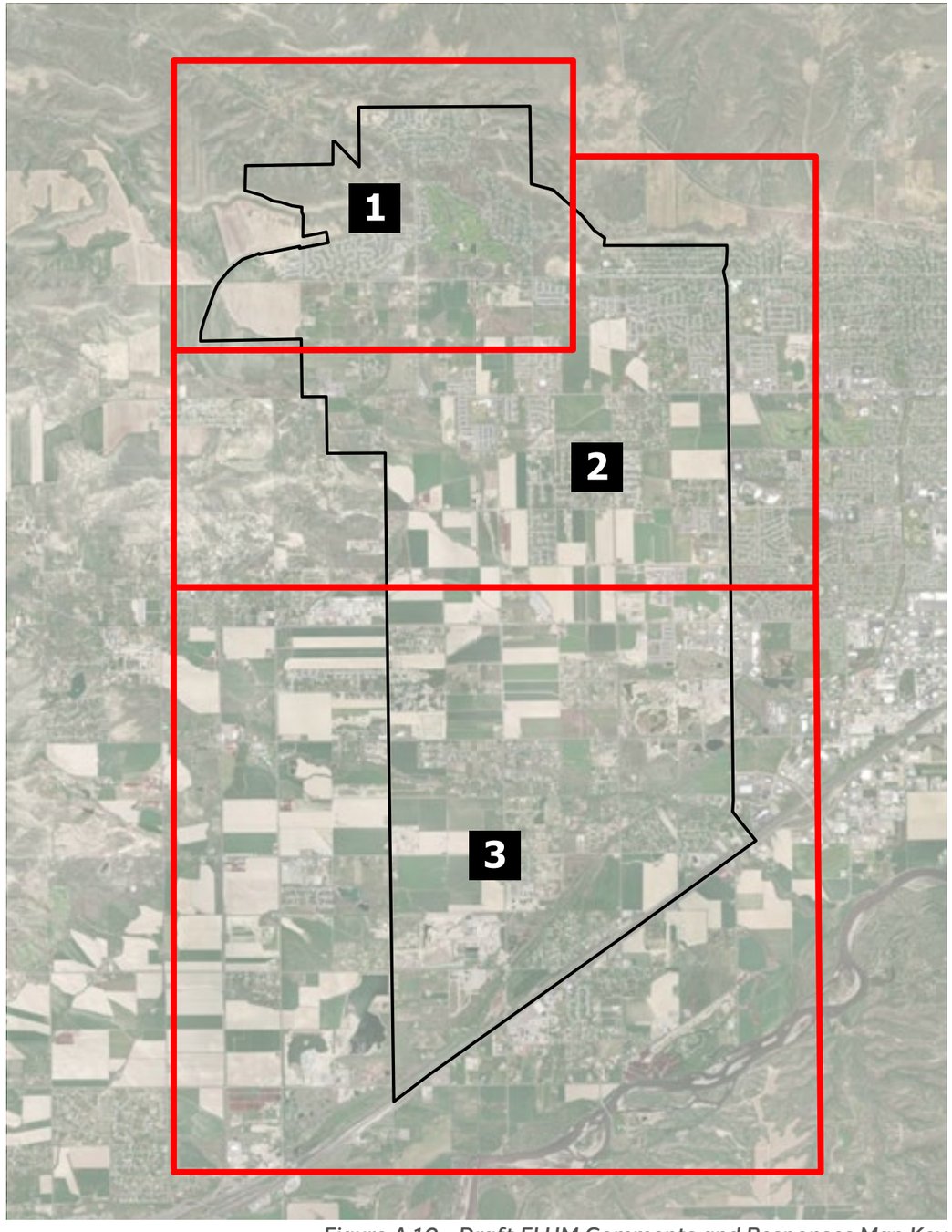


Figure A.10 - Draft FLUM Comments and Responses Map Key

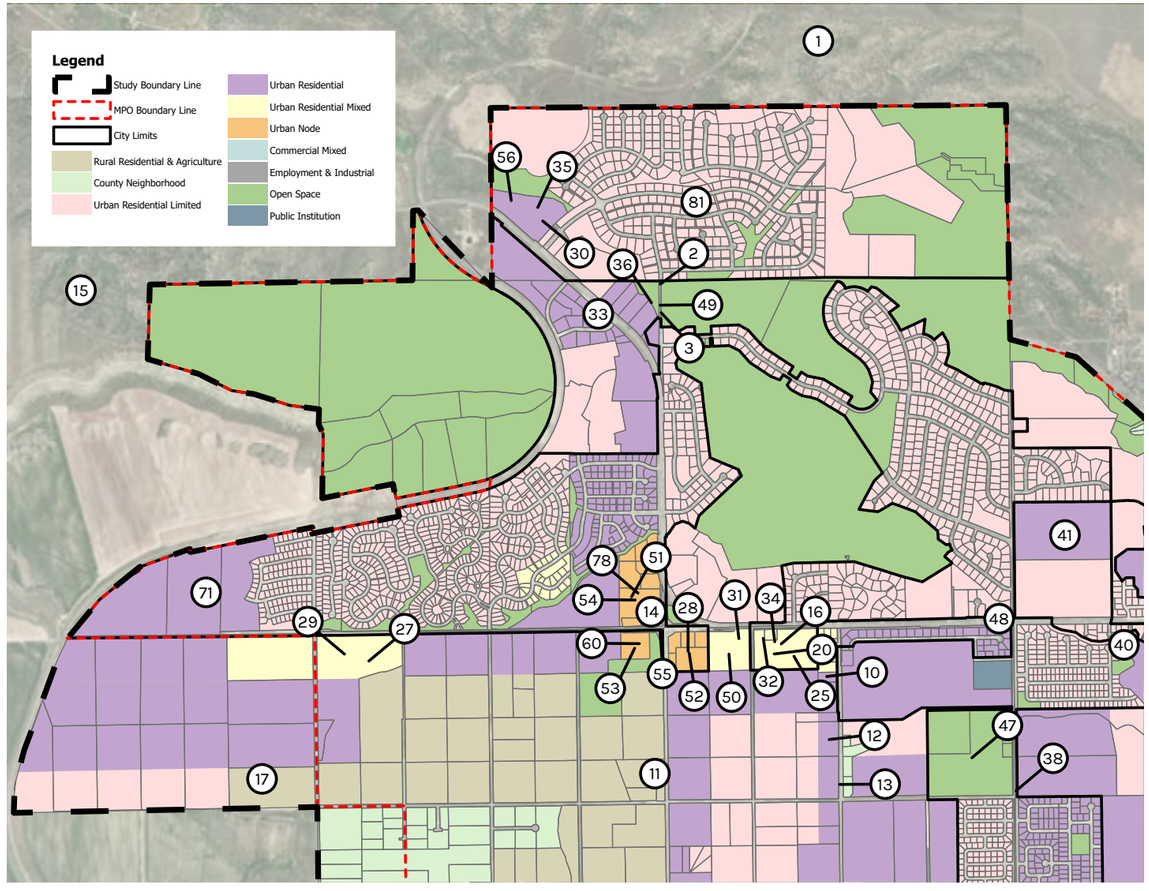


Figure A.11 - Draft FLUM Comments and Responses Area 1

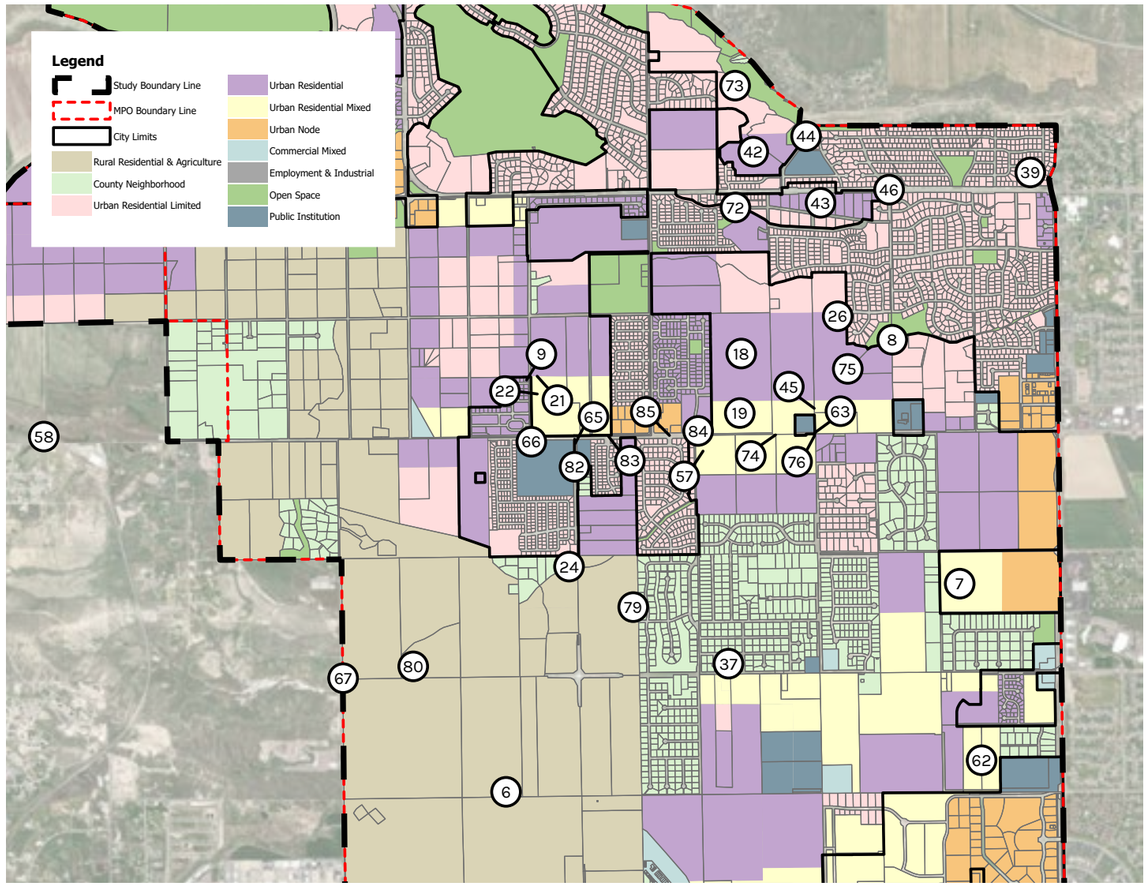


Figure A.12 - Draft FLUM Comments and Responses Area 2

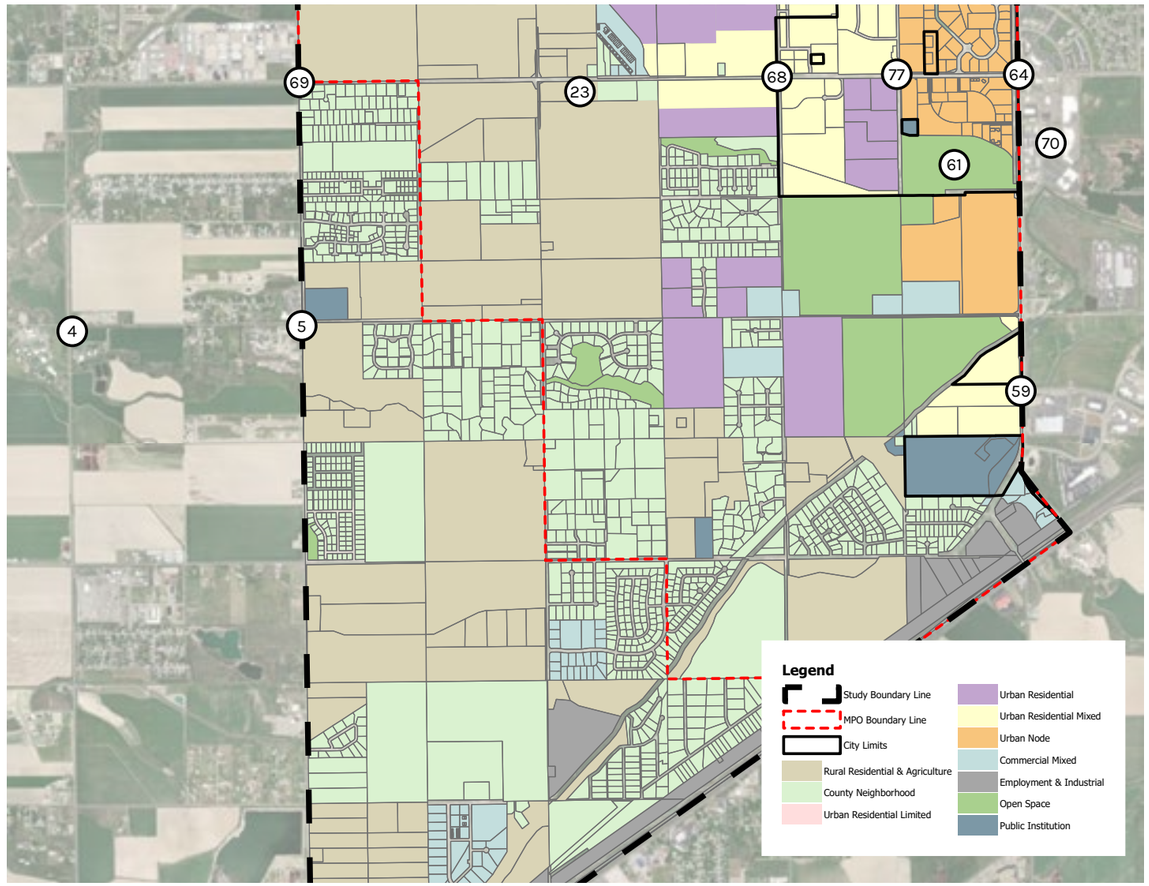


Figure A.13 - Draft FLUM Comments and Responses Area 3

Figure A.14 - Draft FLUM Comments and Responses 1-6

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Comment ID	Subject	Comment	Public Response
1	New Highway	Build the Molt Rd./Highway 3 Connector as studied in 2016 to lower traffic on Rimrock Rd. and Zimmerman Trail and provide a 3rd route off and on to the Rim Rocks.	Comment accepted. Molt Rd./ Hwy 3 connection included in transportation analysis
2	Keep road closed.	An open and improved road in this location is not necessary. Funds that would be used for the improvement of this road could be better allocated to a more needed project. Opening the road would also lead to an increase in traffic in this lower portion of the neighborhood.	Comment rejected. 62nd to Ironwood is currently an emergency access.It will be developed into a public connection in the future and include pedestrian infrastructure should adjacent property be developed.
3	Keep road closed.	This road should be opened/improve to provide an alternative exit/entrance out of Ironwood or at minimum paved to allow bikers access	Comment rejected. 62nd to Ironwood is currently an emergency access.It will be developed into a public connection in the future and include pedestrian infrastructure should adjacent property be developed.
4	Subdivisions already developed or planned	Why wouldn't already developed and planned subdivisions be included in the plan? At the August meeting, you said that by planning and understanding the type of houses in a subdivision gives you the data needed to plan for how many vehicles each house would contribute to the transportation demands. It cannot cost that much money from your budget to calculate and include pre-existing subdivisions in your plan. To not do so is negligent and is not utilizing the easy data provided. By not using existing data, you are already under planning for the growth that has already incurred.	Comment accepted. New parcel data has been included in the updated Future Land Use Map.
5	Why is the Transportation Map not following actual roads?	It doesn't make sense that the main point of this west end plan is for future transportation and the current developed roads are not used as boundaries	Comment rejected. The boundary of the Multi-Modal Plan Update is set by the MPO jurisdictional boundary, which does not necessarily align to roads.
6	Rural Residential/Agricultural Concern	Comment 1: Land Use Classification The current "Rural Residential / Agriculture" designation conflates two fundamentally different land uses with distinct infrastructure requirements, fiscal impacts, and service demands. Request that the FLUM establish separate categories: (1) "Agriculture" for parcels 20+ acres engaged in bona fide agricultural production, and (2) "Large Lot Residential" for suburban residential development on parcels 1-5 acres. This distinction aligns with standard planning practice and enables accurate cost of service analysis required under Montana Code Annotated 7-6-4127 for municipal service extensions. Comment 2: Fiscal Impact Analysis The plan lacks quantitative analysis of per acre tax revenue generation versus service delivery costs for different density categories. Large lot residential development typically generates $3,000-5,000 per acre in property tax revenue while requiring the same linear infrastructure (roads, utilities, emergency services) as higher density development that generates $15,000-25,000 per acre. Request publication of lifecycle cost analysis comparing revenue to expenditure ratios across all FLUM categories to inform fiscally responsible land use decisions. Comment 3: Water Resource Management Grouping irrigated turf on residential lots with agricultural irrigation obscures significant water demand differences. Residential landscape irrigation typically consumes 2-4 acre-feet per acre annually compared to 1.5-2.5 acre-feet for hay production. Given documented aquifer stress in the Yellowstone Valley, the plan should differentiate water allowances and require separate permitting for non-agricultural irrigation on large lots to ensure sustainable resource management. Comment 4: Transportation and Service Delivery Large lot residential development creates service delivery inefficiencies that increase per capita costs for police, fire, EMS, school transportation, and solid waste collection. The plan should analyze vehicle miles traveled per service call and route efficiency impacts. Additionally, low-density development precludes future transit service and contradicts the city's Complete Streets policy by creating car-dependent land use patterns inconsistent with	Comment Rejected. The intent and assignment of this category means that a parcel will likely not be developed within the city in the next 20 years. This is the only plan, of all the MLUPA plans that will be completed by that City, that includes parcels so far outside the limits of annexation. The designation of RRA is intended to identify areas of the county . Finally, we are unclear on the reference to a repealed portion of MCA and its associated requirement, as a brief search did not return any information. If further discussions are necessary, please clarify.

Figure A.15 - Draft FLUM Comments and Responses 7-15

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7	ag land	"Please separate one acre 'suburban ranchettes' from true Agriculture. Large lot housing should carry its own Low Density Residential label, indexed to a cost of services analysis and excluded from ag water allowances. This change aligns with the City's fiscal stewardship goal, and the adopted Growth Policy directive to encourage development within and adjacent to existing city limits."	Comment Rejected. The intent and assignment of this category means that a parcel will likely not be developed within the city in the next 20 years. This is the only plan, of all the MLUPA plans that will be completed by that City, that includes parcels so far outside the limits of annexation. The designation of RRA is intended to identify areas of the county . Finally, we are unclear on the reference to a repealed portion of MCA and its associated requirement, as a brief search did not return any information. If further discussions are necessary, please clarify
8	Bike path	The bike path ends at Rimrock West. It is possible to ride a bike through the neighborhood to the west as far as about 52nd. A bridge over an irrigation ditch will take you to Rimrock, which has a nice bike path, and from there to 54th, which is great to bike south on; not so much north. There are developing neighborhoods between Rimrock West Park and 54th. It would be good to develop a bike path through this area that connects the existing bike path to 54th. I would appreciate a bike path north of Rimrock on 54th as well.	Comment accepted. The City's Transportation Team will review this comment and take it into consideration in future development of bike infrastructure.
9	58th Zoning Mismatch	This end of the street already has lots of ~0.25 ac, ≈ 4 u/ac	Comment rejected. Existing zoning (N3) is at the low end of the Urban Residential category. Proximity to the 56th and Grand Ave node justifies a higher intensity designation.
10	58th Zoning Mismatch	Typical lot size on this block is ≈1 acre (~1 u/ac). Jumping to 6–16 u/ac is a 6×–16× increase.	Comment rejected. 58th is a future collector and the proximity to Rimrock Rd justify higher intensity designations for the area.
11	62nd St Corridor — Upzone from Rural/Ag	• 62nd St W, ~4 blocks west of 58th, is mapped Rural Residential/Agriculture. • 62nd is the logical place for intensity; 58th has many 1–2 acre lots. • Puts trips on a street built to handle them; reduces pressure on interior blocks.	Comment accepted. Changes have been made to the future land use map to reflect this: D04434 - UR D04435 - UR D04450A - UR D04450 - URM D04451 - URM D04465 - UR D04466 - URM D04478 - UN
12	58th — Vacant Land Next to 1–2 Acre Lots	Adjacent lots are ~1–2 acres (≈0.5–1 u/ac). Proposed category is 6–16 u/ac. That's a 6×–32× jump.	Comment rejected.Zoning designations N3 - NX1 are appropriate for this area.
13	58th Zoning Mismatch	Please adjust the proposed zoning West for 58th Street. Existing homes here sit on lots from ~0.25 ac up to ~2 ac, which is ~0.5–4 units/acre. The proposed 6–16 u/ac would create abrupt, side-by-side intensity jumps next to large-lot homes. ASK: • Remap this segment to a lower-density category (≈2–4 u/ac) • Allow higher densities only closer to Grand and King Avenue. BASIS: • Compatibility: prevent height/mass conflicts next to large-lot homes. • Infrastructure fit: higher density where streets, drainage, and access can handle it. • Predictability: aligns with existing neighborhood pattern while still enabling growth.	Comment rejected. Intersection of 58th and Colton are collectors and appropriate for N3 - NX1 zoning designations.
14	Create a dog park	This could be a great location for a nice dog park.	Comment rejected. This location is already zoned CMU-2 and is adjacent to the intersection of Rimrock Rd and 62nd. Urban Node is an appropriate use for this area.
15	Map legend	Dark, light, colored dashed lines, no idea what each means from the legend.	Comment rejected. The future land use map contains a large amount of overlapping information reducing legibility. This information will be easier to read when overlaid onto GIS.

Figure A.16 - Draft FLUM Comments and Responses 16-25

From July 20 to September 1, 2025, community members were invited to share feedback on the Future Land Use interactive map for the West Billings Neighborhood Plan. During this time, we received 85 comments from the public, highlighting local priorities, ideas, and concerns about how the area should grow in the future. Prior to the public map launch, the project's Steering Committee was also invited to provide feedback, resulting in four additional comments to help guide and refine the map based on their community knowledge and experience. Comments 86–105 are not directly pinned on the PDF map because they were submitted outside of the map platform, via email or direct contact with the project team.			
16	Rimrock Road frontage	I still own and have retained, approximately 60 acres of my original farm property off the SW corner of 62nd W and Rimrock Road. It's a little difficult to see detail on the map, but it appears all of my frontage on Rimrock which is in the city limits is zoned residential, some of it "high density" some "irrigated farmland" with some of the acreage to the south residential limited, whatever that means. A development plan for this acreage could well include some neighborhood commercial/office space. How locked in is the designation of the ground included in this plan? Obviously, once development starts on my ground, and there was a zoning and annexation action started and then pulled on 38 acres this spring, the farming will cease. Unfortunately, I am out of town and unable to meet with you prior to 8/31. Thomas Romine 1128 N 32nd Billings, Mt 59101 406-671-7444 thedrom@outlook.com	Comment accepted. Street frontage on Rimrock Rd is assigned URM, which allows for CMU1, NMU, and NO. Going south on the property the designation of UR allows for NMU and NO. Futher south and then west is assigned URL. This is a wide variety of appropriate zones for the parcels.
17	20 acre site	The subject 20 acre site is bordered on the west by Urban Residential and the South by Urban Residential Limited. The Northon border is 70th street. I would hope that you would consider the including it with one of the adjacent primary zones above. What is the thought of going around it when it has roadway frontage suitable for a slightly more intensive use?	Comment rejected. The parcel is not within the limits of annexation and there are present water and sewer issues to supply that level of development.
18	Active Farm	This is an active working farm and will be for a very long time	Comment rejected. Existing land uses will not be affected by category designation on the future land use map, unless land owner applies for a zone change.
19	Active farm	This is an active farm and will be for a every long time	Comment rejected. Existing land uses will not be affected by category designation on the future land use map, unless land owner applies for a zone change.
20	High density	Why is high density housing being pushed so far away from all services and amenities?	Comment rejected. This area was found to be close to services and amenities in an analysis done prior to developing the future land use map.
21	Continued Discussion	Putting an end to public comment as of 8/30 is in complete disregard to our community. Most people, 100% of the people I have been in discussion with this past week, have no idea this plan is even being floated. The city/county MUST do better in engaging the tax payers. As it sits currently, the proposed plan and the timing, are an embarrassment to the city of Billings tax payers/residents. The lay out of map, the "color coding" and lack of explanation of meaning, screams "we're gaming you". He city needs to back up, take a breath, explain more and quit bullying its citizens.	Comment noted. There are further opporunities to comment and participate during Billings 2045. Please see Billings2045.com. Community Planning week will be the week of November 17th.
22	Schools	It is very concerning that the city/county would consider any type of development without major input/impact statement and plan regarding public schools. The schools on the west end of town have been at max/beyond capacity for years. The continued negligence of this issue, and especially in light of future development of the city, is disgraceful, at best, for the city of Billings. We, and our children, deserve better.	Comment accepted. Public school districts have been engaged as a stakeholder and new public school facilities have been taken into consideration while creating the future land use map and will be addressed in the plan document.
23	test	tset	Test Comment.
24	Trails	Continue developing trails along the easements and ditches	Comment Accepted. Though this comment has no bearing on the future land use map, transportation analysis will include trails recommended along ditch ROWs per the 2023 LRTP.
25	Irrigated farm land	Keep as is	Comment rejected. The future land use designation Urban Residential Mixed is appropriate for the area. It is close to Rimrock Rd and higher intensity development. The land owner has expressed interest in developing in the future.

Figure A.17 - Draft FLUM Comments and Responses 26-40

From July 20 to September 1, 2025, community members were invited to share feedback on the Future Land Use interactive map for the West Billings Neighborhood Plan. During this time, we received 85 comments from the public, highlighting local priorities, ideas, and concerns about how the area should grow in the future. Prior to the public map launch, the project's Steering Committee was also invited to provide feedback, resulting in four additional comments to help guide and refine the map based on their community knowledge and experience. Comments 86–105 are not directly pinned on the PDF map because they were submitted outside of the map platform, via email or direct contact with the project team.

26	Traffic concerns	Higher density housing here would create a traffic issue through Rangeview Drive. The area just south of Rangeview should be consistent zoning with the area just north of Rangeview Drive	Comment rejected. The category designation Urban Residential is consistent with adjacent zoning (N3).
27	NO to High density multi family	Allowing high density multi family housing in this area will add undo pressure on the already busy traffic on Rimrock and Grand. While both major collector streets can be widened, past experience has proven the city,county and state cant get together to create fluid traffic corridors. It makes no sense to add to the problems by building high density in these areas.	Comment rejected. URM designation creates nodes at smaller scale appropriate to their context.
28	Excellent space from small commercial like coffee shops etc	This area is an excellent location for coffee shops or small retail businesses.	Comment accepted. No action necessary . The current future land use designation Urban Node will allow this type of development.
29	keep open space		Comment rejected. Suitability analysis supports designation.
30	keep open space	keep open space	Comment rejected. The parcel is on an arterial and directly across the street from utilities. Additionally the parcel is within the limits of annexation.
31	leave green space and park	we do not want dense housing in this area.	Comment rejected. This area along Rimrock Rd is appropriate for Urban Residential Mixed designation.
32	Leave open space	do not let rezoning happen. we do not want dense housing here.	Comment rejected. The future land use designation Urban Residential Mixed is appropriate for the area. It is close to Rimrock Rd and higher intensity development. The land owner has expressed interest in developing in the future.
33	Road use	A bike trail similar to that running on the north side of Rimrock between 54th and 46th would be a welcome addition from 54th to Phipps park. Additionally, from 54th to Shiloh along Grand Ave. Let's give cyclists a fair chance at surviving a ride on the west end.	Comment accepted. A bike facility from 62nd to Phipps Park will be included in the long range transportation plan.
34	Keep open space	Road cannot handle more housing development, especially in this particular area.	Comment rejected. Future capacity projects will change the ability for roadways to handle increased traffic.
35	Keep open space	No more building	Comment rejected. This area is appropriate to develop under the future land use designation Urban Residential as it is currently zoned NO.
36	Keep as a fire road	One way in and out of ironwood to keep crime low.	Comment rejected. Multiple access points into development improve public safety.
37	Seperate suburban ranchettes from true ag	Please separate one acre 'suburban ranchettes' from true Agriculture. Large lot housing should carry its own Low Density Residential label, indexed to a cost of services analysis and excluded from ag water allowances. This change aligns with the City's fiscal stewardship goal, and the adopted Growth Policy directive to encourage development within and adjacent to existing city limits.	Comment rejected. This development is Wells Garden Estates and has existing half acre lots. The parcels are designated County Neighborhood.
38	This needs to at least have a center turn lane	As you continue to dump more traffic on this road, at least getting a center turn lane would help	Comment accepted. This will be analyzed in the Transportation Plan portion.
39	This park was disposed / high density opportunity	The city just disposed of this park, if you look at the lot it has good accessibility in the neighborhood and could support large density build	Comment rejected. The City still owns this park, but the recommendation from the committee is to dispose of the park. If the City were to dispose of the park the property designation will be changed. To change the designation before council officially disposes the parcel is misleading.
40	This strip of park is listed for disposal	This park is not accessible by reasonable means (probably by design of the developer) as such it has been listed as a possible disposal site by the city	Comment rejected. The City still owns this park, but the recommendation from the committee is to dispose of the park. If the City were to dispose of the property designation will be changed. To change the designation before council officially disposes the parcel is misleading.

Figure A.18 - Draft FLUM Comments and Responses 41-54

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41	Poor high density placement	In a perfect world (from the words of McCall): "Higher density builds would ideally happen in the front of a subdivision, rather than the back". Attempting to develop this back plot where in you have already established SFR is a bad idea, at best this should be Pink. In this particular case though flipping this Purple with the Pink that sits in front of it might be workable! The Pink, while platted, to my knowledge has not been developed at all yet (no roads) swapping these land plots might help you get to where you need.	Comment accepted. Parcels will be redesignated as follows: D12427 - UR
42	Poor location for high density planning	In a perfect world (from the words of McCall): "Higher density builds would ideally happen in the front of a subdivision, rather than the back". Attempting to develop this back plot where in you have already established SFR is a bad idea, at best this should be Pink.	Comment accepted. Parcels will be redesignated as follows: D04632 - UR
43	All of these lots are county	All of these lots are county and its unclear why this is allowed to be marked as higher use development. Lets for a moment assume that you could up zone these, their only access is directly on to Rimrock Road which would be less than ideal for a highway. Unfortunately keeping these zoned low density is probably the best of a bad situation unless better access from the back was developed.	Comment rejected. Proximity to Rimrock Rd makes it appropriate for higher intensity development. The future land use map does not change current uses. Additionally, Leroy Lane is unconstructed but platted as public.
44	This is not a public park and is marked as such	This is not a public park and the city has been extremely aggressive lately in ensuring that it is well known that this is not open for public access, especially to those who have dogs.	Comment accepted. The following parcels will be redesignated as Public Insitution: D04632B D04634 C08892
45	Better access to the school via Bike/Walk	There is no safe access to the school here, in theory as this road is completed we'd see it, but why not build a trail in the interim?	Comment rejected. The 48th Street West Corridor is a Principal Arterial. Based on the 2016 Bike and Pedestrian Master Plan, a Shared-use Path would be the best option for non-motorized transportation. This project is identified as a project, but no funding is identified for construction or maintenance.
46	Improve crossing at this location	We need some type of crossing here, this is a major connector to trails (big ditch) that is under utilized by those north of Rimrock due to difficult crossing conditions here	Comment accepted. The Transportation Plan will analyze the impact of a crosswalk on this intersection.
47	Attempting to call this greenspace is a farce	There is no plan to develop this into a workable park and in fact from our understanding it is possible for the land to be withdrawn and then redeveloped into housing if nothing is done soon. Calling this green space is a farce.	Comment rejected. The City still owns Cottonwood Park. If the City were to dispose of the property, the designation would be changed. To change the designation before council official disposes the parcel is misleading.
48	Bike lanes should extend out to Copper Ridge	The bike lane should extend out to copper ridge to give alternatives for transportation	Comment accepted. Rimrock Road is currently under design for reconstruction from Clearview to 62nd as with most City arterials a shared use path will be evaluated for inclusion.
49	This road should be opened/improved	This road should be opened/improve to provide an alternative exit/entrance out of Ironwood or at minimum paved to allow bikers access	Comment rejected. This road is not proposed in the Functional Class map as being extended. The road currently acts a secondary emergency access. It will be developed in the future and include pedestrian infrastructure should adjacent property be developed.
50	Single Family Housing Only	Keep this area as single family housing. The only exception should be that this area could be used to build a new elementary school.	Comment rejected. This area's suitability score makes higher intensity development that allowed by the Urban Residential Mixed designation appropriate at this location.
51	Single Family Housing Only	No apartments. Keep as single family.	Comment rejected. Comment would require categorization contrary to existing zoning.
52	Single Family Housing Only	I do not want any apartment buildings in this area keep it to single family housing.	Comment rejected. Comment would require categorization contrary to existing zoning.
53	Residential Land Use Only	Keep this area for Residential Land use Only.	Comment rejected. Lots at the intersection of Rimrock Rd and 62nd is already zoned for commercial use. Limiting other parcels at the intersection to residential only would be inconsistent.
54	Residential Use Only	I am a property owner in this area and I am concerned about future land use, property values and crime. I would like this area to be zoned residential only.	Comment rejected. Comment would require categorization contrary to existing zoning.

Figure A.19 - Draft FLUM Comments and Responses 55-70

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55	Road expansion	If the city wants to continue to add housing developments they also need to consider road expansion. Two lane roads can't sustain the increase in population much longer. Been here for 6 years and every year the morning traffic gets worse and worse.	Comment noted. The purpose of this plan is to address the best locations for development and plan transportation improvements to match.
56	Green Space	This is an excellent area to identify as Green Space. It is in the 100 yr flood plane and a poor area for housing. The west end needs green space and the idea that the Yellowstone country club is included in green space is laughable.	Comment rejected. This area is appropriate to develop under the future land use designation Urban Residential as it is currently zoned NO.
57	Speeding	52nd already has a lot of problem with people speeding. Adding a roundabout will only make the problem worse if 52nd street is fully connected from Central to Grand. The county commissioners have multiple speed studies showing speeds in excess of 55mph (highest recorded was 70mph in a residential neighborhood).	Comment noted. This is not proposed in the FC Map to be extended from Central to Grand, only connection would be internal as development occurs. County has completed speed humps further south.
58	Homewood Park	There is crime and transients in this neighborhood.	Comment rejected. The comment location is outside of the plan boundary.
59	Left turn lane	Left turn lane into costco to alleviate traffic and enter from west side	Comment rejected. Improvements on Zoo Dr (MDT Road) should improve access to Costco.
60	Potential for commerical development	Would be nice to see some services like gas station out here	Comment accepted. The designation Urban Node will potentially provide these services.
61	Dog Poop Paradise	There is a shit ton of dog poop at shiloh.	Comment noted. Not relevant to the Future Land Use Map.
62	This category does not allow existing zoning	test	Comment accepted. N1 is used sparingly on this parcel. The primary zones to be NX2 and NX3 both are available in the current designation of URM.
63	Left turn green arrow	Driving down Grand heading west, please put a left turn green arrow for those turning left onto 48th St W. The traffic really backs up if we're waiting on just one car who can't turn left. Thank you!	Comment noted. This will be addressed in the Grand Avenue Project.
64	Truck route	It would be nice to have a truck route in/out of west Billings for 18-wheelers and other large towing vehicles that avoids roundabouts.	Comment noted. The City has designated truck routes please contact City Engineering Department.
65	56th and Grand	This intersection should be a signal light, not a roundabout. The traffic needs to be stopped to allow school children to cross with a crossing guard. There is a lot of foot traffic near the school . Roundabout are not friendly to those on foot or biking as the drivers driving over the limit and are not looking for people on foot even with the signals. The traffic also need to be stopped to allow a break in the flow to allow side street traffic to access Grand. The traffic flows at a higher speed than posted pushing 55-60 and at some times of the day is constant. It can take 3-5 minutes of waiting to access Grand from 58th going east.	Comment noted. This will be addressed in the Grand Avenue Project.
66	58th and Grand.	58th Street at Grand has become difficult to exit onto Grand as the volume of cars has increased with building west of the Foxtail subdivision. The speed limit is 45, 35 at school times when the yellow light is flashing. People drive this section of Grand closer to 55-60 making it hard to turn left out of the subdivision. 58th has become a cut thur to go to 56th and to the school. Traffic at times is constant and most do not drive 25. Many are in a hurry and drive 50 to get to the school on time. With that speed it is hard to see cars coming as there are parked cars along 58th and Kit south. With the current project of the water pump the traffic has been a lot less but once that is done the volume and speeds will go up again.	Comment noted. The multi-modal plan and Grand Avenue Project will address these issues.
67	visibility issue	the grade on 64th just north of Central creates a blind spot for vehicles on Central turning left onto 64th	Comment noted. This road is managed by Yellowstone County.
68	road issues	this is a very tight intersection for turning vehicles with trailers	Comment noted. This intersection is under construction by MDT.
69	traffic control	this is a pinch point during the school year and peak morning/afternoon hours	Comment noted. Multi-modal tranportation analysis will address congestion and roadway improvements
70	Grocery store	We need a grocery store in this area.	Comment accepted. The designation Urban Node will potentially provide these services.

Figure A.20 - Draft FLUM Comments and Responses 71-82

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71	Urban Residential	What exactly is urban residential vs. urban residential limited? Does that mean apartment building can be constructed? We fought with a developer a year ago to stop that but apparently it doesn't matter?	Comment accepted. Future land use designations are defined by zoning permited within the desingation. This informaiton is available on the project website.
72	Add strip of open space to along ditch to connect to this park	Preserve the popular path along the irrigation ditch to connect to this neighborhood park. This provides open space continuity between this neighborhood and the Rim Rock West neighborhood and open space along the Big Ditch Trail.	Comment noted. A proposed trail connection to the existing Big Ditch Trail Corridor is proposed to the south of this location.
73	Preserve Public Open Space	This area contains very natural area along the base of the rims, including some popular trails that have been used for decades. This should remain open space; consider adding as a park.	Comment rejected. It is inconsistent to designate this as open space as it is private property. That being said, the designation Urban Residential Limited does not stop someone from using this as recreation.
74	Add Separated Multiuse Pathway Along Grand Avenue	Grand Ave has no pedestrian access. Biking access is unsafe with the narrow shoulder and high volume and speed of traffic. Adding a separated multiuse pathway would residential neighborhoods in this area to other paths. It would also provide a safe route to Ben Steel Middle School and the Christian schools, which could alleviate traffic during morning rush hour, which is particularly congested along Grand Ave from Shiloh to 56th.	Comment accepted. The Grand Ave right-of-way is planned to include biking facilities.
75	Strip of Open Space to Connect Path to Grand	Consider a strip of open space along the ditch to connect the Big Ditch Trail to a multiuse path along Grand. This can be used by kids for safe biking/walking access to Ben Steele Middle School as well as other trail users.	Comment accepted. The trail is identified in the LRTP.
76	Traffic signal	Need protected turn going south on 48th. All traffic is held up going west on Grand for people waiting to turn	Comment accepted. The Grand Avenue Project will review traffic patterns and determine intersection control for this location.
77	Needs traffic circle	This intersection is becoming impossible to turn left safely. There are so many apartments here, competing with King Ave traffic. Please put a light or a traffic circle.	Comment accepted. MDT is in the process of putting a roundabout at 48th and King Ave.
78	Urban node	What is an urban node and what types of development can be built?	Comment accepted. Future land use designations are defined by zoning permited within the desingation. This informaiton is available on the project website.
79	Stupid	Destroying irrigated farm land for housing developments is just stupid. The city should be expanding north and south in the dryland areas, not where we grow our food. Or better yet, let's not expand. As the city grows, crime goes up and the quality of life goes down. Taxes go up and services go down.	Comment noted.
80	Separating Rural Residential and Agricultural	Please separate one acre 'suburban ranchettes' from true Agriculture. Large lot housing should carry its own Low Density Residential label, indexed to a cost of services analysis and excluded from ag water allowances. This change aligns with the City's fiscal stewardship goal, and the adopted Growth Policy directive to encourage development within and adjacent to existing city limits."	Comment Rejected. The intent and assignment of this category means that a parcel will likely not be developed within the city in the next 20 years. This is the only plan, of all the MLUPA plans that will be completed by that City, that includes parcels so far outside the limits of annexation. The designation of RRA is intended to identify areas of the county . Finally, we are unclear on the reference to a repealed portion of MCA and its associated requirement, as a brief search did not return any information. If further discussions are necessary, please clarify
81	One acre designations	One acre residential allotments should not be categorized as "residential/AGRICULTURAL. It is a misnomer to label them agricultural especially if they will probably only house 2 people! There is a potential real loss of property taxes along with a waste of services for a few residents. "Please separate one acre 'suburban ranchettes' from true Agriculture. Large lot housing should carry its own Low Density Residential label, indexed to a cost of services analysis and excluded from ag water allowances. This change aligns with the City's fiscal stewardship goal, and the adopted Growth Policy directive to encourage development within and adjacent to existing city limits."	Comment Rejected. The intent and assignment of this category means that a parcel will likely not be developed within the city in the next 20 years. This is the only plan, of all the MLUPA plans that will be completed by that City, that includes parcels so far outside the limits of annexation. The designation of RRA is intended to identify areas of the county . Finally, we are unclear on the reference to a repealed portion of MCA and its associated requirement, as a brief search did not return any information. If further discussions are necessary, please clarify
82	Traffic circle with realignment north to colton and rimrock	Student traversing north on grand should be re-directed to existing crosswalk north of ben steele. Students crossing from the east should have a new crosswalk developed ~500 ft south of the intersection of 56th and Grand.	Comment accepted. The Grand Avenue Project will review traffic patterns and determine roadway elements that include non-mtorized.

Figure A.21 - Draft FLUM Comments and Responses 83-97

From July 20 to September 1, 2025, community members were invited to share feedback on the Future Land Use interactive map for the West Billings Neighborhood Plan. During this time, we received 85 comments from the public, highlighting local priorities, ideas, and concerns about how the area should grow in the future. Prior to the public map launch, the project's Steering Committee was also invited to provide feedback, resulting in four additional comments to help guide and refine the map based on their community knowledge and experience. Comments 86–105 are not directly pinned on the PDF map because they were submitted outside of the map platform, via email or direct contact with the project team.

83	Should not allow cross street	Daybreak should not continue north to Colton. Alignment from 56th should be adjusted to traverse north to alleviate through traffic on 58th. Major North South Streets are every 8 blocks 32nd (40th aka Shiloh), 48th, 56th, 64th, 72nd, 80th.	Comment accept. Daybreak Dr is not planned to be extended to the north.
84	Traffic Circle Advised	Another dangerous intersection. Vintage estates should be right turn only, additionally, road block @ Vinyard and Burlington should be removed. 52nd should be paved with access to Vintage Estates and the subdivision south. 52nd should be considered a minor city road such as Rehberg ln. There are a lack of north south streets in this area.	Comment accepted. The Grand Avenue Project will review traffic patterns and determine roadway elements that include non-mtorized.
85	Traffic Safety Concerns.	Opportunity for "Right Turn Only" leaving Albertsons with a traffic circle @ Grand and 54th. There have been several injury accidents at this intersection since the exit from Albertsons was installed.	Comment accepted. The Grand Avenue Project will review traffic patterns and determine roadway elements that include non-mtorized.
86		Will the speed limit be reduced on Rimrock - east of the new roundabout. Traffic is crazy	Comment accepted. As Rimrock Rd is built out, a reduced speed limit will likely be evaluated.
87		If the yellow line is for transportation why aren't you following existging roads - Same w/ MPO lines	Comment accept. MPO Boundary is currently being evaluated in a separate project. The Federal Highway Administration requires MPO Boundary to follow urbanized areas, which is why the MPO Boundary does not follow roads.
88		Need more east west corridors (capacity and safety) that don't just go through residential neighborhoods	Comment noted. There is a future funcitonal class map for new development and consideration.
89		We need another way onto Hwy 3 than zimmerman sooner rather than later This is a safety issue similar to what drove the IBL for the Heights	Comment noted.
90		Would be better to have more shared use paths where pedestrians & cyclists are buffered from vehicles	Comment accepted. Bike and pedestrian facilitieswill be evaluated for inclusion on all future collector and arterial right-of-ways.
91		When doing the planning for growth areas - PLEASE consider the impacts to the established neighborhoods. Traffic safety Pedestrians/ Bikes	Comment noted. That is the goal of the transportation portion of this plan.
92		<3 this Annafeld/ Josephine crossing is a decent start b1 mixed use needs to be even more integrated - less car-centric	Comment accepted. The goal of this plan is to create areas of both mixed use and centralized commercial spaces. This will create areas that are less car centric. Comment refers to guiding principle 2 "small commercial/ retail businesses should be allowed in neighborhoods as opposed to pushing all commercial activity to major intersections."
93		Why such a big push for high density so far from the city	Comment noted. The area shown is likely to become a part of the city one day and has been identified in the limits of annexation map. Planning far into the future will allow for better development overall.
94		Need more open space! 40% of open space on map is Yellowstone Club	Comment accepted. Open space designations describe the main overall use of that entire area. Parks and open spaces will still be developed within the other designations.
95		Area Should be pink. Urban residential Ltd.	Comment rejected. The existing zoning and suitability analysis supports category designation.
96		My primary comment is there is NO accompanying explanation for the Land Use Categories. While my "insider" knowledge gives me an idea of what each category entails, no meaningful comments can be made by the West Billings residents without a better "explainer" on each category. How are they supposed to know what an Urban Node means? I am certain there will be misapprehensions and misinterpretations of each of these categories.	Comment noted. The project website and future outreach will continue to educate the public on the placetypes.
97		The future Urban Residential that brackets several county residential neighborhoods north and south of Hesper Road. This presents an inherent conflict boundary. Is there a designation for County Neighborhoods that implies a future annexation category?	Comment noted. The intent of the County Neighborhood future land use placetype is to identify neighborhoods that have already been established in the County. This placetype does not preclude or conflist with the annxation map or policy.

Figure A.22 - Draft FLUM Comments and Responses 98-105

From July 20 to September 1, 2025, community members were invited to share feedback on the Future Land Use interactive map for the West Billings Neighborhood Plan. During this time, we received 85 comments from the public, highlighting local priorities, ideas, and concerns about how the area should grow in the future. Prior to the public map launch, the project's Steering Committee was also invited to provide feedback, resulting in four additional comments to help guide and refine the map based on their community knowledge and experience. Comments 86–105 are not directly pinned on the PDF map because they were submitted outside of the map platform, via email or direct contact with the project team.			
98		There are no substantive Urban Node designations beyond the 1/2-mile west of Shiloh Rd. While there is the Urban Residential Mixed that courses along many primary arterials this provides limited opportunities for neighborhood and commercial services. For example, will 56th St West and Central Avenue stay Rural Residential and Agriculture for the next 20 years? The SD #2 High School land (40 acres) at 48th ST W and Monad will spur the need for adjacent services as well as draw the traffic volumes that encourage commercial interest in nearby land. But there is no plan for this future land use except for Urban Residential and Urban Residential Mixed to the north.	Comment accepted. Parcel D00466A has been changed to URM to better serve a future High School.
99		There needs to be a chart of land area designated for each category. E.g. total area is 14,000 acres: 8,000 acres designed as Rural Residential and Ag; 2,560 acres designated Rural Residential; 1,280 acres designated Open Space; etc...	Comment accepted. A chart has been created to show overall designation amounts and will be included in the final plan.
100		The limits of annexation boundaries need to be shown.	Comment accepted. There will be a separate map within the final plan showing the annexation boundary.
101		The map should have an interactive version so several planning layers can be shown - annexation, zoning, MPO boundary, functional class of roads, etc. without having to flip from tab to tab to see how this all layers together.	Comment noted. Future implementation of the land use map into the City's GIS should create this opportunity.
102		The Neibauer property south of Neibauer Rd between S 48th St W and S 44th St W will be a prime property for further Employment and Industrial or Commercial Mixed Uses. While the parcel is outside the limits of annexation (null area), the city's water supply line to the new reservoir at Hesper Rd goes up S 48th St West.	Comment accepted. Parcel D00903 changed to Commercial Mixed, and parcel D00902 changed to Employment and Industrial.
103		Properties north and south of Elder Grove School will become County Neighborhoods eventually. Probably not stay Rural Residential or Ag.	Comment rejected. The County will not followthe future land use map. Since the parcel is 20 acres the designation of RRA is appropriate.
104		How does this future Land Use Map line up with the Westend Multi-Modal Plan for corridor and intersection improvements?	Comment noted. The boundaries are different between MPO limits and Westend Multi-Modal Plan for corridor and intersection improvements.
105		The scale of the map is incorrect. Each section is 1-mile square. The scale implies otherwise. The scale should reflect common measures - 1/4-mile, 1/2 mile, 1 mile.	Comment accepted. The future land use map scale has been adjusted.

APPENDIX B
FUTURE LAND USE MAP PRODUCTION METHODS

Appendix B Contents

Future Land Use Map Production Methods. 206
MLUPA Compliance 210

Future Land Use Map Production Methods

Suitability Analysis

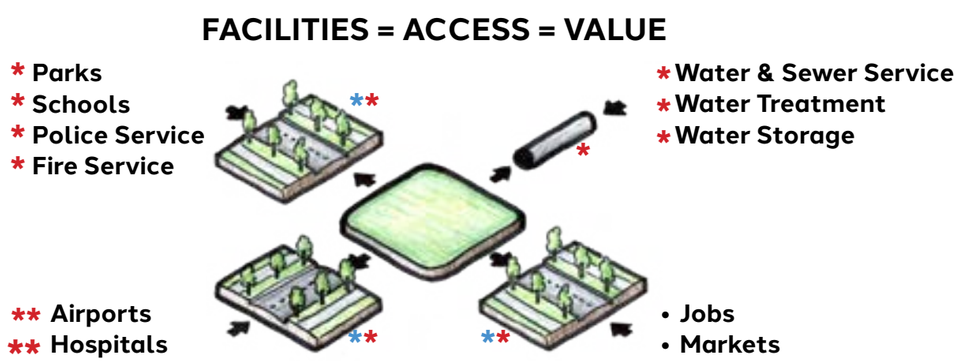
Once the plan themes had been updated, the consultant team and staff began the FLUM drafting process by analyzing where within the study area development is appropriate and likely to occur. Many factors influence where, when and how land is developed, the most influential is access: access to jobs and markets via public transportation facilities like roads, and access to services like water and sewer, schools, parks, police and fire protection. Land with more access is better suited for more intense development than land with less access and is likely to develop sooner. To model that suitability, the consultant team analyzed proximity of land within the plan area to twelve different factors. Each was given a different weight multiplier and distance variable in rough proportion to its influence on development. For example, proximity to a point of interstate access is more influential than proximity to an unscheduled City of Billings capital improvement project. (Figure B.1 Suitability Heatmap Methods, Equations, Weights)

The twelve factors analyzed are as follows:

1. Interstate Access
2. Water Mains (12"+)
3. Schools
4. Limits of Annexation
5. Commercial Address
6. Principle Arterials
7. Minor Aterials
8. Collectors
9. Projects (CIP)
10. Projects (Unscheduled)
11. Residential Density (15+ units per acre)
12. Residential Density (6-15 units per acre)

Those proximity factors were added together in the ArcGIS raster calculator to create a comprehensive heatmap of suitability. (Figure B.2 Suitability Heatmap)

Lastly, developed land and flooplains were removed from the suitability heat map. (Figure B.3 Suitability Heatmap with Undevelopable Land Removed) The remaining area was treated as developable for the purposes of MLUPA compliance.



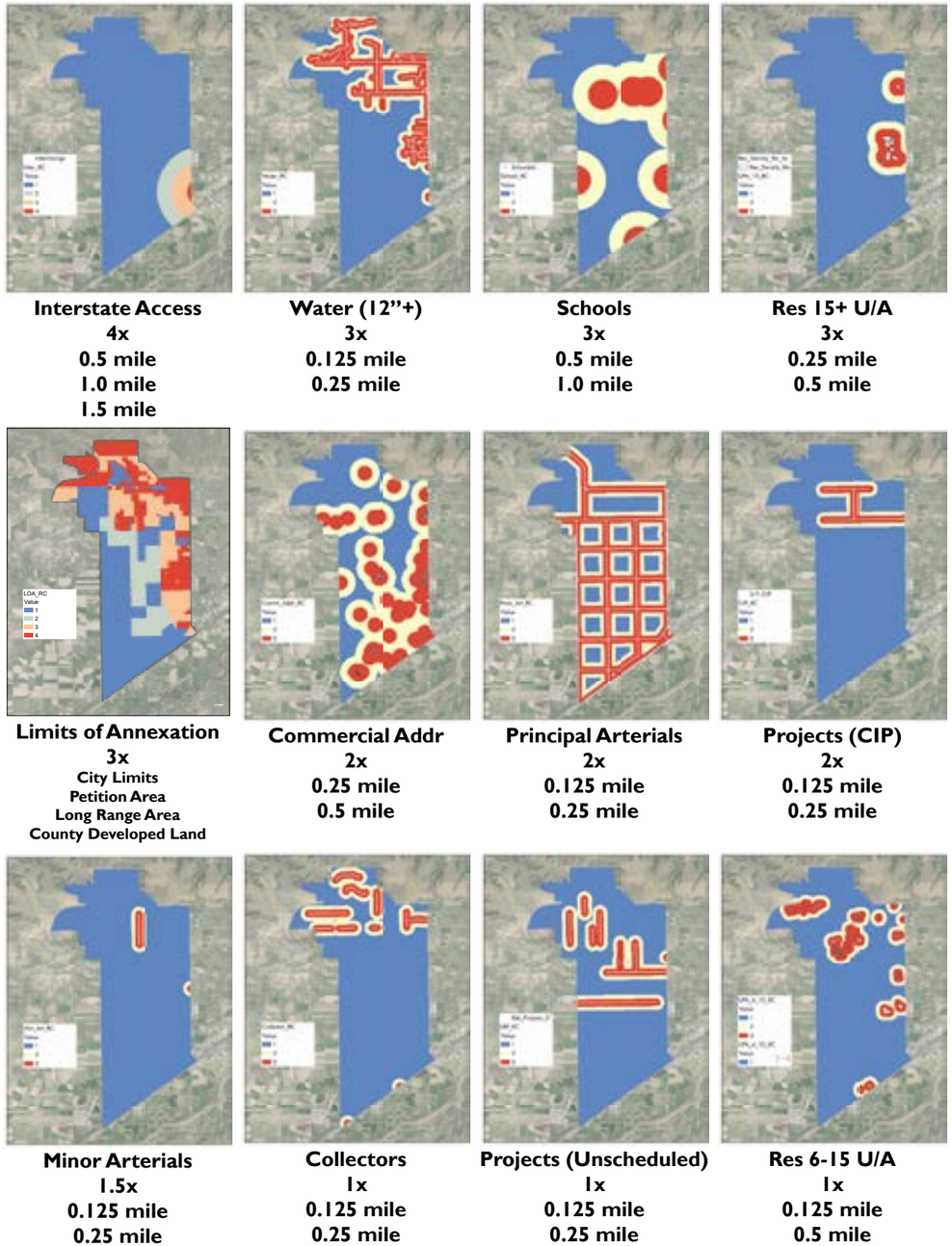


Figure B.1 Suitability Heatmap Methods, Equation, Weights

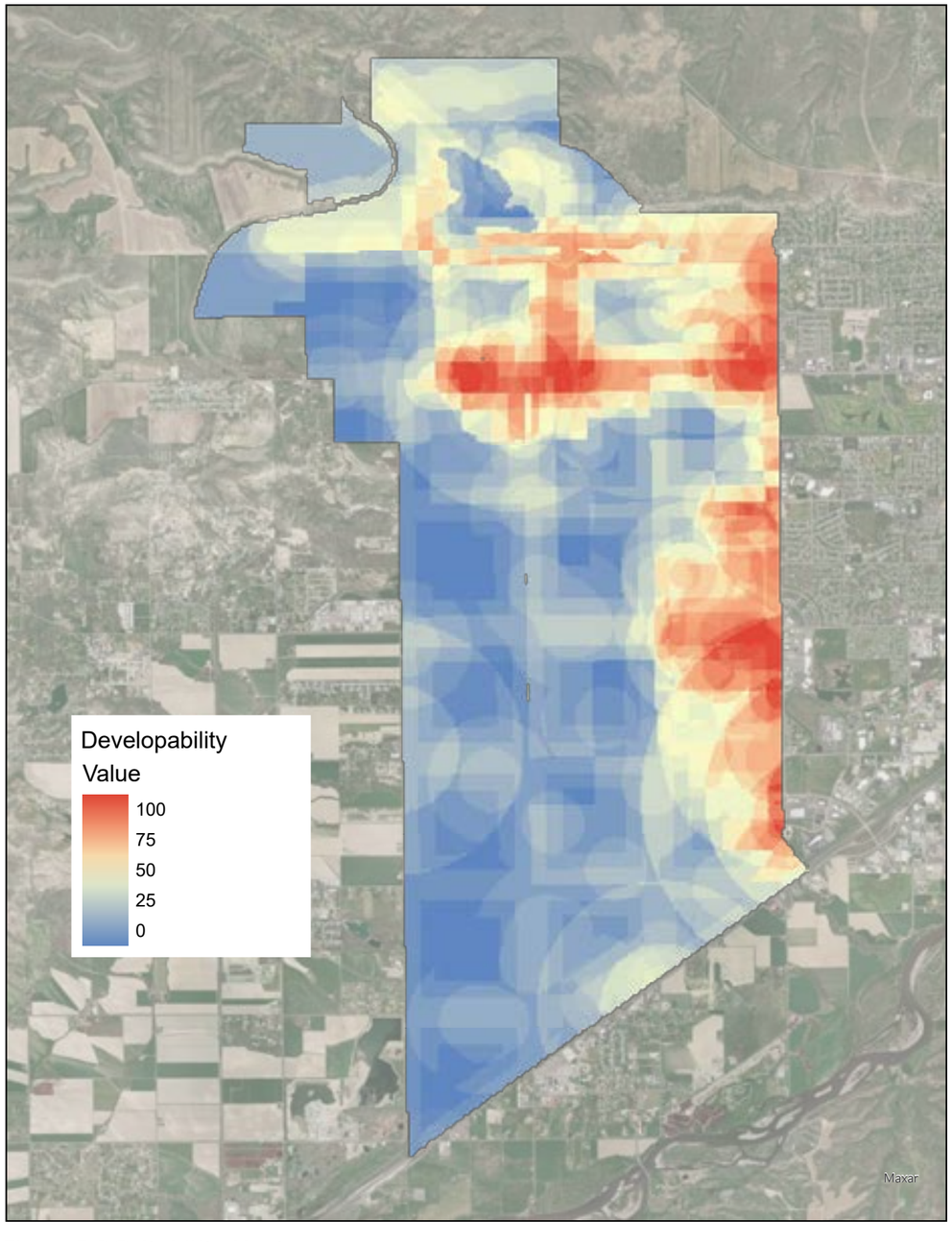


Figure B.2 Suitability Heatmap

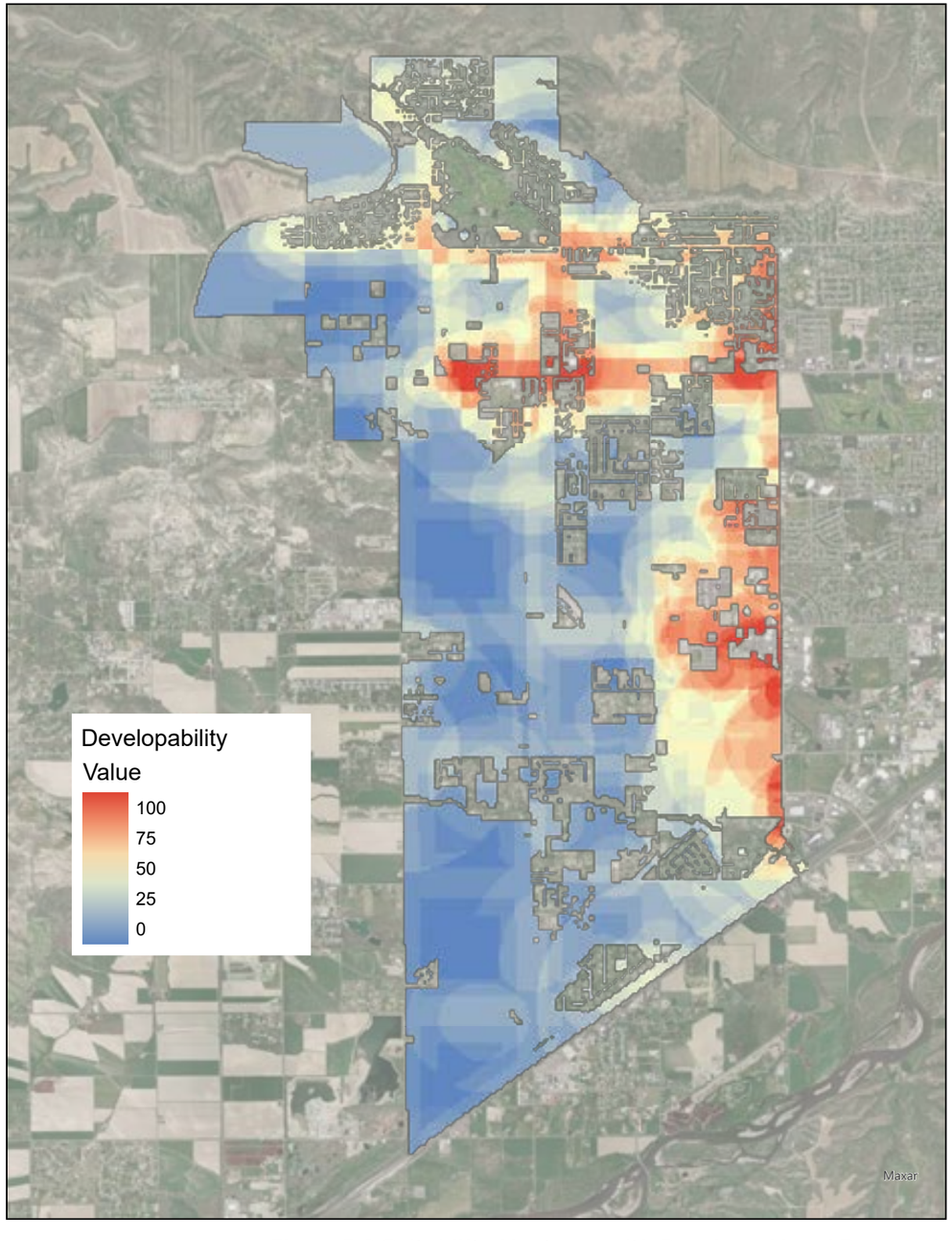


Figure B.3 Suitability Heatmap with Developed Land Removed

Suitability Analysis Conclusions

The suitability analysis of undeveloped land within the plan area gives us a useful model for what land is likely to develop first, what land has better access and supports more intense uses, and what land will be more cost effective to provide municipal services. The final suitability heatmap was used as a basemap for public FLUM workshops held in November of 2024 where participants created their own future land use maps in a game detailed in Appendix A.

The project team then used the suitability heatmap, the public workshop maps, the updated guiding principles and all public input gathered to that point to create a MLUPA-compliant draft Future Land Use Map.

FLUM Game - Sanbell

Members of the Public participate in the FLUM workshop at Ben Steele Middle School, Nov 13, 2024

MLUPA Compliance

The Montana Land Use Planning Act (MLUPA) places many requirements on this plan, known as a Future Land Use Plan, and the Future Land Use Map it creates. Details of all aspects of this plan's MLUPA compliance are provided in Chapter 7. Aspects of the FLUM's compliance with MLUPA which influence its production are provided here.

76-25-213. Land use and future land use map. (1) A land use plan must include a future land use map and a written description of the proposed general distribution, location, and extent of residential, commercial, mixed, industrial, agricultural, recreational, and conservation uses of land and other categories of public and private uses, as determined by the local government.

The future land use map is included in Chapter 3 of this plan. Figures and text describing the future land use categories are also included in that chapter.

(2) The future land use map must reflect the anticipated and preferred pattern and intensities of development for the jurisdiction over the next 20 years, based on the information, analysis, and public input collected, considered, and relevant to the population projections for and economic development of the jurisdiction and the housing and local services needed to accommodate those projections, while acknowledging and addressing the natural resource, environment, and natural hazards of the jurisdiction.

The future land use map in Chapter 3, Future Land Use, was developed in accordance with the public input and updated guiding principles established through the public input process. Natural resources, the environment, and natural hazards were specifically excluded from this planning process at the direction of City/County Planning staff. Those considerations will be addressed in the overall Billings 2045 plan document.

Population Projections				
	2000	2021	2045 Projected	2020-2045 Change
Study Area	6,226	16,182	30,770	14,588
MPO Planning Area	112092	142,358	190,986	48,628
Housing Needs				
	2000	2021	2045 Projected	2020-2045 Change
Study Area	2,155	6,644	13,444	6,800
MPO Planning Area		58,815	78,814	20,000
*Assumes a 30% capture rate of population growth and new housing units				

Figure B.4 Population and Housing Growth Projections

Population Projections

Section 76-25-213(4)(c) requires that the FLUM identify the following:

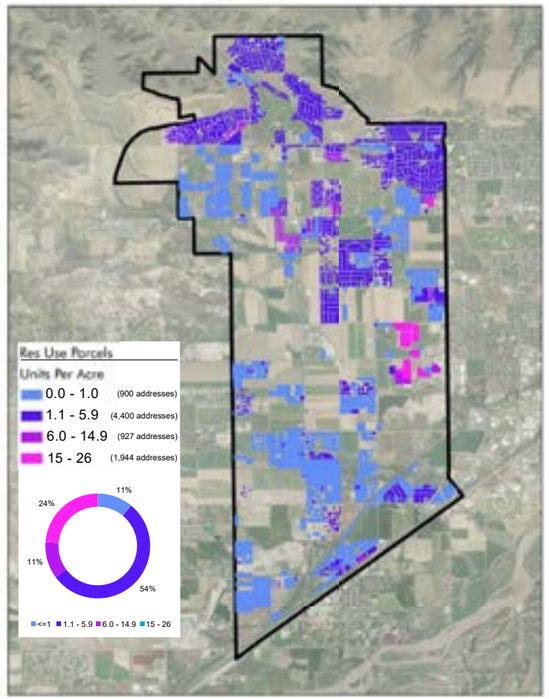
(c) geographic distribution of future land uses in the jurisdiction, anticipated over a 20-year planning period that specifically demonstrate:

i) adequate land to support the projected population in all land use types in areas where local services can be adequately and cost-effectively provided for that population;

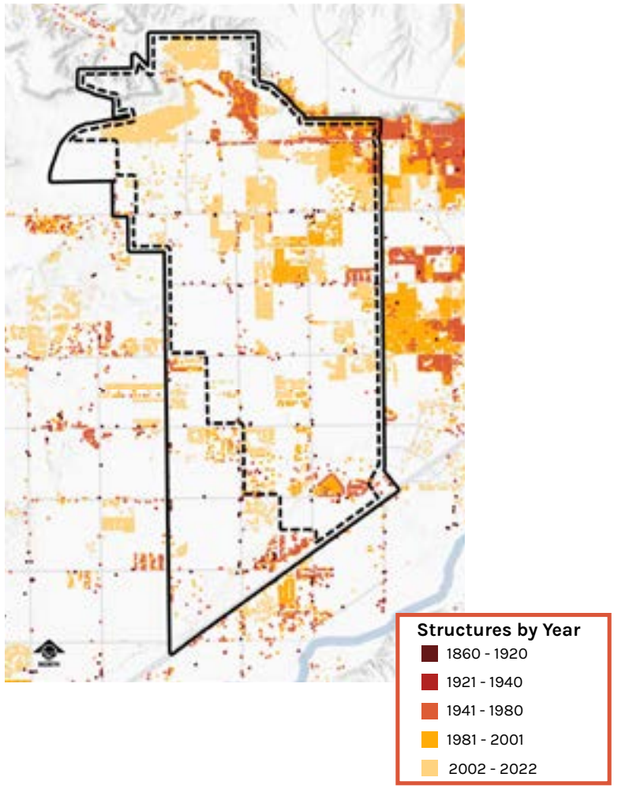
Historically, public investment in utility and transportation facilities combined with ample supply of developable land has driven rapid population growth in West Billings as compared to other areas of Yellowstone County. From 2000 to 2020, a total of 4,490 housing units were constructed in the plan area. This accounts for approximately 30 percent of all housing units constructed within Yellowstone County during that period. Population projections for this plan assume that the West Billings plan area will continue to receive a similar share of county population growth over the next 20 years.

Consistent with the Montana Land Use Planning Act, population projections were estimated over the next 20 years (2045) based on data resources including the Billings Long Range Transportation Plan (LRTP), the US Census, and the Montana Department of Commerce Regional Economic Models Inc (REMI). For consistency among planning documents, data from the LRTP was used to create projections within the West Billings plan area. Figure B.4 provides the growth projections for plan area.

Commercial Land Use Demand



B.5 Housing Inventory by Density



B.6 Housing Inventory by Year Built

Projection

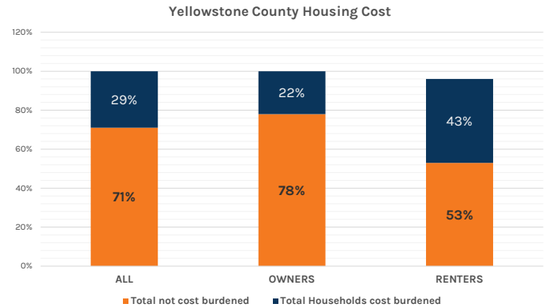
In order to meet the project themes informed by the project's public input, the project team included varying scales of commercial zones in several future land use categories. Categories that allow commercial zones include; Urban Residential (UR), Urban Residential Mixed (URM), Urban Node (UN), Commercial Mixed (CM), and Employment and Industrial (EI).

Yellowstone County GIS data indicates that 905 acres within the plan area are under commercial use. Applying a compound annual growth rate similar to the plan area's projected 3.1% population growth yields a projected demand of 1,660 acres. The FLUM provides 4,076 acres of future land use categories that allow commercial use. It is unlikely that those categories will develop as 100% commercial land uses, but the market for commercial land use has adequate room to expand within the plan area over the next twenty years.

Residential Land Use Demand Projection

Section 76-25-213(4)(c) requires that the FLUM identify the following:

(ii) adequate sites to accommodate the type and supply of housing needed for the projected population; and



B.7 Yellowstone County Housing Burden

B.8 Median Sales Price by Housing Type

After performing an analysis of existing housing stock including factors like year built and residential density (Figures B.5 and B.6) the project team cross referenced the plan area's population growth projections, average houshold size, and percent of Yellowstone County residents who experience housing burden to determine the 20-year projected housing demand and percent of that projected demand which will need to be affordable to Billings area residents.

Because 29% of Yellowstone County residents experience housing burden (Figure B.7 Yellowstone County Housing Burden), the project team determined that, to meet the above MLUPA requirement, 29% of the projected housing demand should be met by providing land in the FLUM categorized to provide "missing middle" housing, which tends to be more affordable than lower-density, single-family housing or higher-density apartment buildings (Figure B.8). Future land use categories considered most likely to provide missing middle housing include Urban Residential (UR) and Urban Residential Mixed (URM).

To determine the area required to meet projected residential land use demand, the project team analyzed existing development in the plan area according to their zoning and the resulting residential density. (Figure B.5)

Section 76-25-213(4)(c) requires that the FLUM identify the following:

(iii) areas of the jurisdiction that are not generally suitable for development and the reason, based on the constraints identified through the land use plan analysis;

As stated in the suitability mapping process section of this appendix, the project team designated all floodplains in the plan area as undevelopable for purposes of MLUPA compliance. Where a zoned, developed property intersects a floodplain, a category containing the present zoning was applied.

APPENDIX C
TRAFFIC COUNT DATA

Appendix C Contents

Traffic Count Data 216

Traffic Count Data

Average Daily Traffic:

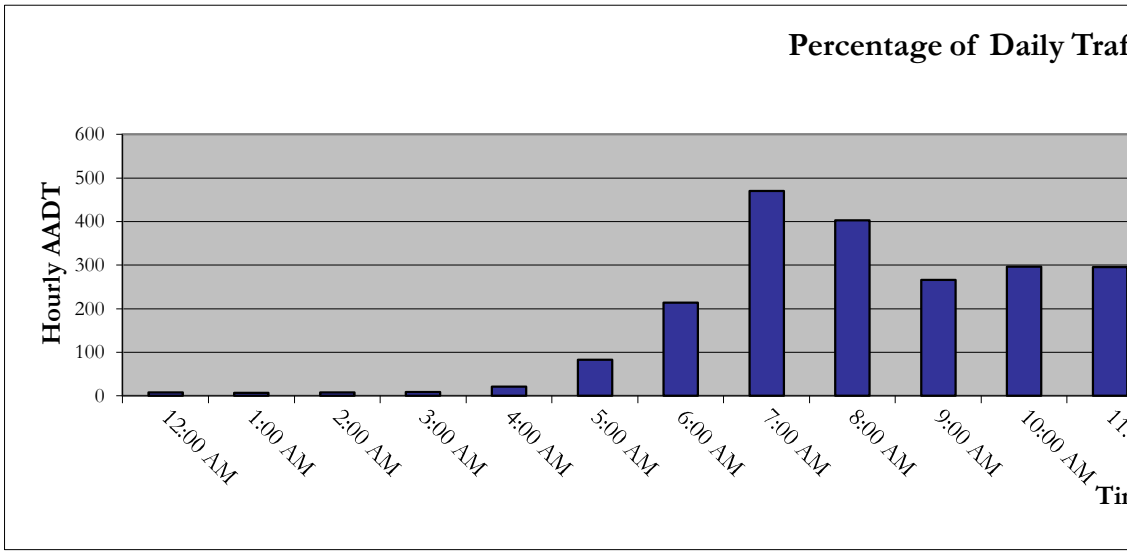
VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	2/8/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	2/4/2024 Sunday		2/5/2024 Monday		2/6/2024 Tuesday		2/7/2024 Wednesday		2/8/2024 Thursday	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
0:00									4	4
1:00									7	0
2:00									2	6
3:00									2	7
4:00									0	21
5:00									10	73
6:00									43	171
7:00									64	406
8:00									140	263
9:00									100	166
10:00									157	140
11:00									129	167
12:00									175	146
13:00									164	137
14:00									190	167
15:00									279	186
16:00									271	203
17:00									330	177
18:00									214	152
19:00									166	56
20:00									121	42
21:00									82	22
22:00									30	14
23:00									11	5
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2,691**	**2,731**

Percentage of Daily Traf



NT SUMMARY

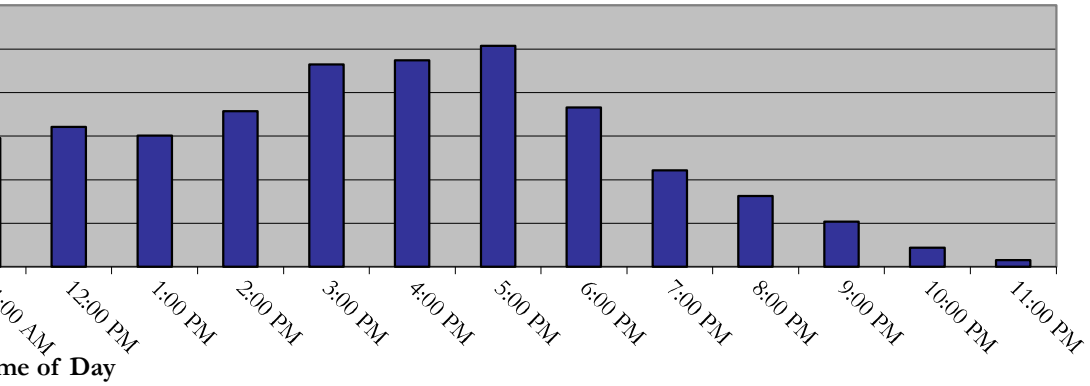
ocation: Rimrock Rd & 62ND ST West (North Leg) - North Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.010

	2/9/2024 Friday		2/10/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	NB	SB	NB	SB	NB	SB	ADT	NB	SB	ADT
					4	4	8	0.1%	0.1%	0.1%
					7	0	7	0.3%	0.0%	0.1%
					2	6	8	0.1%	0.2%	0.1%
					2	7	9	0.1%	0.3%	0.2%
					0	21	21	0.0%	0.8%	0.4%
					10	73	83	0.4%	2.7%	1.5%
					43	171	214	1.6%	6.3%	3.9%
					64	406	470	2.4%	14.9%	8.7%
					140	263	403	5.2%	9.6%	7.4%
					100	166	266	3.7%	6.1%	4.9%
					157	140	297	5.8%	5.1%	5.5%
					129	167	296	4.8%	6.1%	5.5%
					175	146	321	6.5%	5.3%	5.9%
					164	137	301	6.1%	5.0%	5.6%
					190	167	357	7.1%	6.1%	6.6%
					279	186	465	10.4%	6.8%	8.6%
					271	203	474	10.1%	7.4%	8.7%
					330	177	507	12.3%	6.5%	9.4%
					214	152	366	8.0%	5.6%	6.8%
					166	56	222	6.2%	2.1%	4.1%
					121	42	163	4.5%	1.5%	3.0%
					82	22	104	3.0%	0.8%	1.9%
					30	14	44	1.1%	0.5%	0.8%
					11	5	16	0.4%	0.2%	0.3%
	0	**0**	**0**	**0**	**2,691**	**2,731**	**5,422**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour

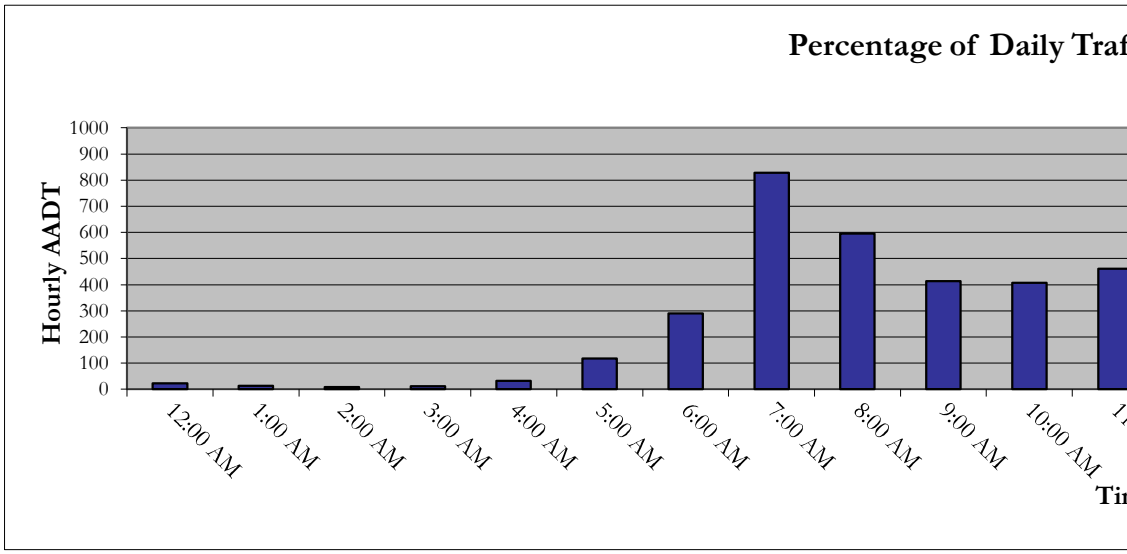


VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	5/16/2023	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	5/14/2023 Sunday		5/15/2023 Monday		5/16/2023 Tuesday		5/17/2023 Wednesday		5/18/2023 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00					8	15				
1:00					4	10				
2:00					5	4				
3:00					8	4				
4:00					18	14				
5:00					74	43				
6:00					170	120				
7:00					512	317				
8:00					341	255				
9:00					234	179				
10:00					210	197				
11:00					245	216				
12:00					258	249				
13:00					237	239				
14:00					254	304				
15:00					422	423				
16:00					434	507				
17:00					477	434				
18:00					318	314				
19:00					151	223				
20:00					106	196				
21:00					61	91				
22:00					34	77				
23:00					14	22				
TOTAL	0	0	0	0	4,595	4,453	0	0	0	0



NT SUMMARY

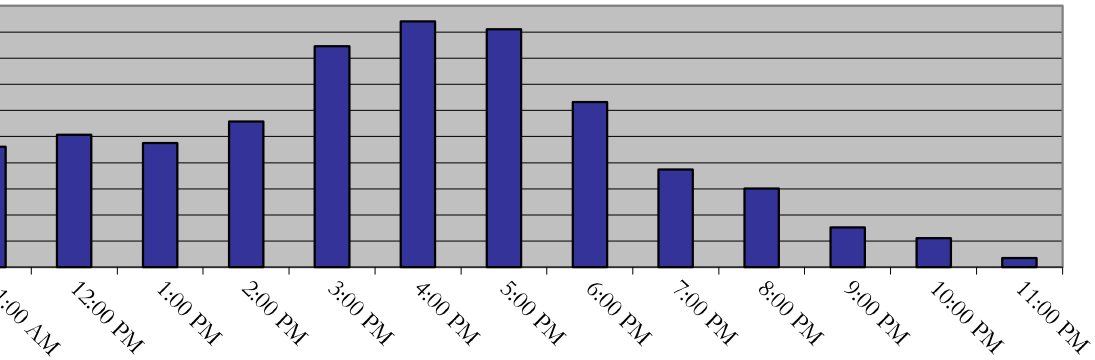
ocation: Grand Avenue & 56TH ST West - East Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 0.970

	5/19/2023 Friday		5/20/2023 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					8	15	23	0.2%	0.3%	0.3%
					4	10	14	0.1%	0.2%	0.2%
					5	4	9	0.1%	0.1%	0.1%
					8	4	12	0.2%	0.1%	0.1%
					18	14	32	0.4%	0.3%	0.4%
					74	43	117	1.6%	1.0%	1.3%
					170	120	290	3.7%	2.7%	3.2%
					512	317	829	11.1%	7.1%	9.2%
					341	255	596	7.4%	5.7%	6.6%
					234	179	413	5.1%	4.0%	4.6%
					210	197	407	4.6%	4.4%	4.5%
					245	216	461	5.3%	4.9%	5.1%
					258	249	507	5.6%	5.6%	5.6%
					237	239	476	5.2%	5.4%	5.3%
					254	304	558	5.5%	6.8%	6.2%
					422	423	845	9.2%	9.5%	9.3%
					434	507	941	9.4%	11.4%	10.4%
					477	434	911	10.4%	9.7%	10.1%
					318	314	632	6.9%	7.1%	7.0%
					151	223	374	3.3%	5.0%	4.1%
					106	196	302	2.3%	4.4%	3.3%
					61	91	152	1.3%	2.0%	1.7%
					34	77	111	0.7%	1.7%	1.2%
					14	22	36	0.3%	0.5%	0.4%
	0	**0**	**0**	**0**	**4,595**	**4,453**	**9,048**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



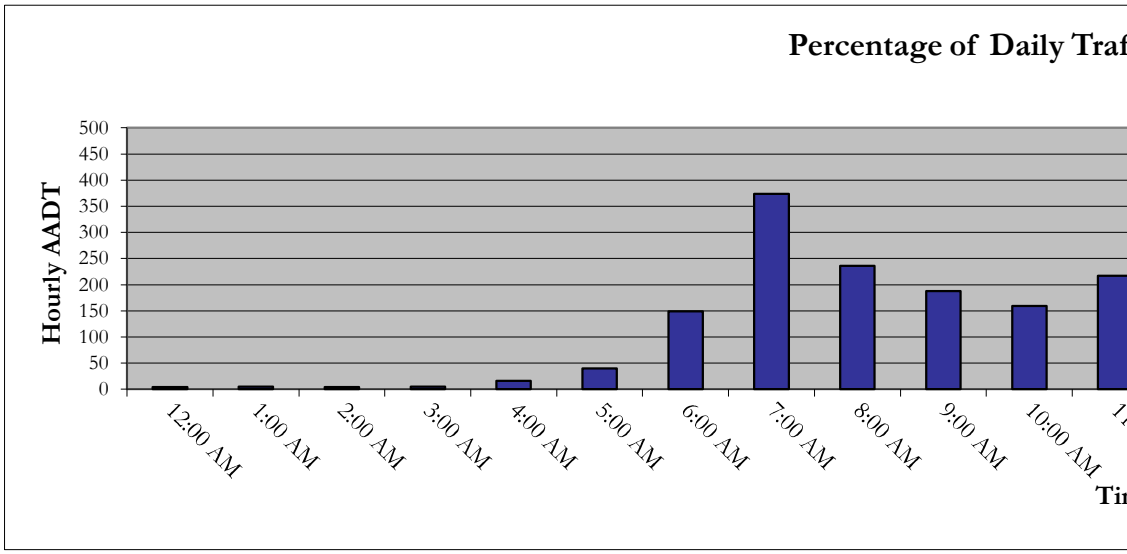
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	1/9/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	1/9/2024 Sunday		1/10/2024 Monday		1/11/2024 Tuesday		1/12/2024 Wednesday		1/13/2024 Thursday	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
0:00					1	3				
1:00					4	1				
2:00					2	2				
3:00					4	1				
4:00					10	6				
5:00					22	18				
6:00					74	75				
7:00					165	209				
8:00					126	110				
9:00					88	100				
10:00					86	73				
11:00					115	102				
12:00					98	95				
13:00					106	93				
14:00					144	138				
15:00					250	179				
16:00					189	194				
17:00					214	176				
18:00					133	101				
19:00					96	77				
20:00					77	43				
21:00					30	17				
22:00					11	16				
23:00					6	9				
TOTAL	**0**	**0**	**0**	**0**	**2,051**	**1,838**	**0**	**0**	**0**	**0**



NT SUMMARY

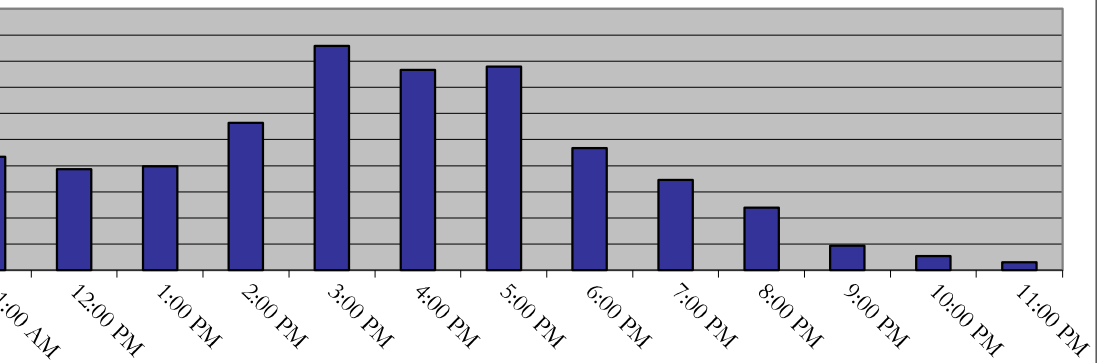
ocation: Rimrock Rd & 54TH ST West - South Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.040

	1/14/2024 Friday		1/15/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	NB	SB	NB	SB	NB	SB	ADT	NB	SB	ADT
					1	3	4	0.0%	0.2%	0.1%
					4	1	5	0.2%	0.1%	0.1%
					2	2	4	0.1%	0.1%	0.1%
					4	1	5	0.2%	0.1%	0.1%
					10	6	16	0.5%	0.3%	0.4%
					22	18	40	1.1%	1.0%	1.0%
					74	75	149	3.6%	4.1%	3.8%
					165	209	374	8.0%	11.4%	9.6%
					126	110	236	6.1%	6.0%	6.1%
					88	100	188	4.3%	5.4%	4.8%
					86	73	159	4.2%	4.0%	4.1%
					115	102	217	5.6%	5.5%	5.6%
					98	95	193	4.8%	5.2%	5.0%
					106	93	199	5.2%	5.1%	5.1%
					144	138	282	7.0%	7.5%	7.3%
					250	179	429	12.2%	9.7%	11.0%
					189	194	383	9.2%	10.6%	9.8%
					214	176	390	10.4%	9.6%	10.0%
					133	101	234	6.5%	5.5%	6.0%
					96	77	173	4.7%	4.2%	4.4%
					77	43	120	3.8%	2.3%	3.1%
					30	17	47	1.5%	0.9%	1.2%
					11	16	27	0.5%	0.9%	0.7%
					6	9	15	0.3%	0.5%	0.4%
	0	**0**	**0**	**0**	**2,051**	**1,838**	**3,889**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



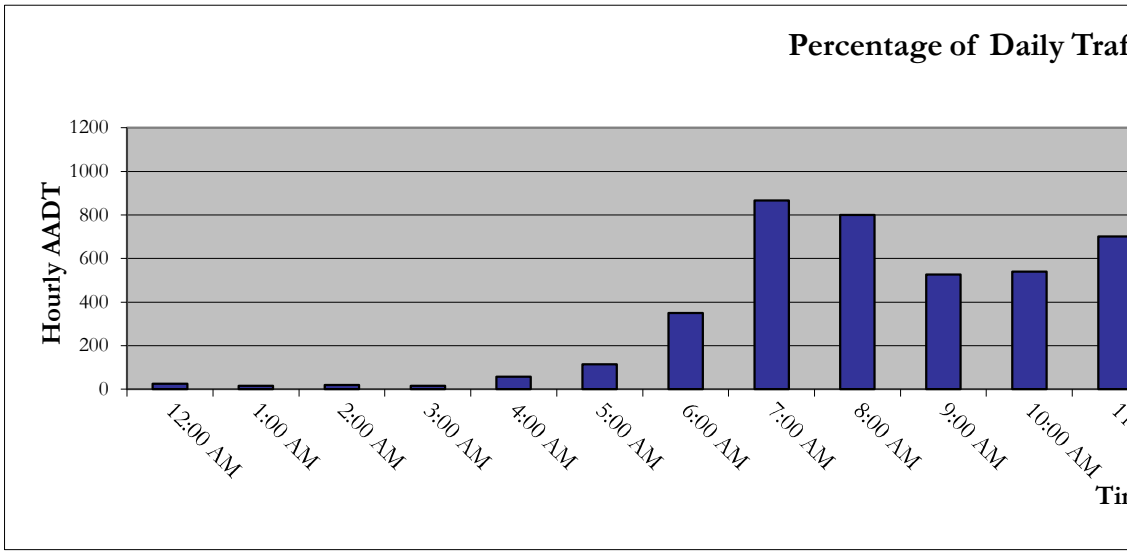
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	1/9/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	1/7/2024 Sunday		1/8/2024 Monday		1/9/2024 Tuesday		1/10/2024 Wednesday		1/11/2024 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00					8	18				
1:00					7	9				
2:00					8	11				
3:00					10	6				
4:00					41	17				
5:00					83	32				
6:00					256	94				
7:00					633	234				
8:00					436	365				
9:00					307	220				
10:00					281	260				
11:00					340	361				
12:00					330	371				
13:00					283	327				
14:00					357	406				
15:00					400	566				
16:00					350	558				
17:00					361	672				
18:00					266	365				
19:00					157	308				
20:00					96	208				
21:00					43	77				
22:00					41	44				
23:00					15	22				
TOTAL	**0**	**0**	**0**	**0**	**5,109**	**5,551**	**0**	**0**	**0**	**0**



NT SUMMARY

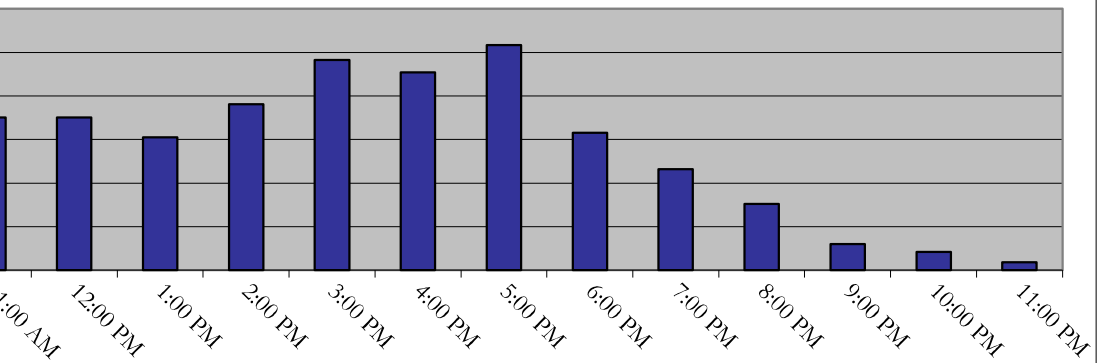
ocation: Grand Avenue & 48TH ST West - East Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.040

	1/12/2024 Friday		1/13/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					8	18	26	0.2%	0.3%	0.2%
					7	9	16	0.1%	0.2%	0.2%
					8	11	19	0.2%	0.2%	0.2%
					10	6	16	0.2%	0.1%	0.2%
					41	17	58	0.8%	0.3%	0.5%
					83	32	115	1.6%	0.6%	1.1%
					256	94	350	5.0%	1.7%	3.3%
					633	234	867	12.4%	4.2%	8.1%
					436	365	801	8.5%	6.6%	7.5%
					307	220	527	6.0%	4.0%	4.9%
					281	260	541	5.5%	4.7%	5.1%
					340	361	701	6.7%	6.5%	6.6%
					330	371	701	6.5%	6.7%	6.6%
					283	327	610	5.5%	5.9%	5.7%
					357	406	763	7.0%	7.3%	7.2%
					400	566	966	7.8%	10.2%	9.1%
					350	558	908	6.9%	10.1%	8.5%
					361	672	1033	7.1%	12.1%	9.7%
					266	365	631	5.2%	6.6%	5.9%
					157	308	465	3.1%	5.5%	4.4%
					96	208	304	1.9%	3.7%	2.9%
					43	77	120	0.8%	1.4%	1.1%
					41	44	85	0.8%	0.8%	0.8%
					15	22	37	0.3%	0.4%	0.3%
	0	**0**	**0**	**0**	**5,109**	**5,551**	**10,660**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



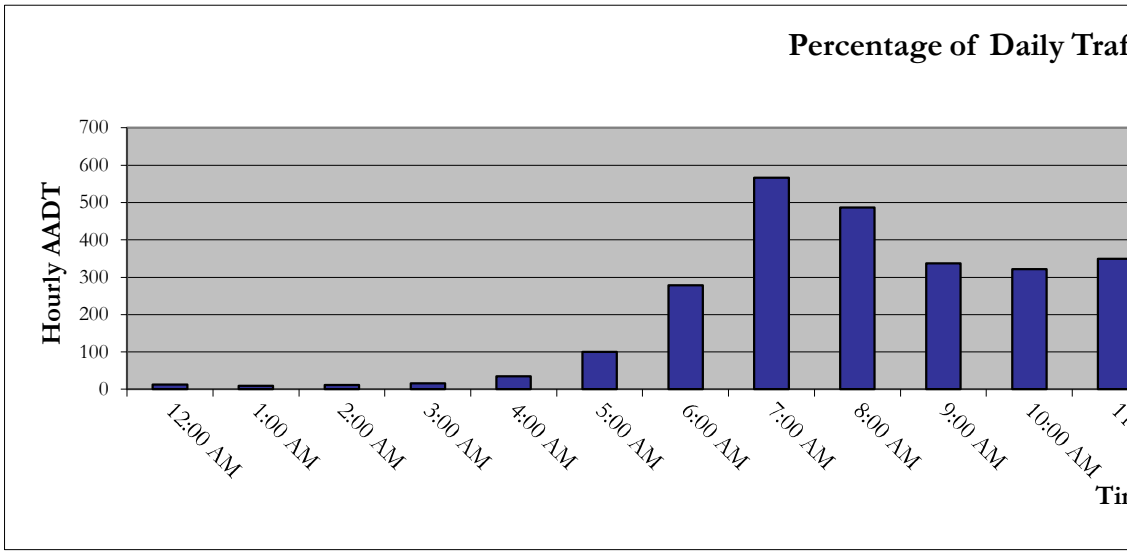
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	2/8/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	2/4/2024 Sunday		2/5/2024 Monday		2/6/2024 Tuesday		2/7/2024 Wednesday		2/8/2024 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00									6	7
1:00									2	7
2:00									6	5
3:00									11	5
4:00									30	5
5:00									87	13
6:00									215	63
7:00									469	98
8:00									304	183
9:00									206	131
10:00									165	157
11:00									185	164
12:00									186	190
13:00									166	206
14:00									199	231
15:00									227	340
16:00									240	339
17:00									204	364
18:00									170	236
19:00									73	174
20:00									56	168
21:00									34	107
22:00									19	36
23:00									10	19
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3,270**	**3,248**



NT SUMMARY

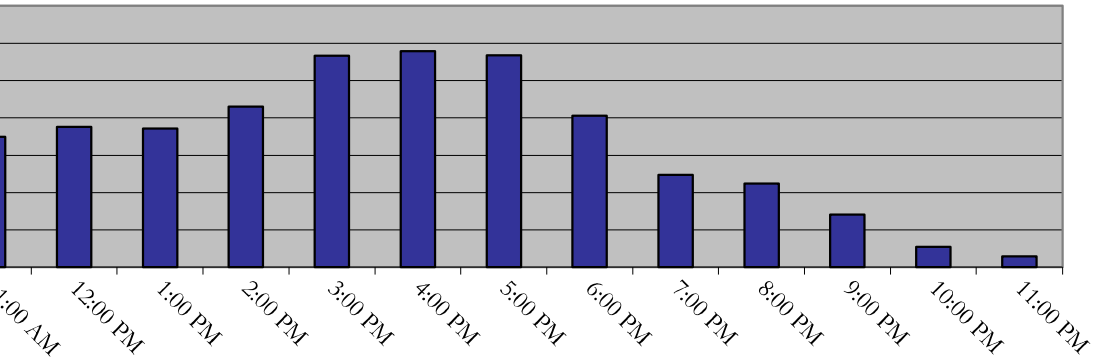
ocation: Rimrock Rd & 62ND ST West (East Leg) - East Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.010

	2/9/2024 Friday		2/10/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					6	7	13	0.2%	0.2%	0.2%
					2	7	9	0.1%	0.2%	0.1%
					6	5	11	0.2%	0.2%	0.2%
					11	5	16	0.3%	0.2%	0.2%
					30	5	35	0.9%	0.2%	0.5%
					87	13	100	2.7%	0.4%	1.5%
					215	63	278	6.6%	1.9%	4.3%
					469	98	567	14.3%	3.0%	8.7%
					304	183	487	9.3%	5.6%	7.5%
					206	131	337	6.3%	4.0%	5.2%
					165	157	322	5.0%	4.8%	4.9%
					185	164	349	5.7%	5.0%	5.4%
					186	190	376	5.7%	5.8%	5.8%
					166	206	372	5.1%	6.3%	5.7%
					199	231	430	6.1%	7.1%	6.6%
					227	340	567	6.9%	10.5%	8.7%
					240	339	579	7.3%	10.4%	8.9%
					204	364	568	6.2%	11.2%	8.7%
					170	236	406	5.2%	7.3%	6.2%
					73	174	247	2.2%	5.4%	3.8%
					56	168	224	1.7%	5.2%	3.4%
					34	107	141	1.0%	3.3%	2.2%
					19	36	55	0.6%	1.1%	0.8%
					10	19	29	0.3%	0.6%	0.4%
3	**0**	**0**	**0**	**0**	**3,270**	**3,248**	**6,518**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



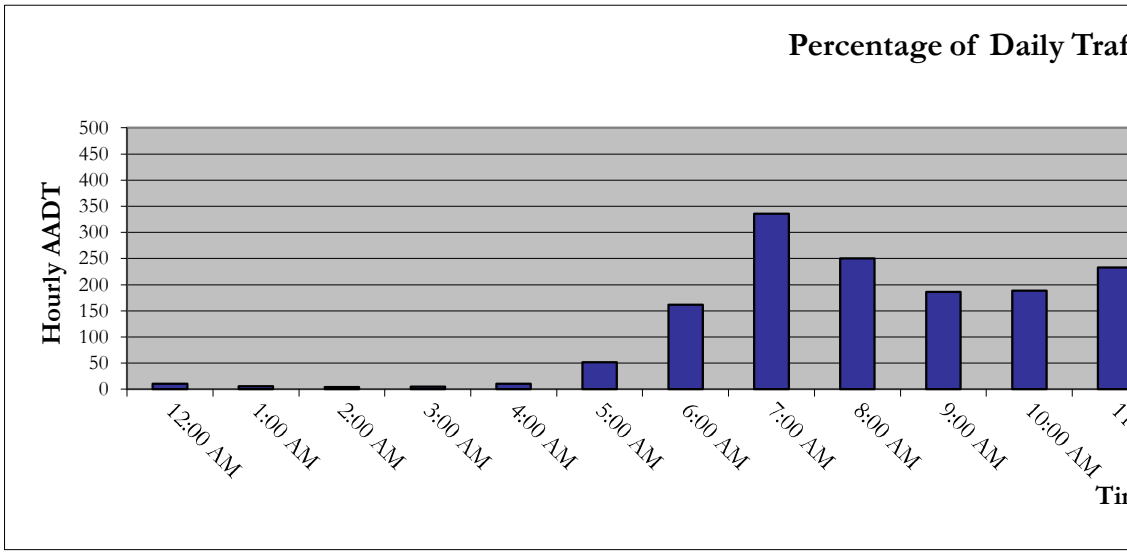
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	9/12/2023	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	9/10/2023 Sunday		9/11/2023 Monday		9/12/2023 Tuesday		9/13/2023 Wednesday		9/14/2023 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00					5	6				
1:00					4	2				
2:00					2	2				
3:00					4	1				
4:00					8	3				
5:00					38	14				
6:00					119	43				
7:00					240	96				
8:00					171	79				
9:00					98	88				
10:00					93	96				
11:00					117	116				
12:00					119	130				
13:00					95	111				
14:00					94	137				
15:00					128	226				
16:00					156	254				
17:00					145	287				
18:00					136	123				
19:00					88	99				
20:00					21	77				
21:00					8	31				
22:00					11	19				
23:00					9	15				
TOTAL	**0**	**0**	**0**	**0**	**1,909**	**2,055**	**0**	**0**	**0**	**0**



NT SUMMARY

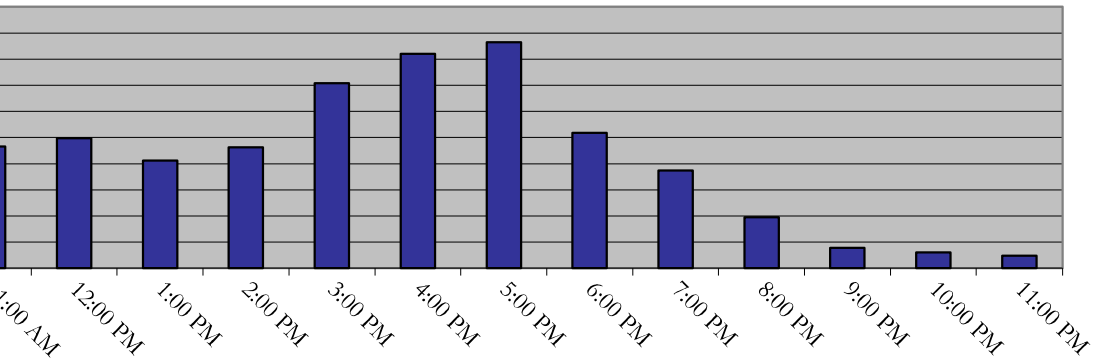
ocation: Hesper Rd & 48TH ST West - West Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 0.950

	9/15/2023 Friday		9/16/2023 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					5	6	11	0.3%	0.3%	0.3%
					4	2	6	0.2%	0.1%	0.2%
					2	2	4	0.1%	0.1%	0.1%
					4	1	5	0.2%	0.0%	0.1%
					8	3	11	0.4%	0.1%	0.3%
					38	14	52	2.0%	0.7%	1.3%
					119	43	162	6.2%	2.1%	4.1%
					240	96	336	12.6%	4.7%	8.5%
					171	79	250	9.0%	3.8%	6.3%
					98	88	186	5.1%	4.3%	4.7%
					93	96	189	4.9%	4.7%	4.8%
					117	116	233	6.1%	5.6%	5.9%
					119	130	249	6.2%	6.3%	6.3%
					95	111	206	5.0%	5.4%	5.2%
					94	137	231	4.9%	6.7%	5.8%
					128	226	354	6.7%	11.0%	8.9%
					156	254	410	8.2%	12.4%	10.3%
					145	287	432	7.6%	14.0%	10.9%
					136	123	259	7.1%	6.0%	6.5%
					88	99	187	4.6%	4.8%	4.7%
					21	77	98	1.1%	3.7%	2.5%
					8	31	39	0.4%	1.5%	1.0%
					11	19	30	0.6%	0.9%	0.8%
					9	15	24	0.5%	0.7%	0.6%
	0	**0**	**0**	**0**	**1,909**	**2,055**	**3,964**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



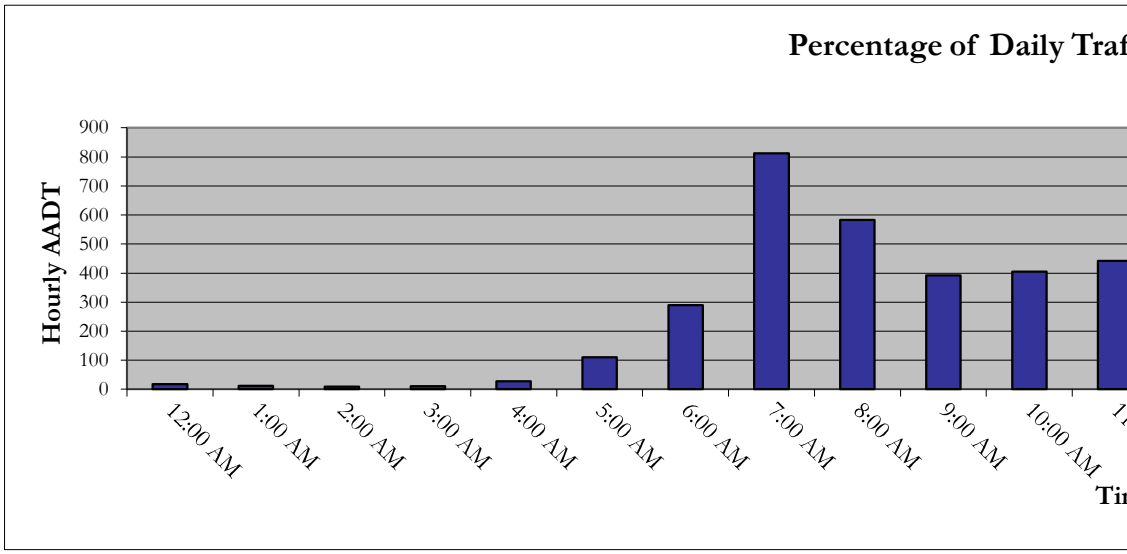
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	5/16/2023	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	5/14/2023 Sunday		5/15/2023 Monday		5/16/2023 Tuesday		5/17/2023 Wednesday		5/18/2023 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00					8	10				
1:00					3	9				
2:00					5	4				
3:00					8	3				
4:00					19	9				
5:00					74	36				
6:00					201	89				
7:00					554	258				
8:00					347	236				
9:00					229	163				
10:00					218	187				
11:00					239	203				
12:00					241	259				
13:00					214	235				
14:00					243	281				
15:00					372	371				
16:00					371	391				
17:00					362	434				
18:00					223	324				
19:00					146	228				
20:00					87	196				
21:00					55	101				
22:00					30	73				
23:00					12	22				
TOTAL	**0**	**0**	**0**	**0**	**4,261**	**4,122**	**0**	**0**	**0**	**0**



NT SUMMARY

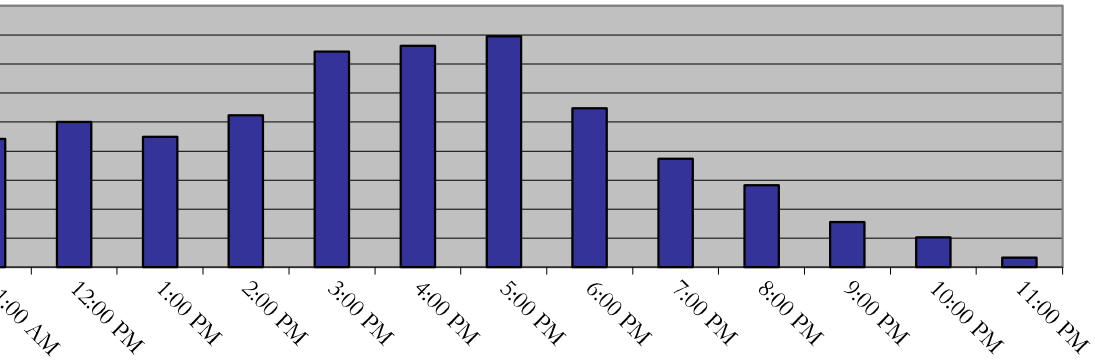
ocation: Grand Avenue & 56TH ST West - West Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 0.970

	5/19/2023 Friday		5/20/2023 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					8	10	18	0.2%	0.2%	0.2%
					3	9	12	0.1%	0.2%	0.1%
					5	4	9	0.1%	0.1%	0.1%
					8	3	11	0.2%	0.1%	0.1%
					19	9	28	0.4%	0.2%	0.3%
					74	36	110	1.7%	0.9%	1.3%
					201	89	290	4.7%	2.2%	3.5%
					554	258	812	13.0%	6.3%	9.7%
					347	236	583	8.1%	5.7%	7.0%
					229	163	392	5.4%	4.0%	4.7%
					218	187	405	5.1%	4.5%	4.8%
					239	203	442	5.6%	4.9%	5.3%
					241	259	500	5.7%	6.3%	6.0%
					214	235	449	5.0%	5.7%	5.4%
					243	281	524	5.7%	6.8%	6.3%
					372	371	743	8.7%	9.0%	8.9%
					371	391	762	8.7%	9.5%	9.1%
					362	434	796	8.5%	10.5%	9.5%
					223	324	547	5.2%	7.9%	6.5%
					146	228	374	3.4%	5.5%	4.5%
					87	196	283	2.0%	4.8%	3.4%
					55	101	156	1.3%	2.5%	1.9%
					30	73	103	0.7%	1.8%	1.2%
					12	22	34	0.3%	0.5%	0.4%
	0	**0**	**0**	**0**	**4,261**	**4,122**	**8,383**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



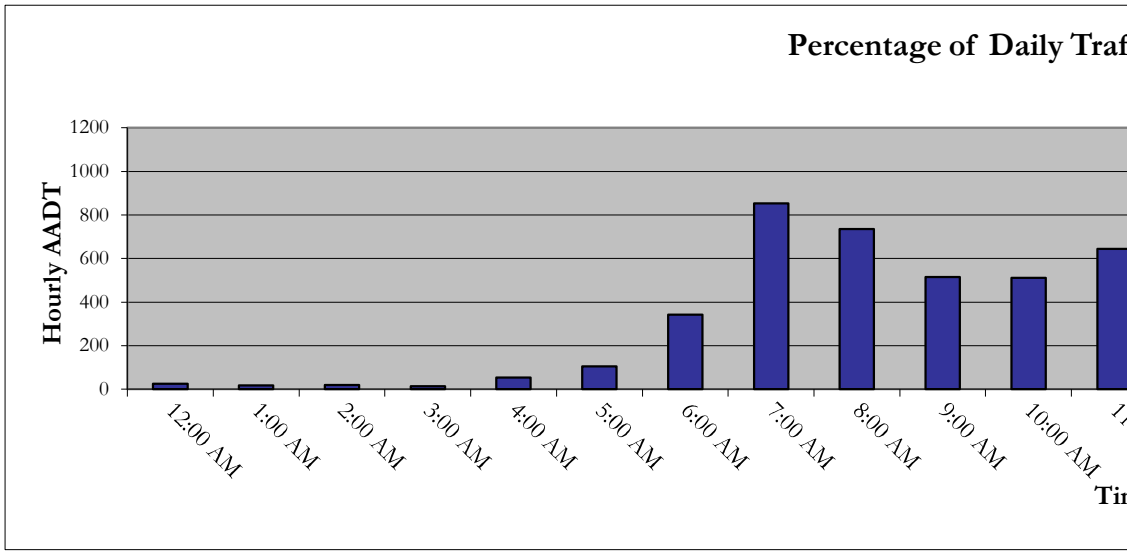
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count Lo
Agency/Company:	Sanderson Stewart	
Dates Performed:	1/9/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	1/7/2024 Sunday		1/8/2024 Monday		1/9/2024 Tuesday		1/10/2024 Wednesday		1/11/2024 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00					9	16				
1:00					9	9				
2:00					8	11				
3:00					9	5				
4:00					37	17				
5:00					75	30				
6:00					251	92				
7:00					635	219				
8:00					478	257				
9:00					281	234				
10:00					272	240				
11:00					316	329				
12:00					332	368				
13:00					289	319				
14:00					366	373				
15:00					391	525				
16:00					332	538				
17:00					371	657				
18:00					249	360				
19:00					171	292				
20:00					92	199				
21:00					43	79				
22:00					38	40				
23:00					12	26				
TOTAL	**0**	**0**	**0**	**0**	**5,066**	**5,235**	**0**	**0**	**0**	**0**



NT SUMMARY

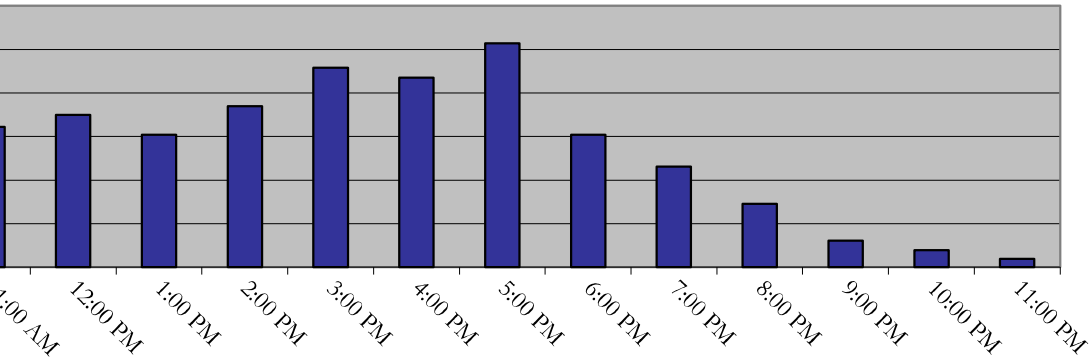
ocation: Grand Avenue & 48TH ST West - West Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.040

	1/12/2024 Friday		1/13/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					9	16	25	0.2%	0.3%	0.2%
					9	9	18	0.2%	0.2%	0.2%
					8	11	19	0.2%	0.2%	0.2%
					9	5	14	0.2%	0.1%	0.1%
					37	17	54	0.7%	0.3%	0.5%
					75	30	105	1.5%	0.6%	1.0%
					251	92	343	5.0%	1.8%	3.3%
					635	219	854	12.5%	4.2%	8.3%
					478	257	735	9.4%	4.9%	7.1%
					281	234	515	5.5%	4.5%	5.0%
					272	240	512	5.4%	4.6%	5.0%
					316	329	645	6.2%	6.3%	6.3%
					332	368	700	6.6%	7.0%	6.8%
					289	319	608	5.7%	6.1%	5.9%
					366	373	739	7.2%	7.1%	7.2%
					391	525	916	7.7%	10.0%	8.9%
					332	538	870	6.6%	10.3%	8.4%
					371	657	1028	7.3%	12.6%	10.0%
					249	360	609	4.9%	6.9%	5.9%
					171	292	463	3.4%	5.6%	4.5%
					92	199	291	1.8%	3.8%	2.8%
					43	79	122	0.8%	1.5%	1.2%
					38	40	78	0.8%	0.8%	0.8%
					12	26	38	0.2%	0.5%	0.4%
	0	**0**	**0**	**0**	**5,066**	**5,235**	**10,301**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



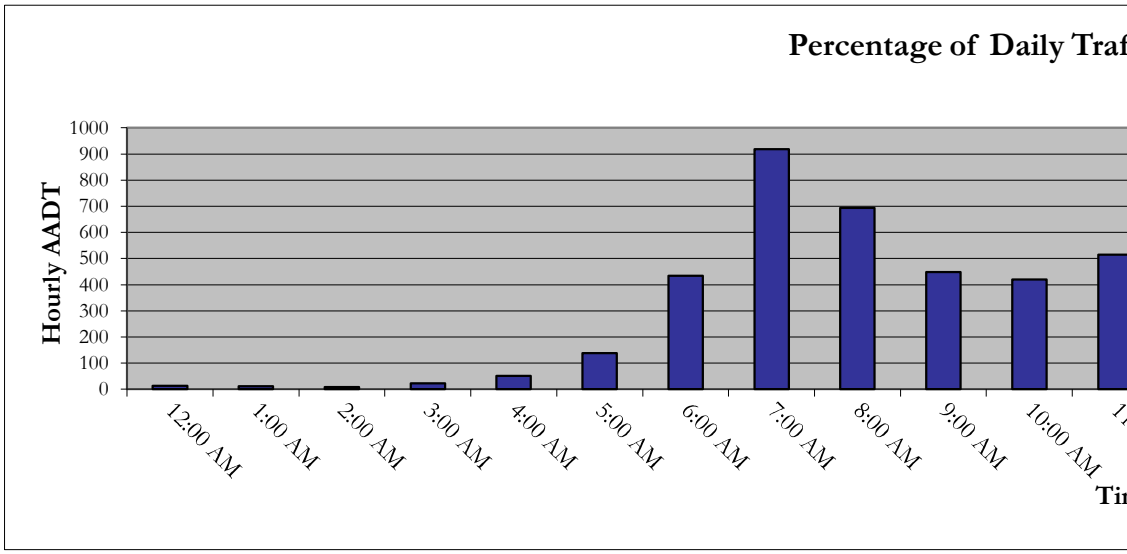
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	1/9/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	1/9/2024 Sunday		1/10/2024 Monday		1/11/2024 Tuesday		1/12/2024 Wednesday		1/13/2024 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00					3	11				
1:00					7	5				
2:00					4	4				
3:00					18	5				
4:00					45	7				
5:00					109	29				
6:00					337	97				
7:00					714	204				
8:00					438	256				
9:00					246	202				
10:00					239	181				
11:00					272	243				
12:00					268	256				
13:00					257	249				
14:00					306	296				
15:00					343	445				
16:00					350	523				
17:00					345	546				
18:00					196	303				
19:00					109	259				
20:00					69	197				
21:00					43	107				
22:00					18	62				
23:00					12	30				
TOTAL	**0**	**0**	**0**	**0**	**4,748**	**4,517**	**0**	**0**	**0**	**0**



NT SUMMARY

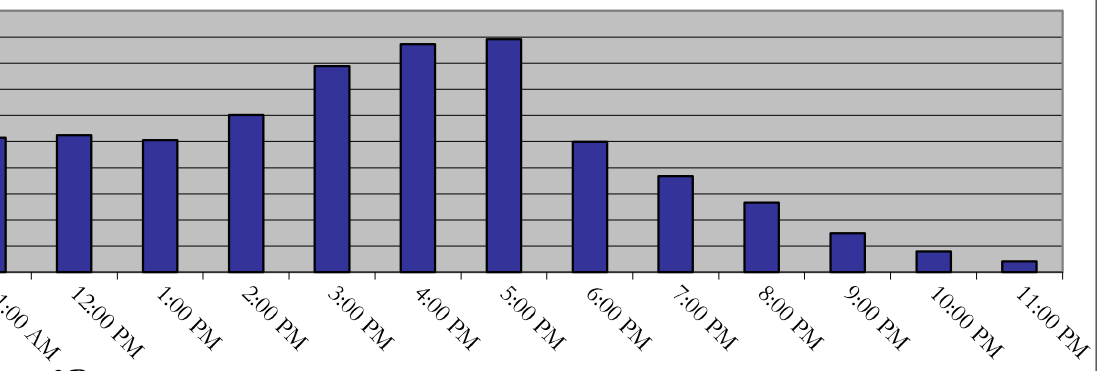
ocation: Rimrock Rd & 54TH ST West - East Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.040

	1/14/2024 Friday		1/15/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					3	11	14	0.1%	0.2%	0.2%
					7	5	12	0.1%	0.1%	0.1%
					4	4	8	0.1%	0.1%	0.1%
					18	5	23	0.4%	0.1%	0.2%
					45	7	52	0.9%	0.2%	0.6%
					109	29	138	2.3%	0.6%	1.5%
					337	97	434	7.1%	2.1%	4.7%
					714	204	918	15.0%	4.5%	9.9%
					438	256	694	9.2%	5.7%	7.5%
					246	202	448	5.2%	4.5%	4.8%
					239	181	420	5.0%	4.0%	4.5%
					272	243	515	5.7%	5.4%	5.6%
					268	256	524	5.6%	5.7%	5.7%
					257	249	506	5.4%	5.5%	5.5%
					306	296	602	6.4%	6.6%	6.5%
					343	445	788	7.2%	9.9%	8.5%
					350	523	873	7.4%	11.6%	9.4%
					345	546	891	7.3%	12.1%	9.6%
					196	303	499	4.1%	6.7%	5.4%
					109	259	368	2.3%	5.7%	4.0%
					69	197	266	1.5%	4.4%	2.9%
					43	107	150	0.9%	2.4%	1.6%
					18	62	80	0.4%	1.4%	0.9%
					12	30	42	0.3%	0.7%	0.5%
	0	**0**	**0**	**0**	**4,748**	**4,517**	**9,265**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



me of Day

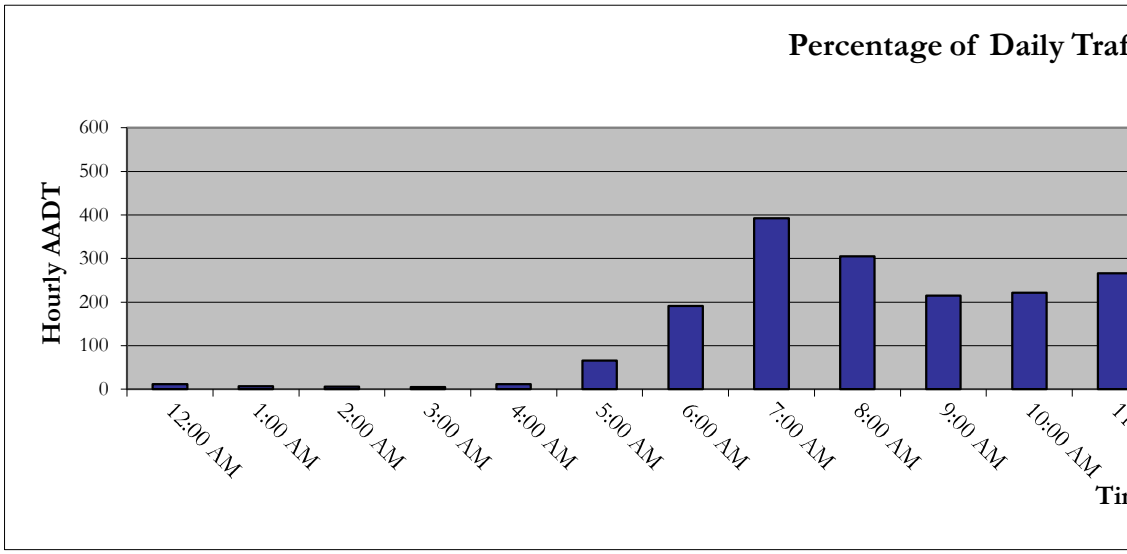
VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	9/12/2023	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	9/10/2023 Sunday		9/11/2023 Monday		9/12/2023 Tuesday		9/13/2023 Wednesday		9/14/2023 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00					5	7				
1:00					5	2				
2:00					4	2				
3:00					4	1				
4:00					8	4				
5:00					51	15				
6:00					144	47				
7:00					291	102				
8:00					209	96				
9:00					111	104				
10:00					107	115				
11:00					122	144				
12:00					144	164				
13:00					123	141				
14:00					118	157				
15:00					150	257				
16:00					193	285				
17:00					176	333				
18:00					147	140				
19:00					91	119				
20:00					22	95				
21:00					10	41				
22:00					10	25				
23:00					8	16				
TOTAL	**0**	**0**	**0**	**0**	**2,253**	**2,412**	**0**	**0**	**0**	**0**

Percentage of Daily Traf



NT SUMMARY

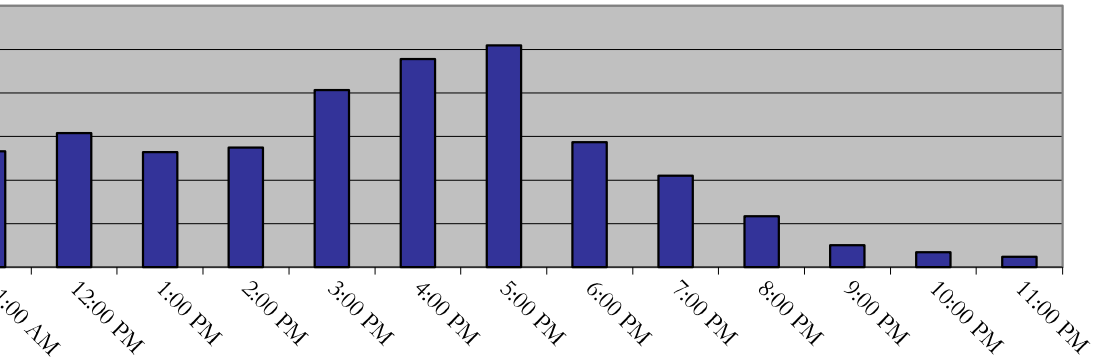
ocation: Hesper Rd & 48TH ST West - East Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 0.950

	9/15/2023 Friday		9/16/2023 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					5	7	12	0.2%	0.3%	0.3%
					5	2	7	0.2%	0.1%	0.2%
					4	2	6	0.2%	0.1%	0.1%
					4	1	5	0.2%	0.0%	0.1%
					8	4	12	0.4%	0.2%	0.3%
					51	15	66	2.3%	0.6%	1.4%
					144	47	191	6.4%	1.9%	4.1%
					291	102	393	12.9%	4.2%	8.4%
					209	96	305	9.3%	4.0%	6.5%
					111	104	215	4.9%	4.3%	4.6%
					107	115	222	4.7%	4.8%	4.8%
					122	144	266	5.4%	6.0%	5.7%
					144	164	308	6.4%	6.8%	6.6%
					123	141	264	5.5%	5.8%	5.7%
					118	157	275	5.2%	6.5%	5.9%
					150	257	407	6.7%	10.7%	8.7%
					193	285	478	8.6%	11.8%	10.2%
					176	333	509	7.8%	13.8%	10.9%
					147	140	287	6.5%	5.8%	6.2%
					91	119	210	4.0%	4.9%	4.5%
					22	95	117	1.0%	3.9%	2.5%
					10	41	51	0.4%	1.7%	1.1%
					10	25	35	0.4%	1.0%	0.8%
					8	16	24	0.4%	0.7%	0.5%
	0	**0**	**0**	**0**	**2,253**	**2,412**	**4,665**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



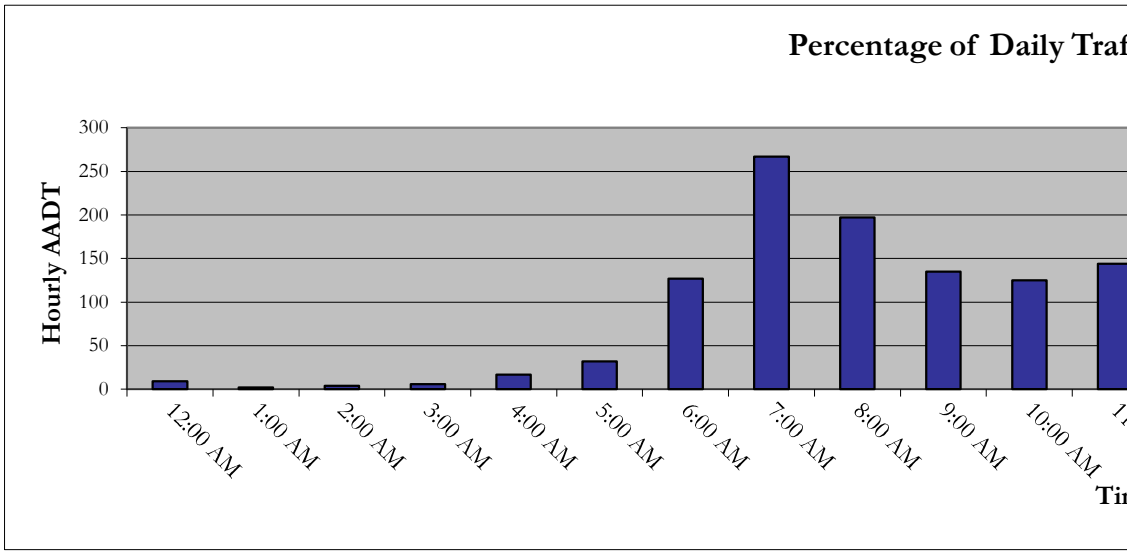
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	2/8/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	2/4/2024 Sunday		2/5/2024 Monday		2/6/2024 Tuesday		2/7/2024 Wednesday		2/8/2024 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00									3	6
1:00									1	1
2:00									0	4
3:00									5	1
4:00									15	2
5:00									29	3
6:00									101	26
7:00									227	40
8:00									128	69
9:00									83	52
10:00									68	57
11:00									68	76
12:00									80	94
13:00									69	74
14:00									60	75
15:00									85	137
16:00									82	169
17:00									95	181
18:00									70	115
19:00									34	81
20:00									31	76
21:00									6	43
22:00									4	15
23:00									2	9
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1,346**	**1,406**



NT SUMMARY

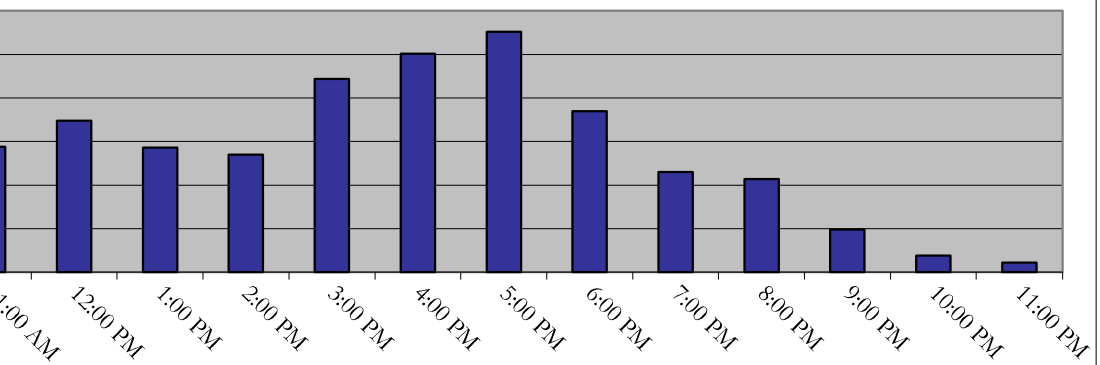
ocation: Rimrock Rd & 62ND ST West (South Leg) - West Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.010

	2/9/2024 Friday		2/10/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					3	6	9	0.2%	0.4%	0.3%
					1	1	2	0.1%	0.1%	0.1%
					0	4	4	0.0%	0.3%	0.1%
					5	1	6	0.4%	0.1%	0.2%
					15	2	17	1.1%	0.1%	0.6%
					29	3	32	2.2%	0.2%	1.2%
					101	26	127	7.5%	1.8%	4.6%
					227	40	267	16.9%	2.8%	9.7%
					128	69	197	9.5%	4.9%	7.2%
					83	52	135	6.2%	3.7%	4.9%
					68	57	125	5.1%	4.1%	4.5%
					68	76	144	5.1%	5.4%	5.2%
					80	94	174	5.9%	6.7%	6.3%
					69	74	143	5.1%	5.3%	5.2%
					60	75	135	4.5%	5.3%	4.9%
					85	137	222	6.3%	9.7%	8.1%
					82	169	251	6.1%	12.0%	9.1%
					95	181	276	7.1%	12.9%	10.0%
					70	115	185	5.2%	8.2%	6.7%
					34	81	115	2.5%	5.8%	4.2%
					31	76	107	2.3%	5.4%	3.9%
					6	43	49	0.4%	3.1%	1.8%
					4	15	19	0.3%	1.1%	0.7%
					2	9	11	0.1%	0.6%	0.4%
	0	0	0	0	1,346	1,406	2,752	100.0%	100.0%	100.0%

ffic Volume Per Hour



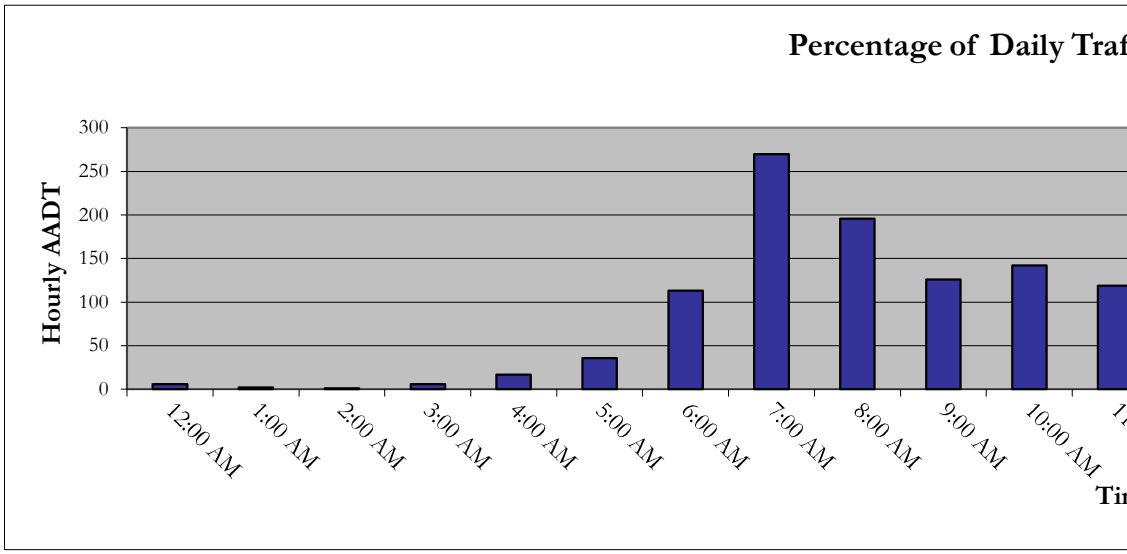
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	2/8/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	2/4/2024 Sunday		2/5/2024 Monday		2/6/2024 Tuesday		2/7/2024 Wednesday		2/8/2024 Thursday	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
0:00									4	2
1:00									2	0
2:00									1	0
3:00									2	4
4:00									4	13
5:00									10	26
6:00									30	83
7:00									60	210
8:00									72	124
9:00									51	75
10:00									75	67
11:00									54	65
12:00									94	64
13:00									61	71
14:00									74	68
15:00									152	106
16:00									149	94
17:00									183	102
18:00									102	70
19:00									85	33
20:00									47	33
21:00									32	9
22:00									17	7
23:00									5	3
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1,366**	**1,329**



NT SUMMARY

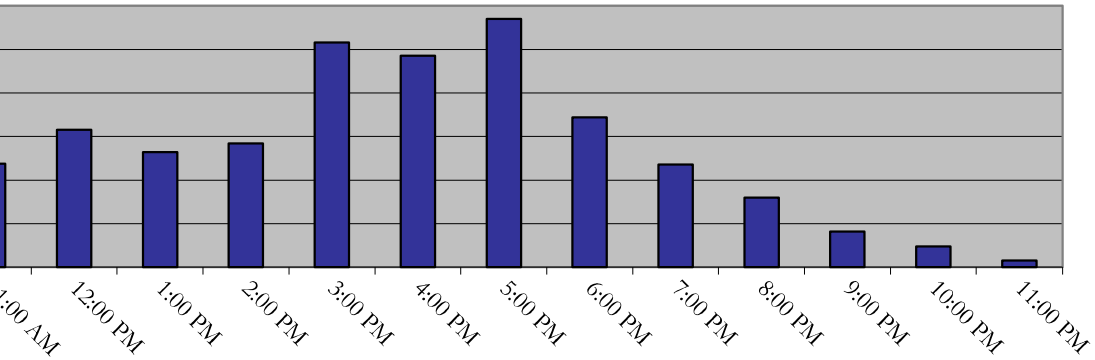
ocation: Rimrock Rd & 62ND ST West (South Leg) - South Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.010

	2/9/2024 Friday		2/10/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	NB	SB	NB	SB	NB	SB	ADT	NB	SB	ADT
					4	2	6	0.3%	0.2%	0.2%
					2	0	2	0.1%	0.0%	0.1%
					1	0	1	0.1%	0.0%	0.0%
					2	4	6	0.1%	0.3%	0.2%
					4	13	17	0.3%	1.0%	0.6%
					10	26	36	0.7%	2.0%	1.3%
					30	83	113	2.2%	6.2%	4.2%
					60	210	270	4.4%	15.8%	10.0%
					72	124	196	5.3%	9.3%	7.3%
					51	75	126	3.7%	5.6%	4.7%
					75	67	142	5.5%	5.0%	5.3%
					54	65	119	4.0%	4.9%	4.4%
					94	64	158	6.9%	4.8%	5.9%
					61	71	132	4.5%	5.3%	4.9%
					74	68	142	5.4%	5.1%	5.3%
					152	106	258	11.1%	8.0%	9.6%
					149	94	243	10.9%	7.1%	9.0%
					183	102	285	13.4%	7.7%	10.6%
					102	70	172	7.5%	5.3%	6.4%
					85	33	118	6.2%	2.5%	4.4%
					47	33	80	3.4%	2.5%	3.0%
					32	9	41	2.3%	0.7%	1.5%
					17	7	24	1.2%	0.5%	0.9%
					5	3	8	0.4%	0.2%	0.3%
	0	0	0	0	1,366	1,329	2,695	100.0%	100.0%	100.0%

ffic Volume Per Hour



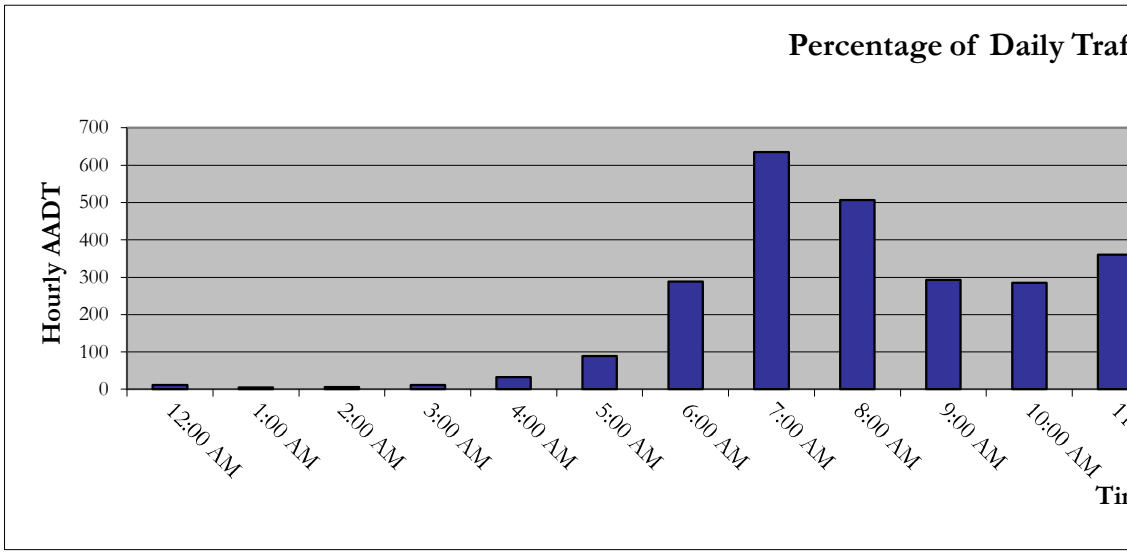
me of Day

VOLUME COUN

General Information

Counted By:	Rafael Teixeira	Count L
Agency/Company:	Sanderson Stewart	
Dates Performed:	1/9/2024	Jurisdicti
Project Number:	23379	Street Cl
Project Description:	West Billings Neighborhood Plan	
		Seasonal

Hour Begin	1/9/2024 Sunday		1/10/2024 Monday		1/11/2024 Tuesday		1/12/2024 Wednesday		1/13/2024 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
0:00					2	10				
1:00					3	2				
2:00					3	3				
3:00					11	1				
4:00					30	3				
5:00					77	12				
6:00					240	49				
7:00					535	100				
8:00					317	190				
9:00					171	122				
10:00					152	133				
11:00					189	172				
12:00					191	179				
13:00					176	183				
14:00					222	224				
15:00					193	324				
16:00					218	360				
17:00					206	413				
18:00					156	253				
19:00					82	194				
20:00					50	178				
21:00					19	75				
22:00					11	47				
23:00					9	22				
TOTAL	**0**	**0**	**0**	**0**	**3,263**	**3,249**	**0**	**0**	**0**	**0**



NT SUMMARY

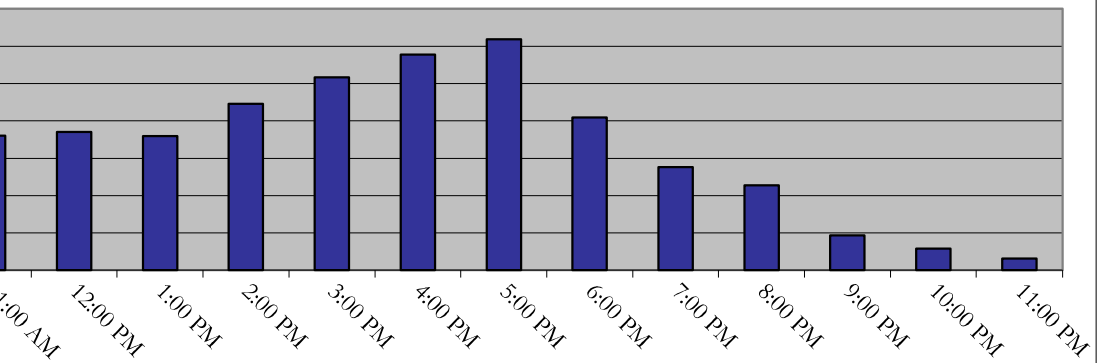
ocation: Rimrock Rd & 54TH ST West - West Leg

on: City of Billings, MT / MDT
assification: Principal Arterial

Count Factor: 1.040

	1/14/2024 Friday		1/15/2024 Saturday		Annual Average Daily Traffic (AADT)			Hourly Percentage of Total (%)		
	EB	WB	EB	WB	EB	WB	ADT	EB	WB	ADT
					2	10	12	0.1%	0.3%	0.2%
					3	2	5	0.1%	0.1%	0.1%
					3	3	6	0.1%	0.1%	0.1%
					11	1	12	0.3%	0.0%	0.2%
					30	3	33	0.9%	0.1%	0.5%
					77	12	89	2.4%	0.4%	1.4%
					240	49	289	7.4%	1.5%	4.4%
					535	100	635	16.4%	3.1%	9.8%
					317	190	507	9.7%	5.8%	7.8%
					171	122	293	5.2%	3.8%	4.5%
					152	133	285	4.7%	4.1%	4.4%
					189	172	361	5.8%	5.3%	5.5%
					191	179	370	5.9%	5.5%	5.7%
					176	183	359	5.4%	5.6%	5.5%
					222	224	446	6.8%	6.9%	6.8%
					193	324	517	5.9%	10.0%	7.9%
					218	360	578	6.7%	11.1%	8.9%
					206	413	619	6.3%	12.7%	9.5%
					156	253	409	4.8%	7.8%	6.3%
					82	194	276	2.5%	6.0%	4.2%
					50	178	228	1.5%	5.5%	3.5%
					19	75	94	0.6%	2.3%	1.4%
					11	47	58	0.3%	1.4%	0.9%
					9	22	31	0.3%	0.7%	0.5%
	0	**0**	**0**	**0**	**3,263**	**3,249**	**6,512**	**100.0%**	**100.0%**	**100.0%**

ffic Volume Per Hour



me of Day

COUNT LOCATIONS

Link	Location ID	Functional Class	Location On	Loc Al
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-351	56-4A-351	Minor Collector	CENTRAL AVE	W of 5
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-352	56-4A-352	Minor Collector	CENTRAL AVE	E of 5
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-353	56-4A-353	Minor Collector	56TH ST W	N of C
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-354	56-4A-354	Minor Collector	56TH ST W	S of C
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-355	56-4A-355	Minor Collector	62nd ST W	N of G
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-356	56-4A-356	Minor Arterial	Rimrock RD	62nd
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-357	56-4A-357	Minor Collector	GRAND AVE	E of 6
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-358	56-4A-358	Local	54th ST W	S of R
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-359	56-4A-359	Local	58TH ST W	N of K
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-360	56-4A-360	Minor Collector	56TH ST W	S of G
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-361	56-4A-361	Minor Collector	GRAND AVE	W of 5
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-362	56-4A-362	Local	HESPER RD	W of 5
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-363	56-4A-363	Minor Collector	56TH ST W	S of H
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-364	56-4A-364	Local	HESPER RD	E of 5
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-365	56-4A-365	Major Collector	ROUTE 532	E of 5
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-366	56-4A-366	Major Collector	ROUTE 532	btwn
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-367	56-4A-367	Local	64TH ST W	N of H
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-368	56-4A-368	Local	64TH ST W	N of M
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-369	56-4A-369	Local	64TH ST W	S of K
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-374	56-4A-374	Local	54TH ST W	N of G
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-375	56-4A-375	Local	54th ST W	N of R
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-376	56-4A-376	Minor Collector	GRAND AVE	E of 5
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-377	56-4A-377	Local	48TH ST W	N of C
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-378	56-4A-378	Local	48TH ST W	N of H
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-379	56-4A-379	Local	48TH ST W	N of M
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-380	56-4A-380	Local	48TH ST W	S of C
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-381	56-4A-381	Local	48TH ST W	S of G
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-382	56-4A-382	Local	48TH ST W	S of K
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-383	56-4A-383	Minor Collector	NIEBAUER RD	W of 4
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-384	56-4A-384	Major Collector	GRAND AVE	W of 4
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-389	56-4A-389	Minor Collector	56TH ST W	S of K
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-393	56-4A-393	Minor Collector	64th St W	S of G
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-394	56-4A-394	Minor Collector	64th St W	N of K
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-085	56-4A-085	Minor Collector	GRAND AVE	3.5 m
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-112	56-4A-112	Minor Arterial	Rimrock RD	E of 5
http://www.ms2soft.com/tcds/?loc=Mdt&mod=tcds&local_id=56-4A-342	56-4A-342	Local	Rimrock RD	W of 6
	56-4A-123	Local	NIEBAUER RD	SW of
	56-4A-122	Minor Arterial	SHILOH ROAD	at I-90

(-) -- 2022 Data was projected by MDT

ias	2022 AADT	2023 count 1	Count 1 date	2023 count 2	Count 2 date	2023 count 3	Count 3 date	Consider ?
56th AV	945	1582	8/14/2023	1602	8/15/2023			YES
6th Av	2273	3122	8/14/2023	3201	8/15/2023			YES
Central Av	2583	4300	8/14/2023	4063	8/15/2023			YES
entral Av	3293	3735	8/14/2023	3575	8/15/2023			YES
Grand Av	2848	2890	9/25/2023	2947	9/26/2023	2994	9/27/2023	YES
ST W	-2134							NO
2nd St W	5312							YES
imrock RD	3344							YES
it Ln	-420	510	4/24/2023	589	4/25/2023			NEW IN 2023
rand Ave	-4252	4413	4/24/2023	4512	4/25/2023			NEW IN 2023
56th St W	6335							YES
56th St W	-2022	3060	4/24/2023	3170	4/25/2023			NEW IN 2023
esper Rd	-2785							NO
6th St W	-2159							NO
6th St W	6038	11162	4/24/2023	11351	4/25/2023			YES
S64th St W & Ollie St	7011	7782	4/24/2023	7960	4/25/2023			YES
Nesper Rd	1944	2517	4/24/2023	2606	4/25/2023			YES
Neibauer Rd	-876							NO
ing Ave W	-1758							NO
Grand Ave	3977							YES
Limrock Av	3176							YES
4th St W	8810							YES
Central Ave	3029	4938	4/24/2023	5033	4/25/2023			YES
Nesper RD	2051	2377	4/24/2023	2363	4/25/2023			YES
Neibauer Rd	1146	1075	4/10/2023	920	4/11/2023			YES
entral Ave	4548	3546	4/10/2023	3677	4/11/2023			YES
rand Ave	4097							YES
ing Avve	2274							YES
48th St W	2418	3168	4/10/2023	3340	4/11/2023	3135	4/12/2023	YES
48th St W	14060	13400	4/10/2023	14556	4/11/2023			YES
ing AVE W	-3430							NO
rand Ave	-5081	5479	4/10/2023	5833	4/11/2023			NEW IN 2023
Ling Ave W	-3573	5325	4/10/2023	5096	4/11/2023			NEW IN 2023
i W of Shiloh Rd	2723	3823	8/14/2023	4072	8/15/2023			YES
4th	-11420							NO
62nd St W	-2413							NO
f Shiloh Rd	3076							YES
0 separation	-2158	3814	627/2023	4014	6/28/2023			NEW IN 2023

Bike and Pedestrian:

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

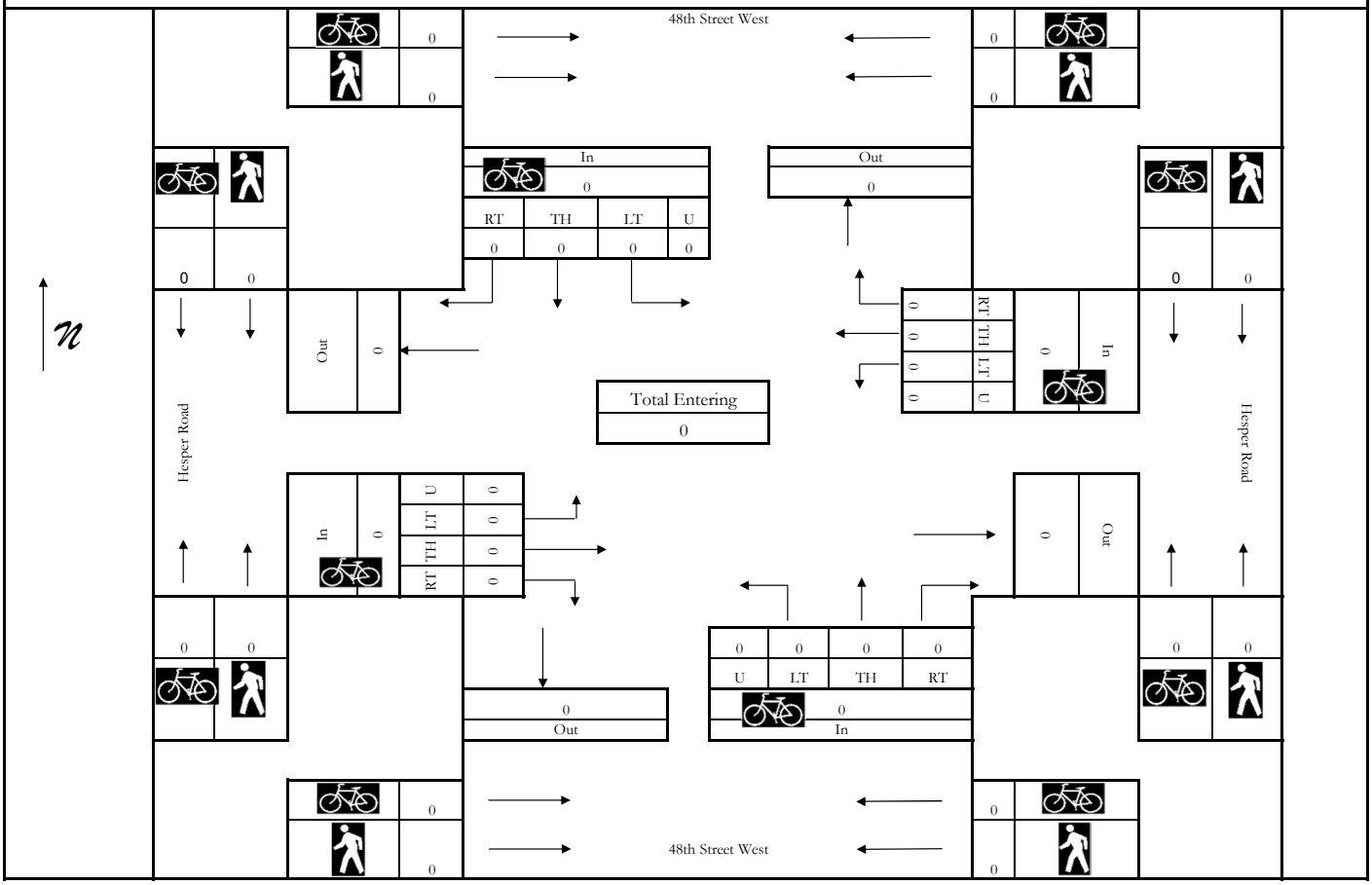
Counted By:	Rafael Teixeira	Intersection:	Hesper Road & 48th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48th Street West	East/West Street:	Hesper Road

Bikes in Roadway

	48th Street West Southbound					48th Street West Northbound					Hesper Road Eastbound					Hesper 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	48th Street West Southbound					48th Street West Northbound					Hesper Road Eastbound					Hesper Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

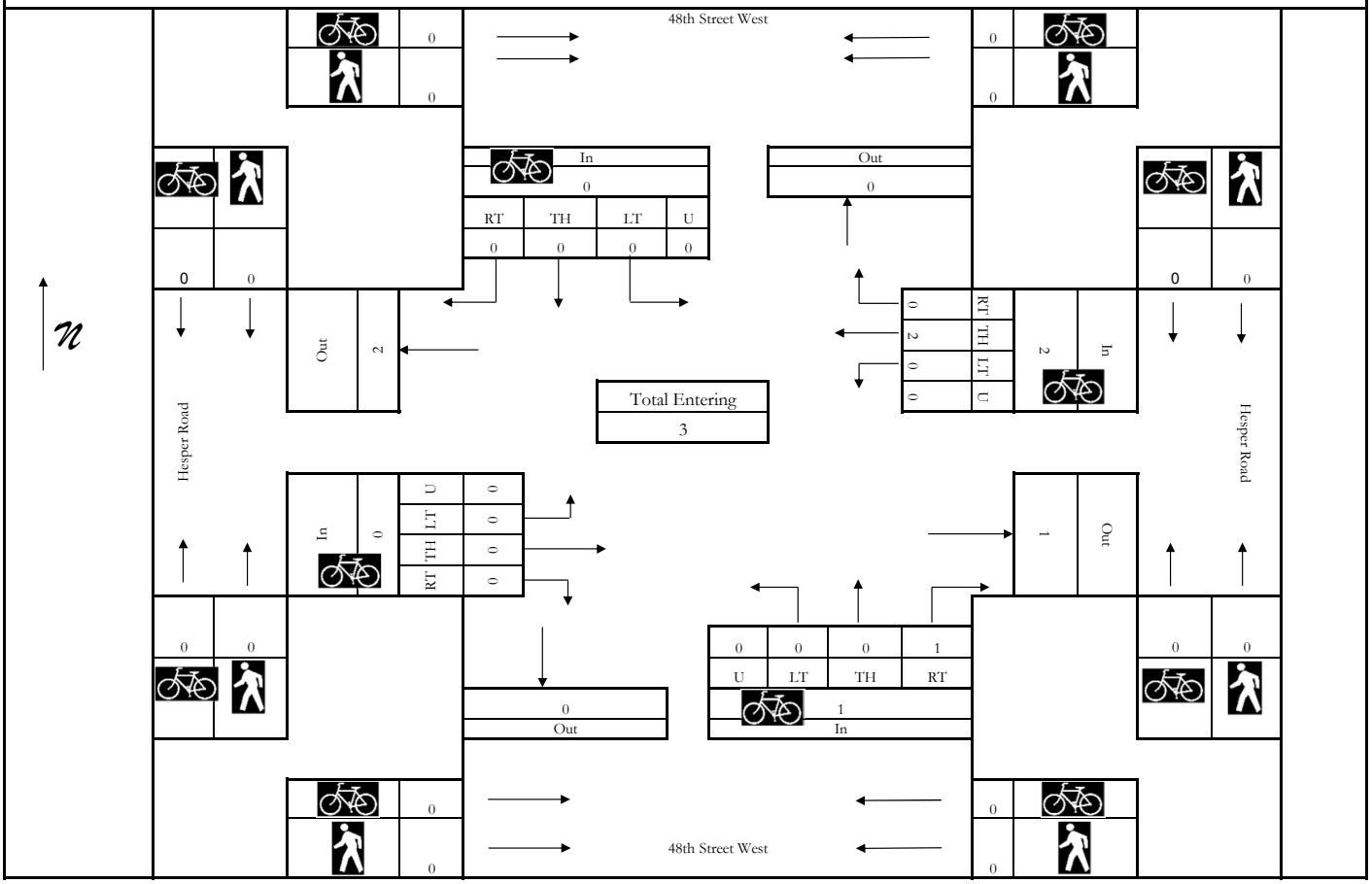
Counted By:	Rafael Teixeira	Intersection:	Hesper Road & 48th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48th Street West	East/West Street:	Hesper Road

Bikes in Roadway

	48th Street West Southbound					48th Street West Northbound					Hesper Road Eastbound					Hesper 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Grand Total	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2	0	0	2	3

Bikes & Pedestrians in Crosswalk

	48th Street West Southbound					48th Street West Northbound					Hesper Road Eastbound					Hesper Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

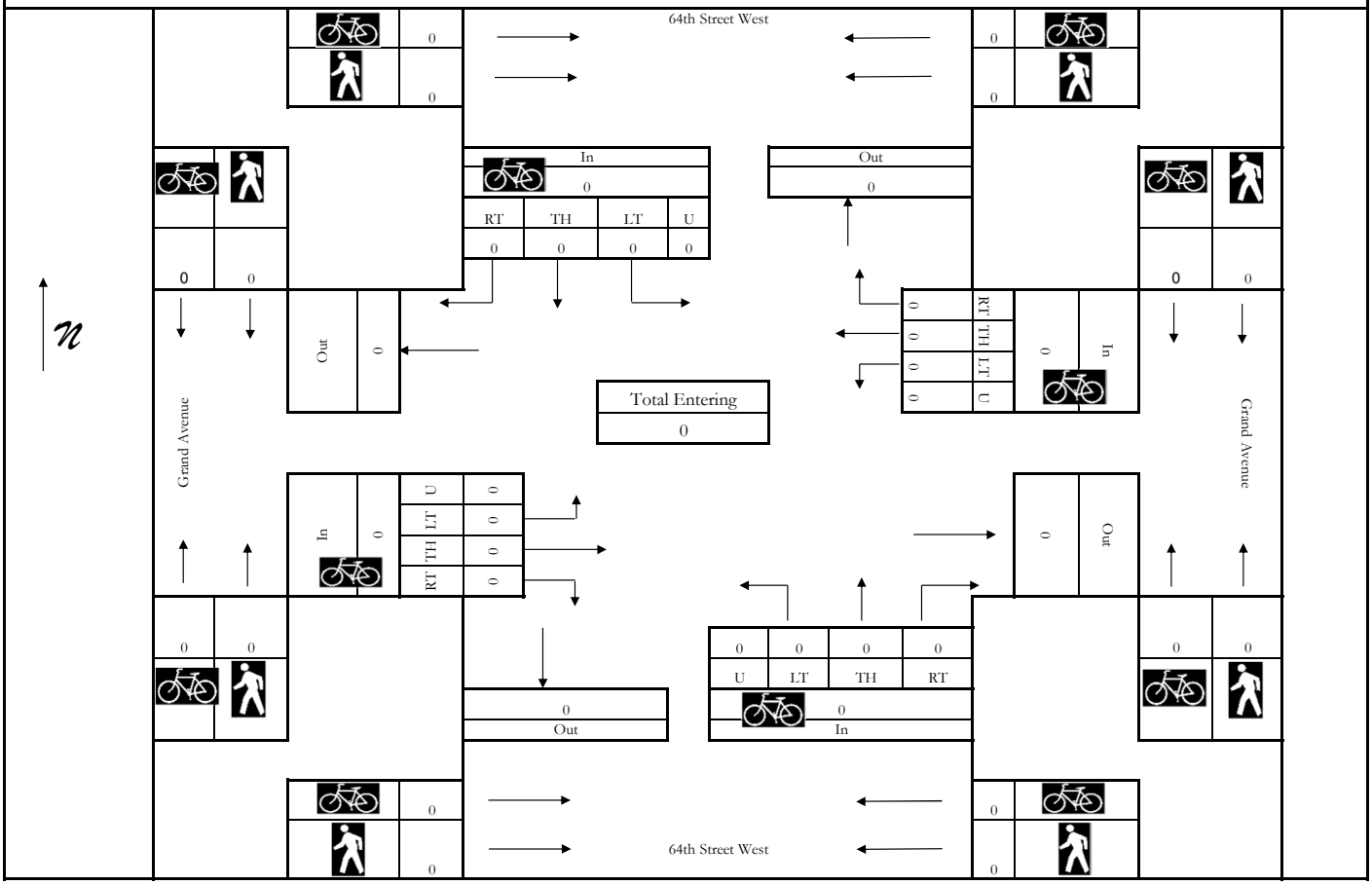
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 64th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 16, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64th Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	64th Street West Southbound					64th 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	64th Street West Southbound					64th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

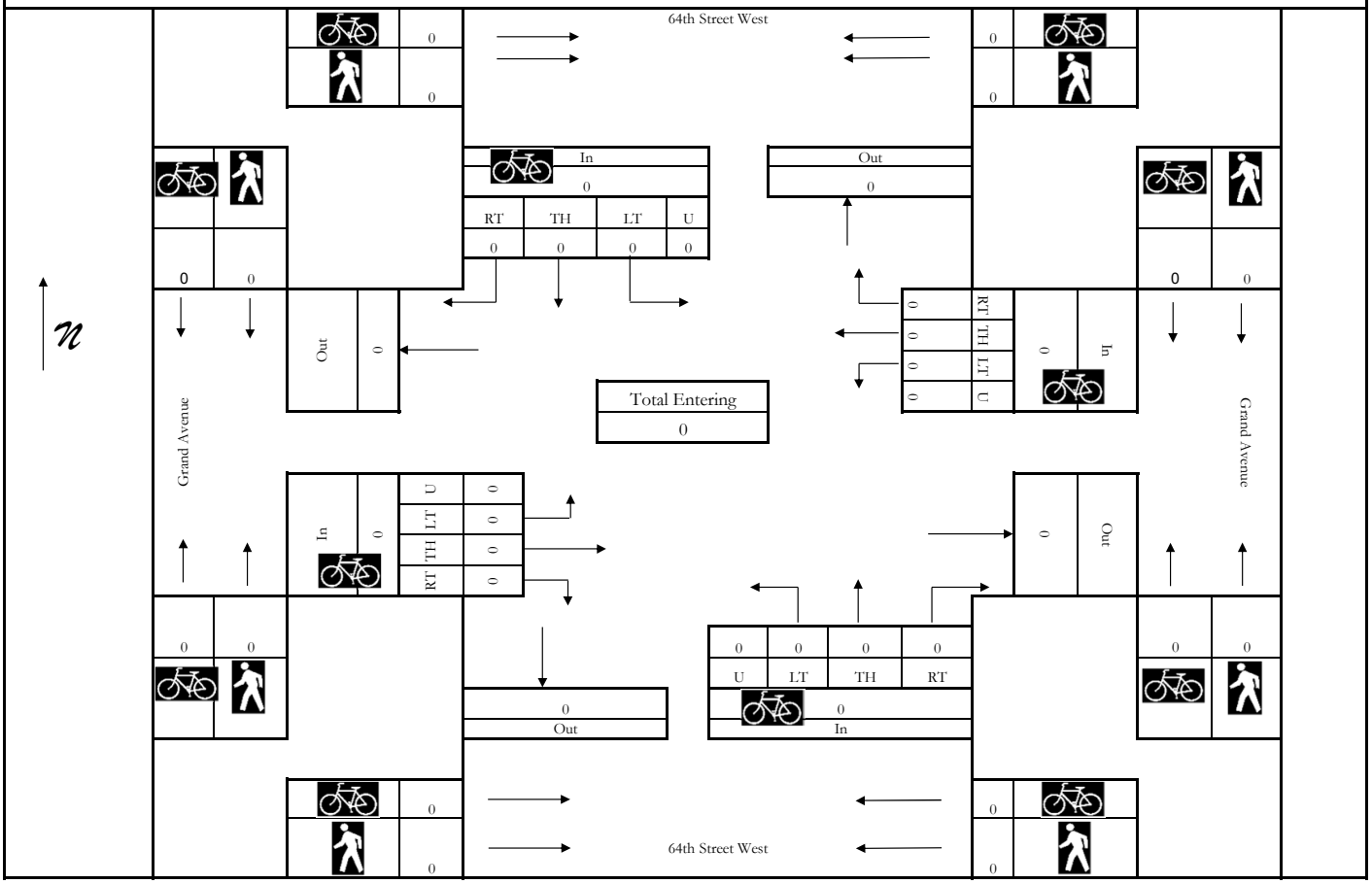
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 64th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 16, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64th Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	64th Street West Southbound					64th 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	64th Street West Southbound					64th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

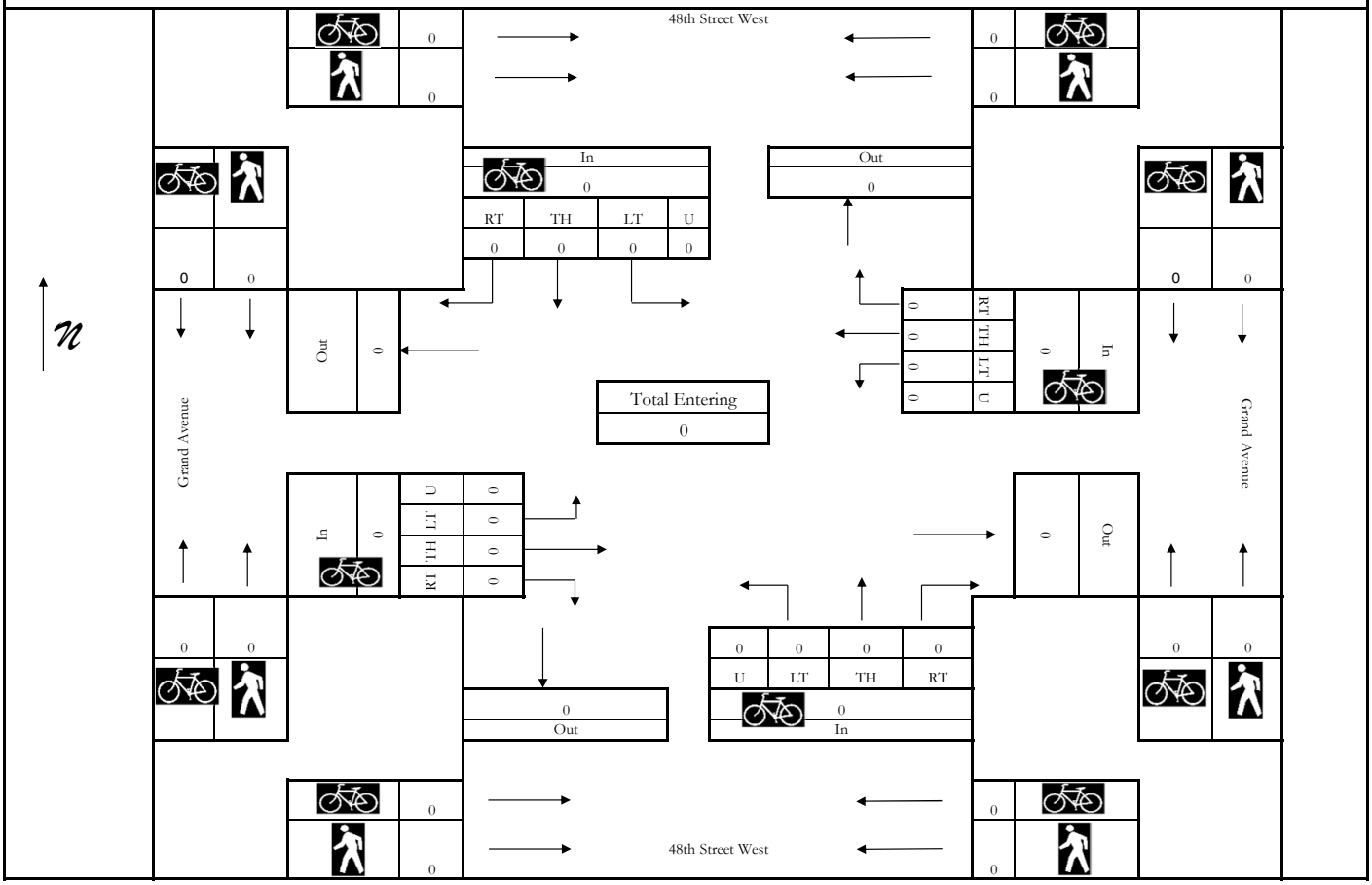
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 48th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48th Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	48th Street West 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	48th Street West Southbound					48th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

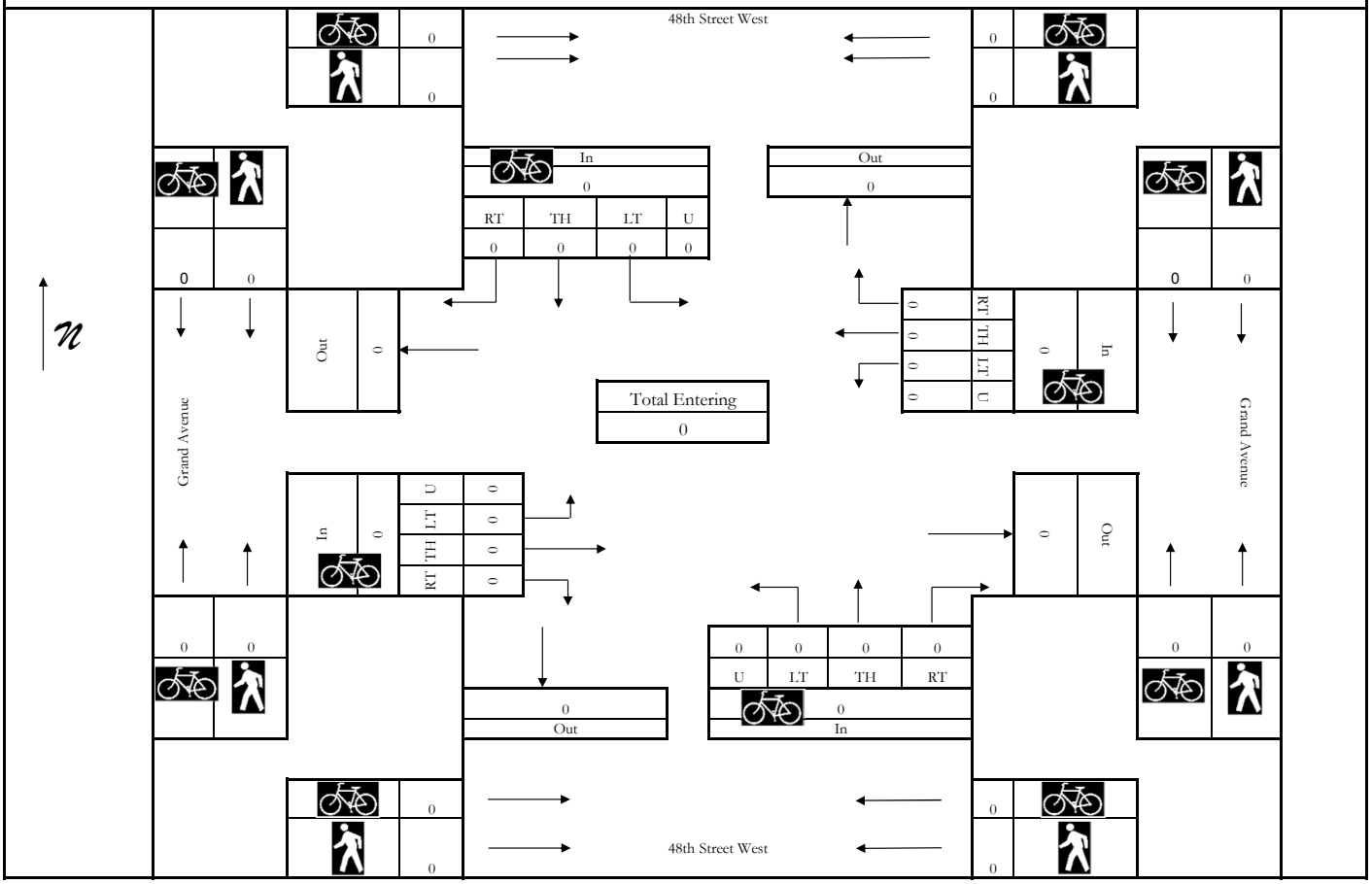
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 48th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48th Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	48th Street West 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	48th Street West Southbound					48th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

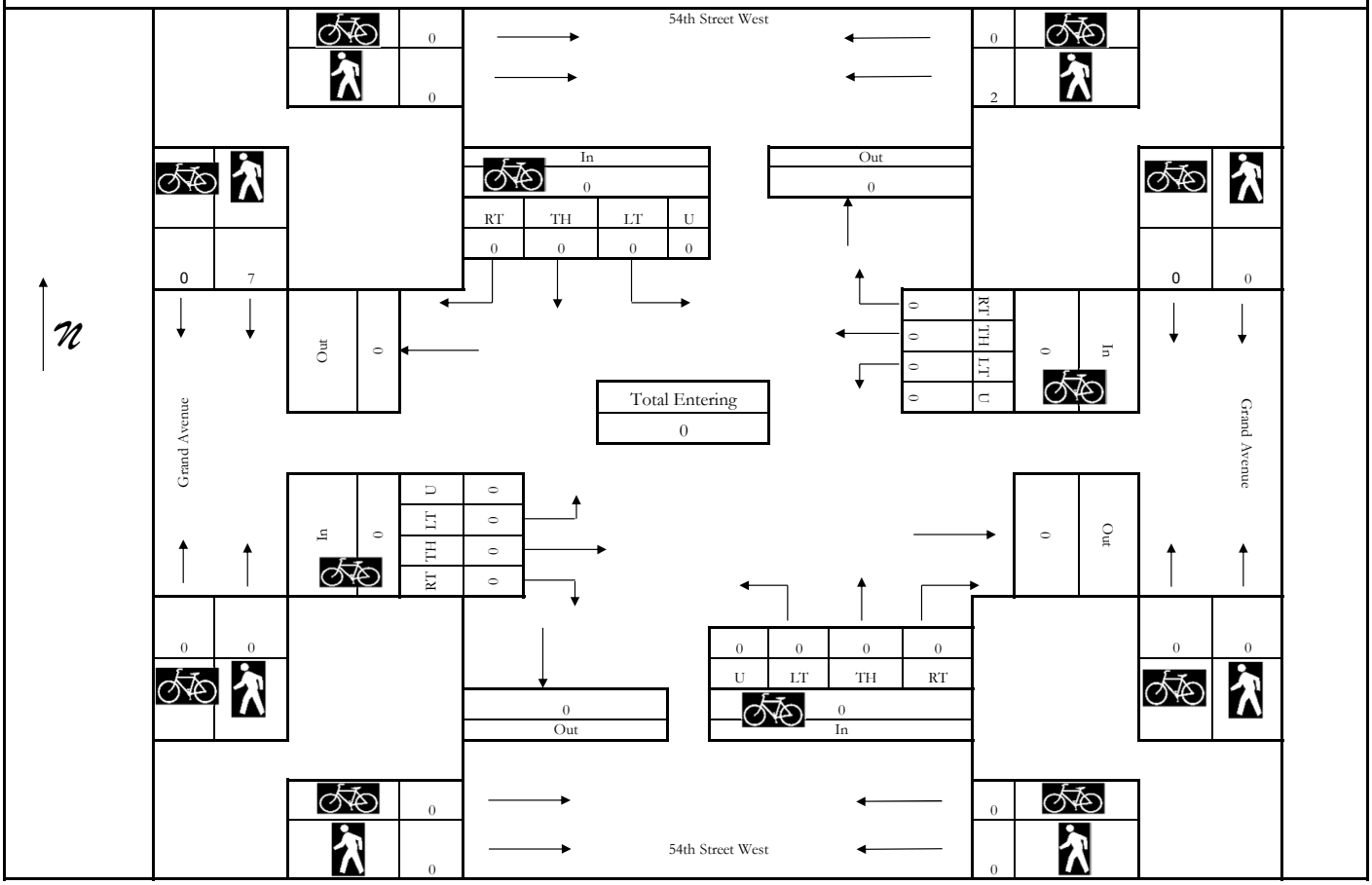
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 54th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	54th Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	54th Street West Southbound					54th 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	54th Street West Southbound					54th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
7:45 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	6	6	0	0	0	0	0	8
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	2	2	0	0	0	0	0	0	0	0	7	7	0	0	0	0	0	9



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

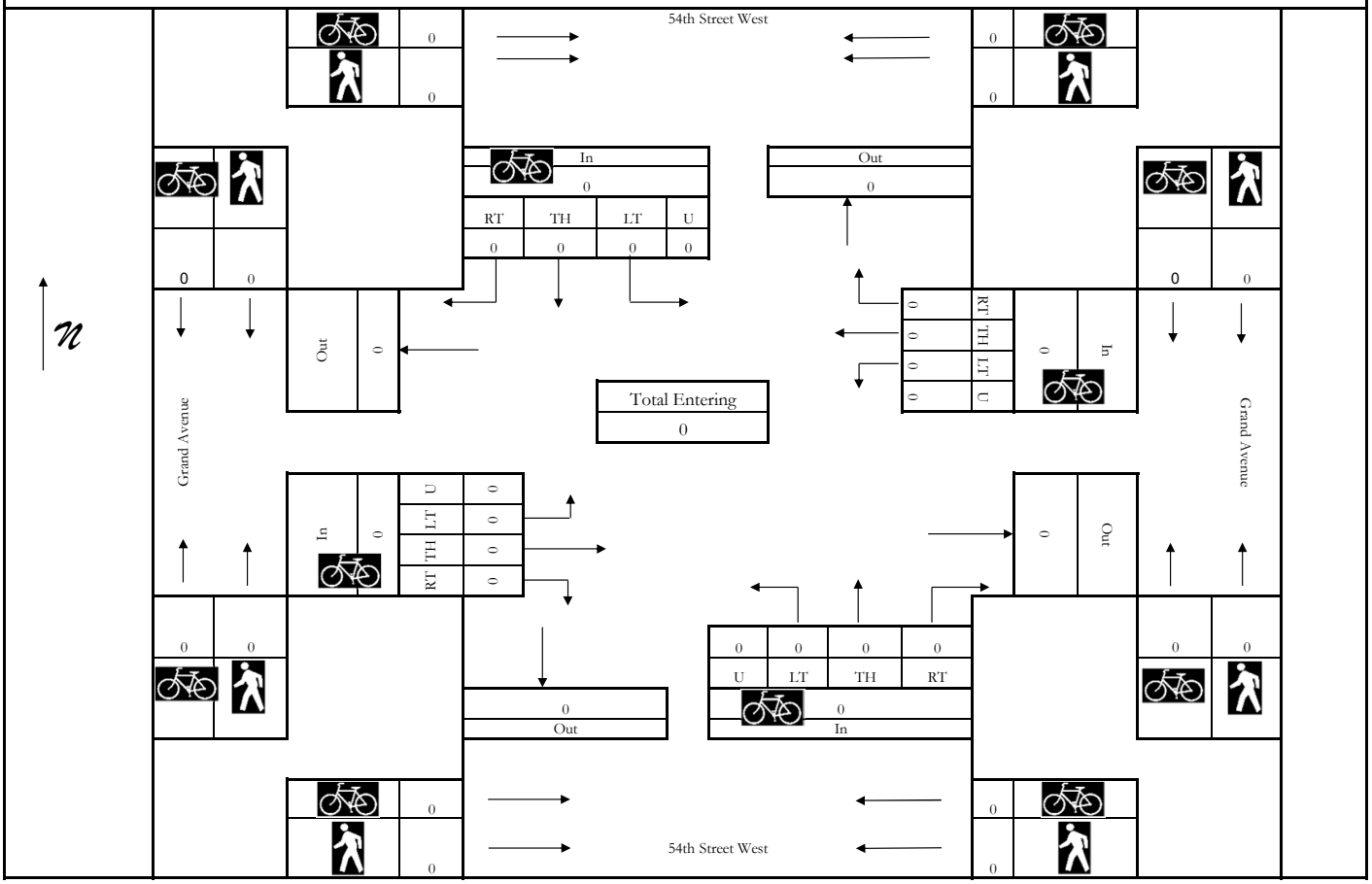
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 54th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	54th Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	54th Street West Southbound					54th 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	54th Street West Southbound					54th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

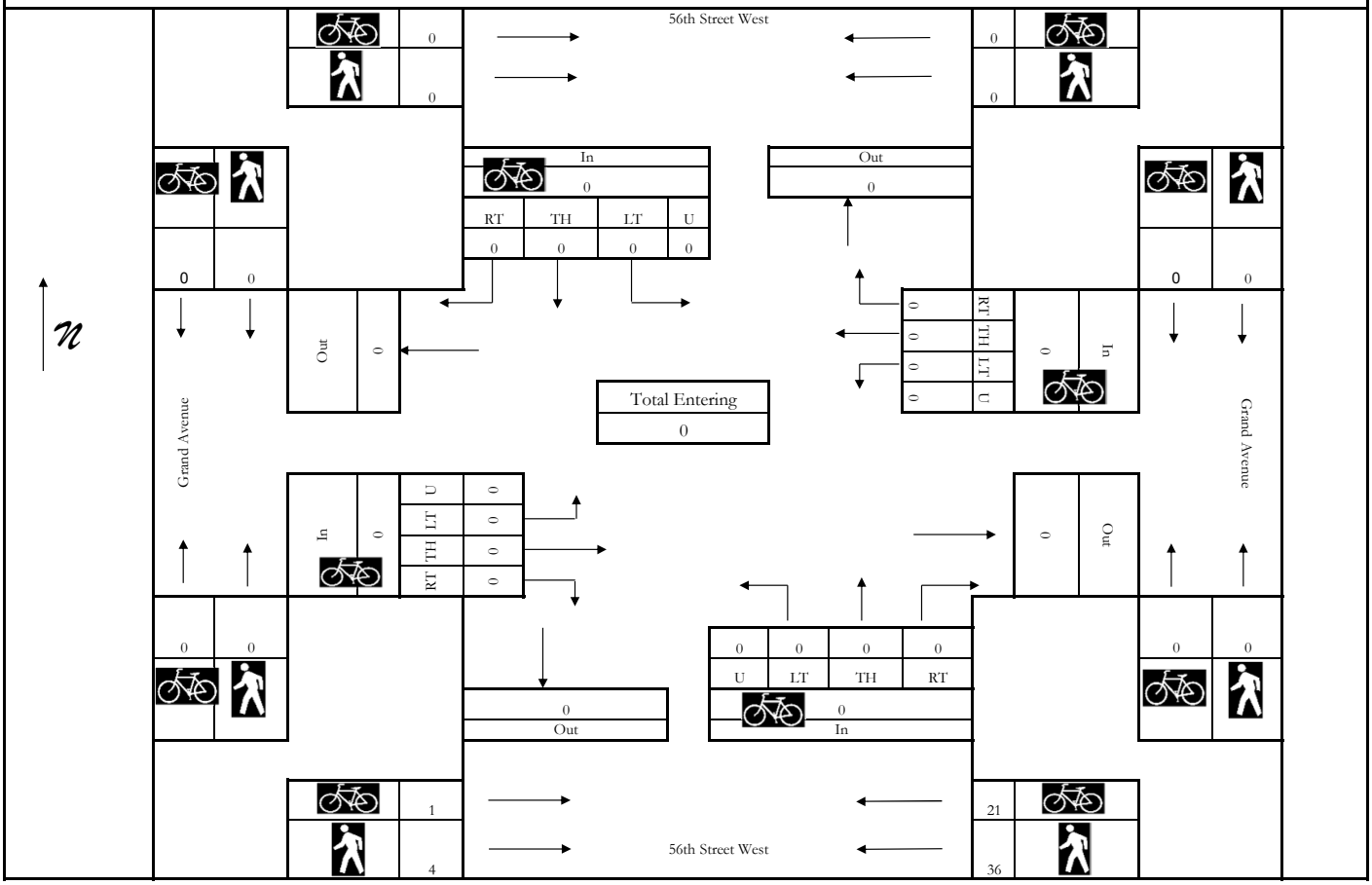
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 56th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, May 16, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56th Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	56th Street West 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	56th Street West Southbound					56th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	6
7:30 AM	0	0	0	0	0	2	11	0	4	17	0	0	0	0	0	0	0	0	0	0	17
7:45 AM	0	0	0	0	0	10	15	0	0	25	0	0	0	0	0	0	0	0	0	0	25
8:00 AM	0	0	0	0	0	9	4	1	0	14	0	0	0	0	0	0	0	0	0	0	14
Grand Total	0	0	0	0	0	21	36	1	4	62	0	0	0	0	0	0	0	0	0	0	62



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

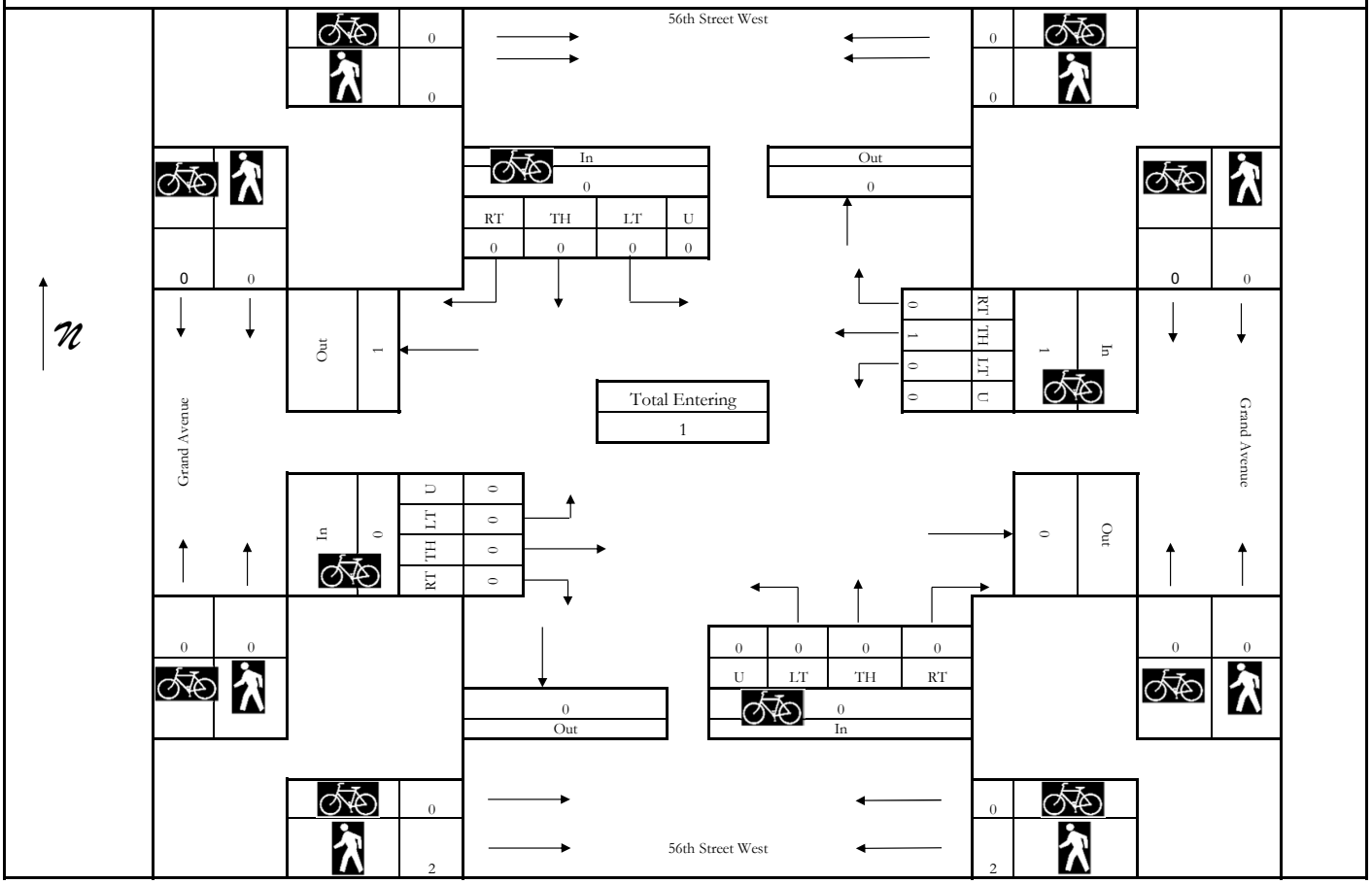
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 56th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, May 16, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56th Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	56th Street West 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1

Bikes & Pedestrians in Crosswalk

	56th Street West Southbound					56th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	2	0	2	4	0	0	0	0	0	0	0	0	0	0	4
Grand Total	0	0	0	0	0	0	2	0	2	4	0	0	0	0	0	0	0	0	0	0	4



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

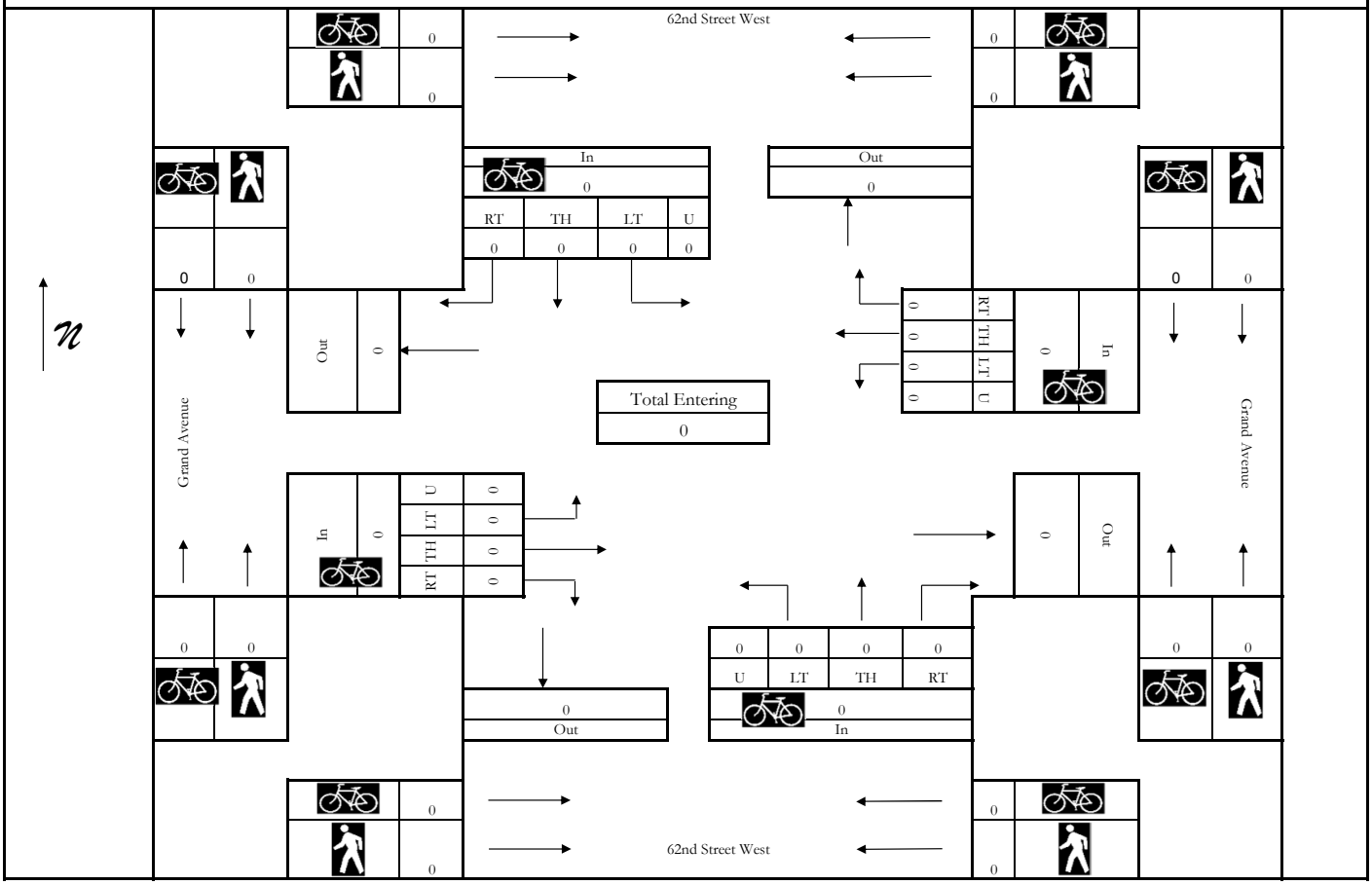
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 62nd Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	62nd Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	62nd Street West Southbound					62nd 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	62nd Street West Southbound					62nd Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

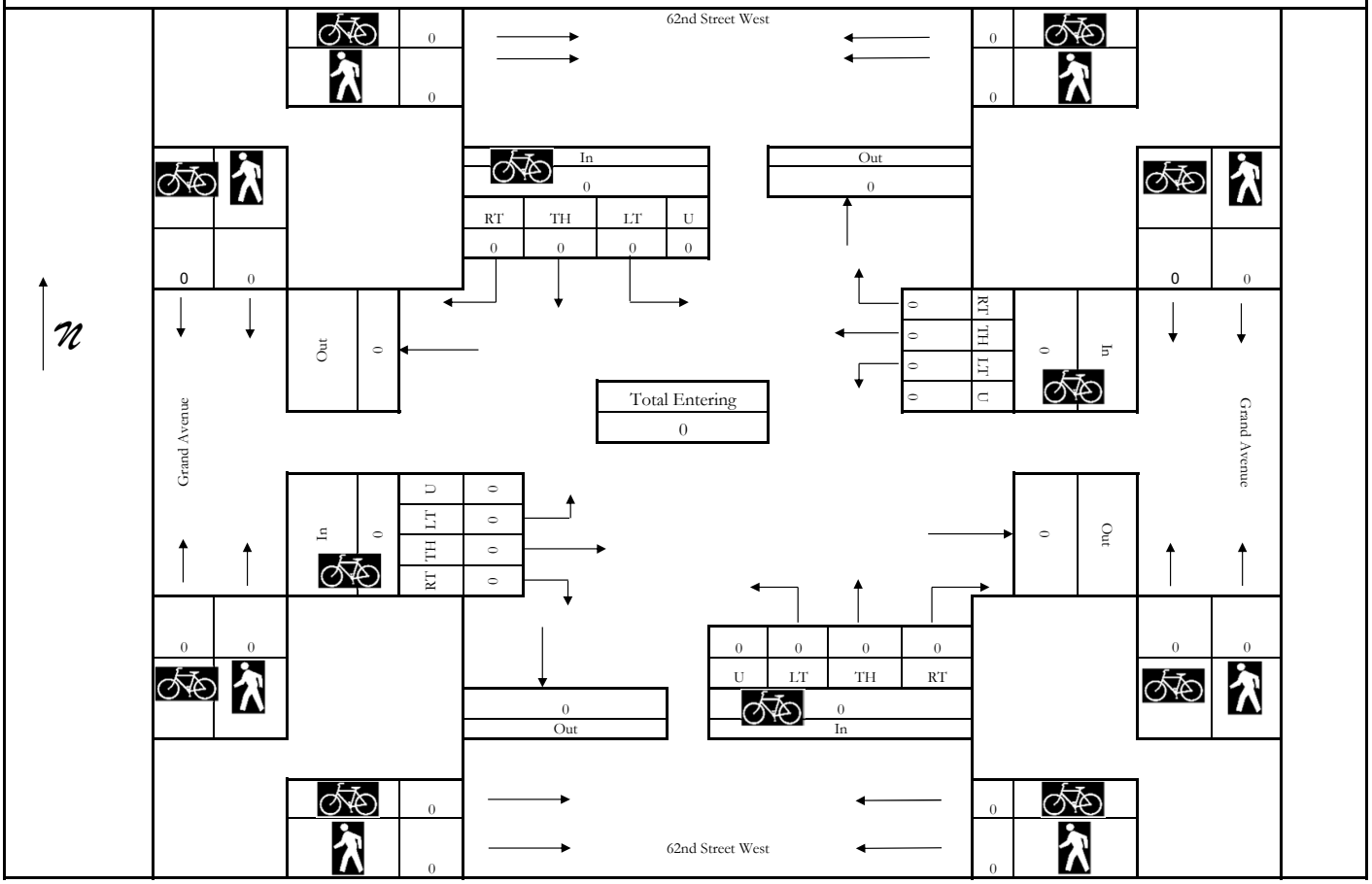
Counted By:	Rafael Teixeira	Intersection:	Grand Avenue & 62nd Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	62nd Street West	East/West Street:	Grand Avenue

Bikes in Roadway

	62nd Street West Southbound					62nd 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	62nd Street West Southbound					62nd Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

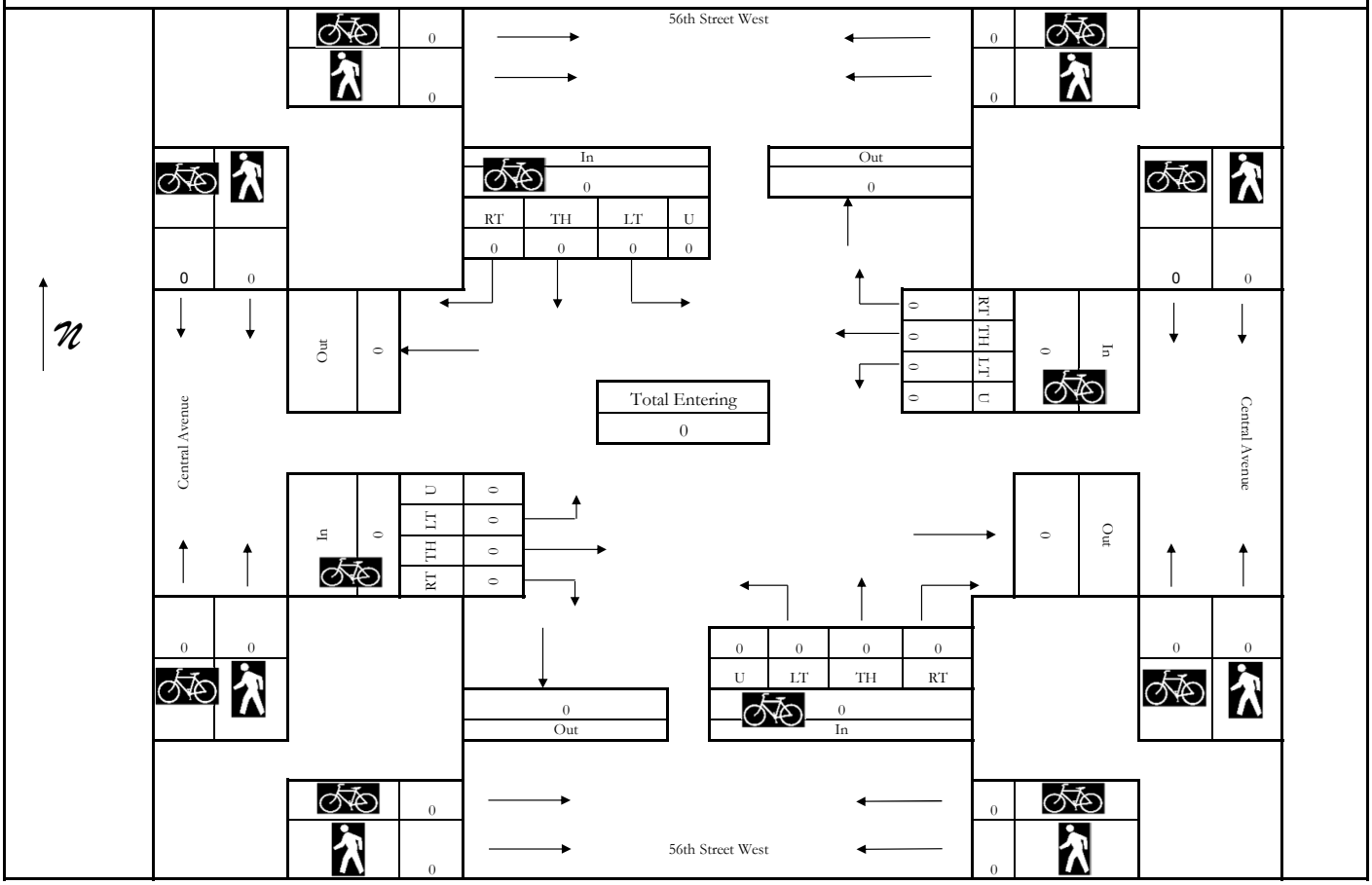
Counted By:	Rafael Teixeira	Intersection:	Central Avenue & 56th Street West
Agency/Company:	Sanbell		
Date Performed:	Thursday, January 11, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56th Street West	East/West Street:	Central Avenue

Bikes in Roadway

	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	56th Street West Southbound					56th Street West Northbound					Central Avenue Eastbound					Central Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

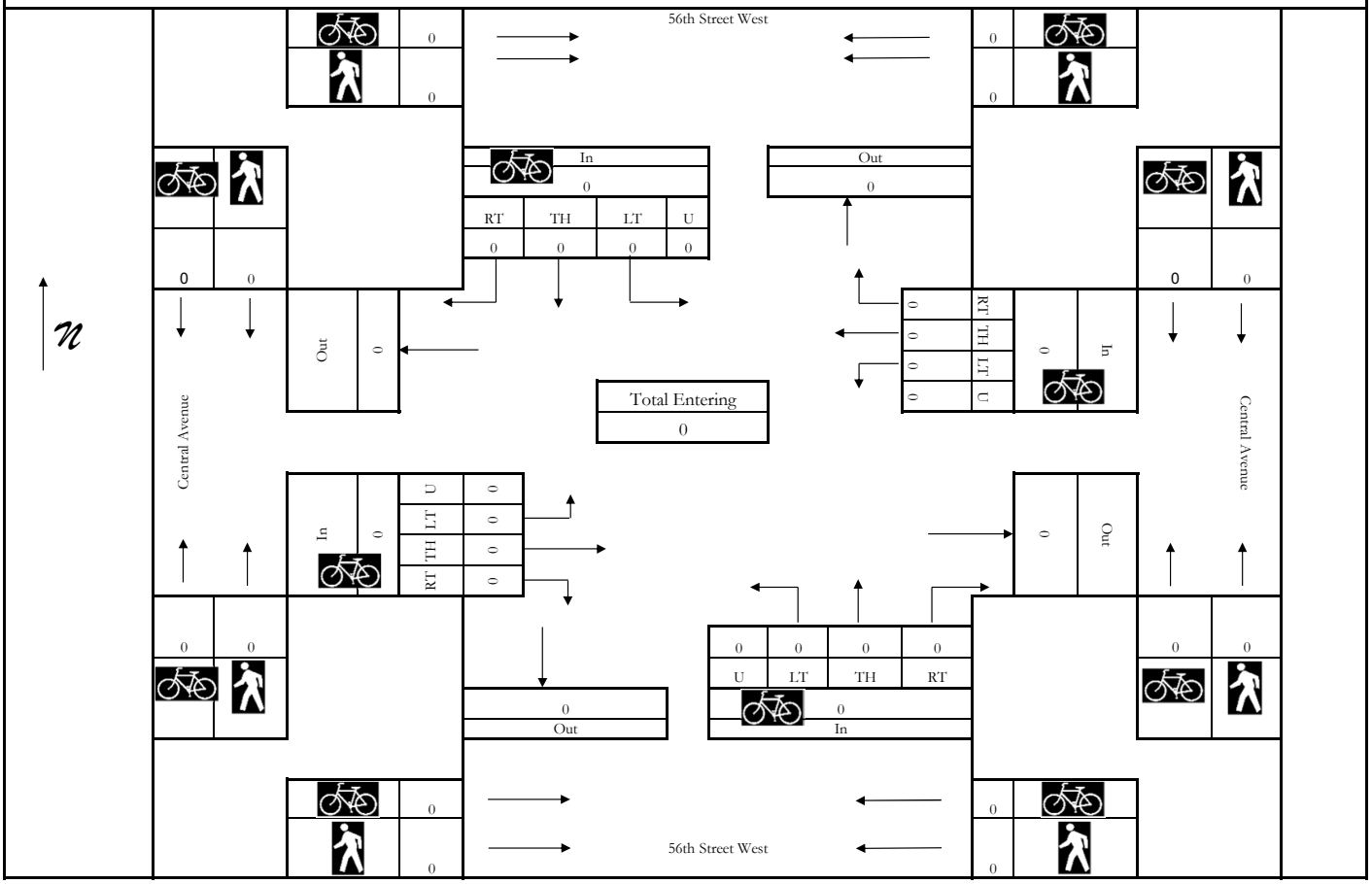
Counted By:	Rafael Teixeira	Intersection:	Central Avenue & 56th Street West
Agency/Company:	Sanbell		
Date Performed:	Thursday, January 11, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56th Street West	East/West Street:	Central Avenue

Bikes in Roadway

	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	56th Street West Southbound					56th Street West Northbound					Central Avenue Eastbound					Central Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

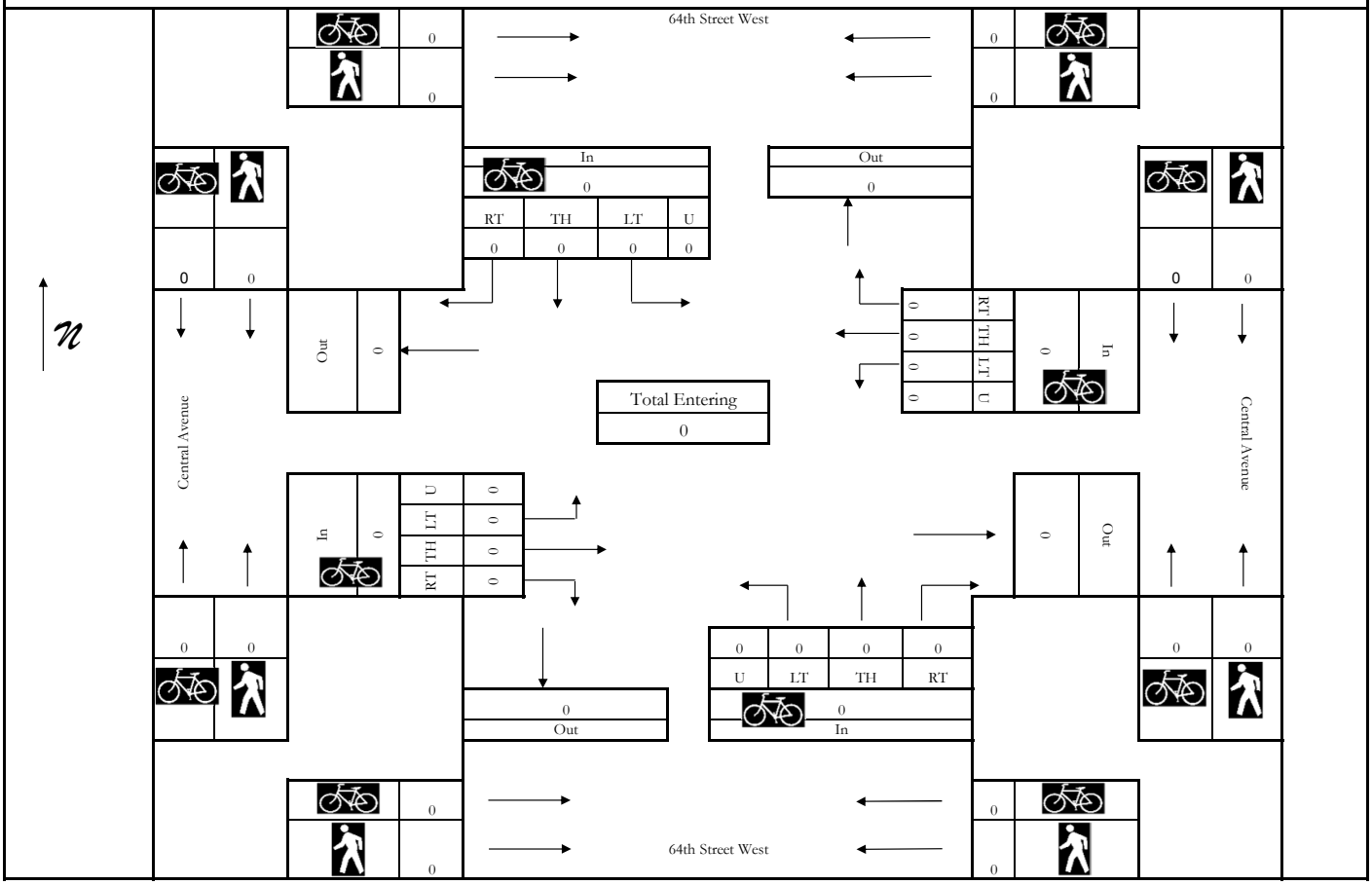
Counted By:	Rafael Teixeira	Intersection:	Central Avenue & 64th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64th Street West	East/West Street:	Central Avenue

Bikes in Roadway

	64th Street West Southbound					64th 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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	64th Street West Southbound					64th Street West Northbound					Central Avenue Eastbound					Central Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

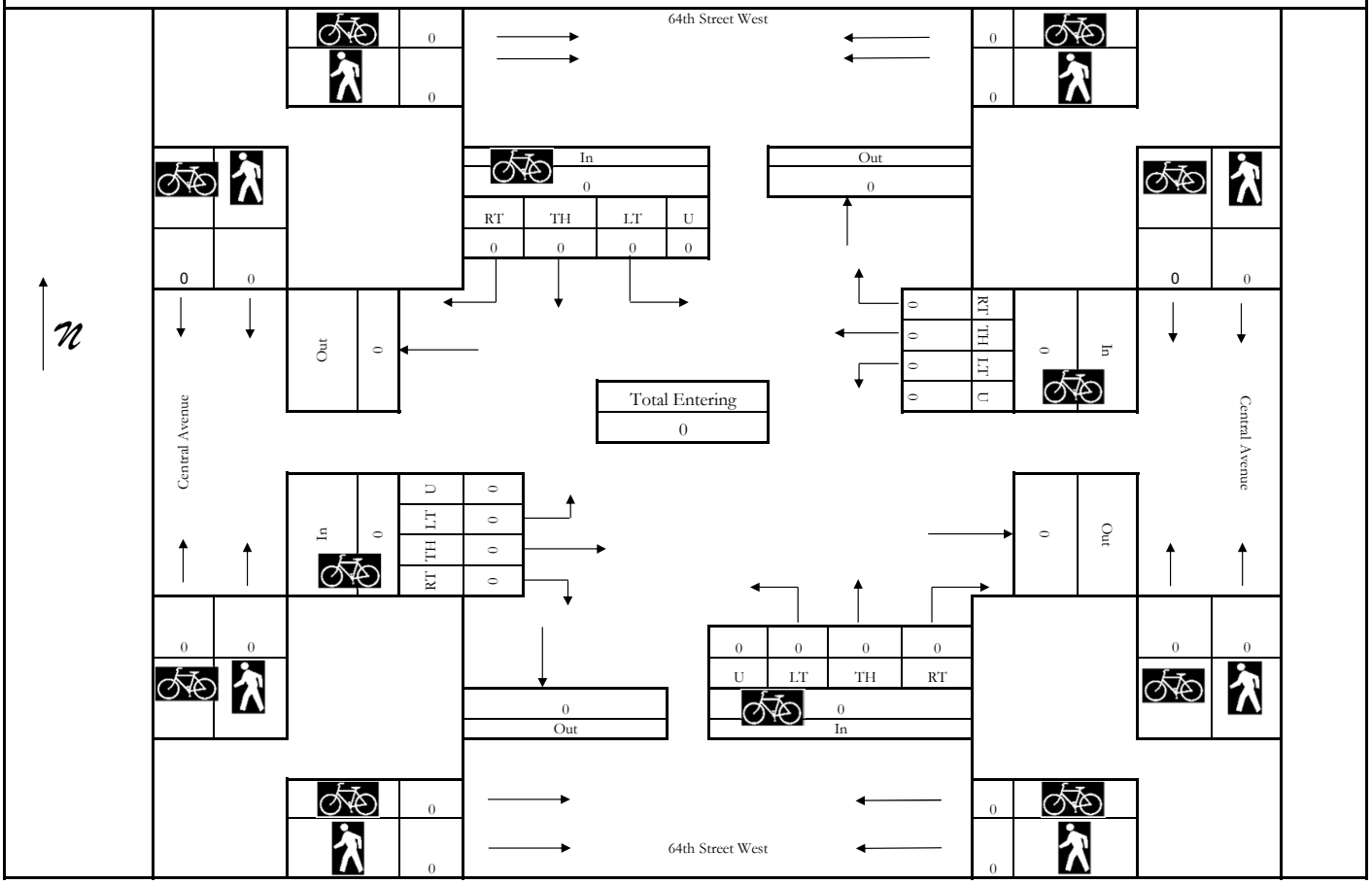
Counted By:	Rafael Teixeira	Intersection:	Central Avenue & 64th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64th Street West	East/West Street:	Central Avenue

Bikes in Roadway

	64th Street West Southbound					64th 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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	64th Street West Southbound					64th Street West Northbound					Central Avenue Eastbound					Central Avenue Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

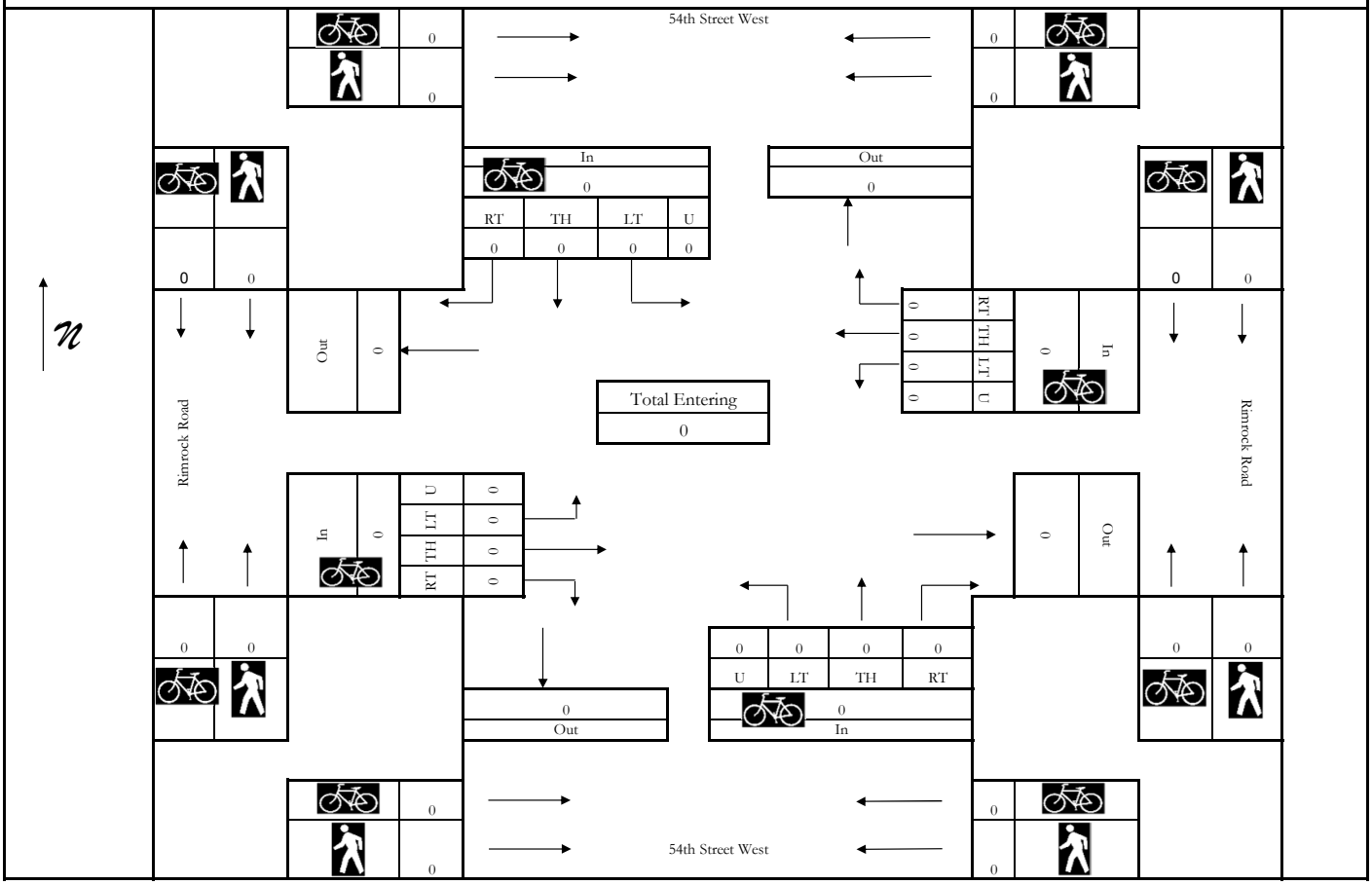
Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 54th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	54th Street West	East/West Street:	Rimrock Road

Bikes in Roadway

	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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	54th Street West Southbound					54th Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

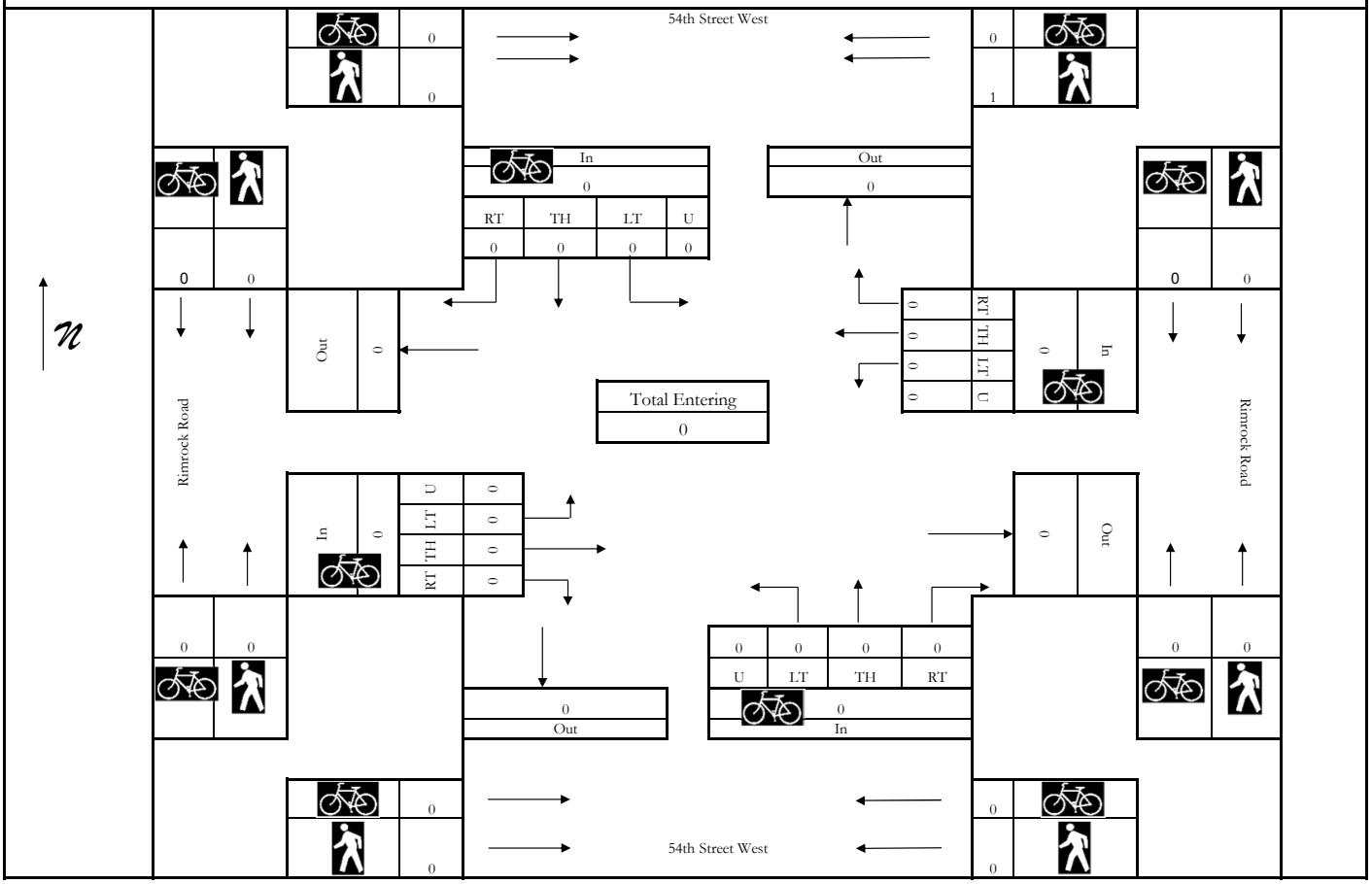
Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 54th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	54th Street West	East/West Street:	Rimrock Road

Bikes in Roadway

	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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	54th Street West Southbound					54th Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

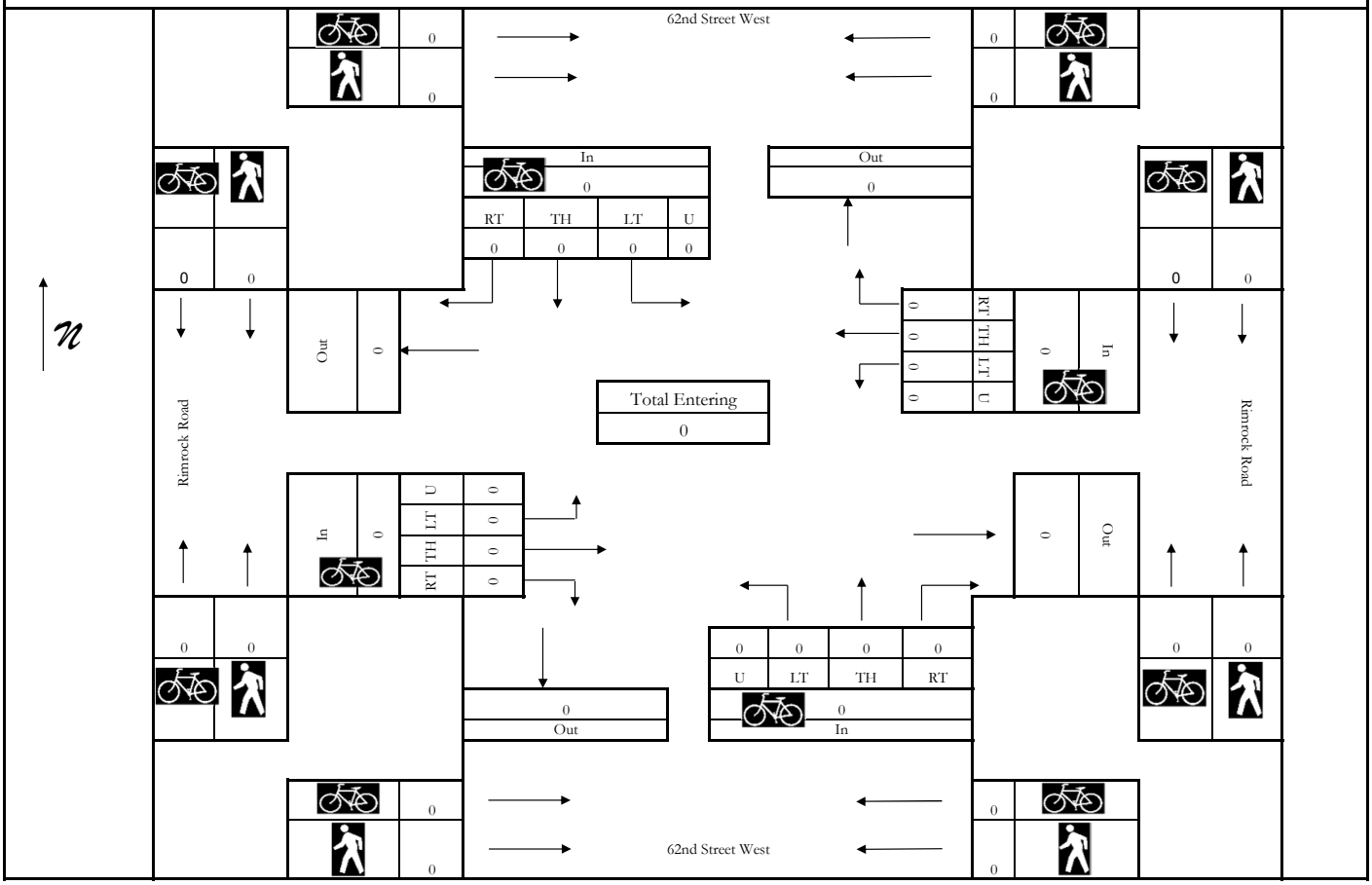
Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 62nd Street West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	62nd Street West	East/West Street:	Rimrock Road

Bikes in Roadway

	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	62nd Street West Southbound					62nd Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

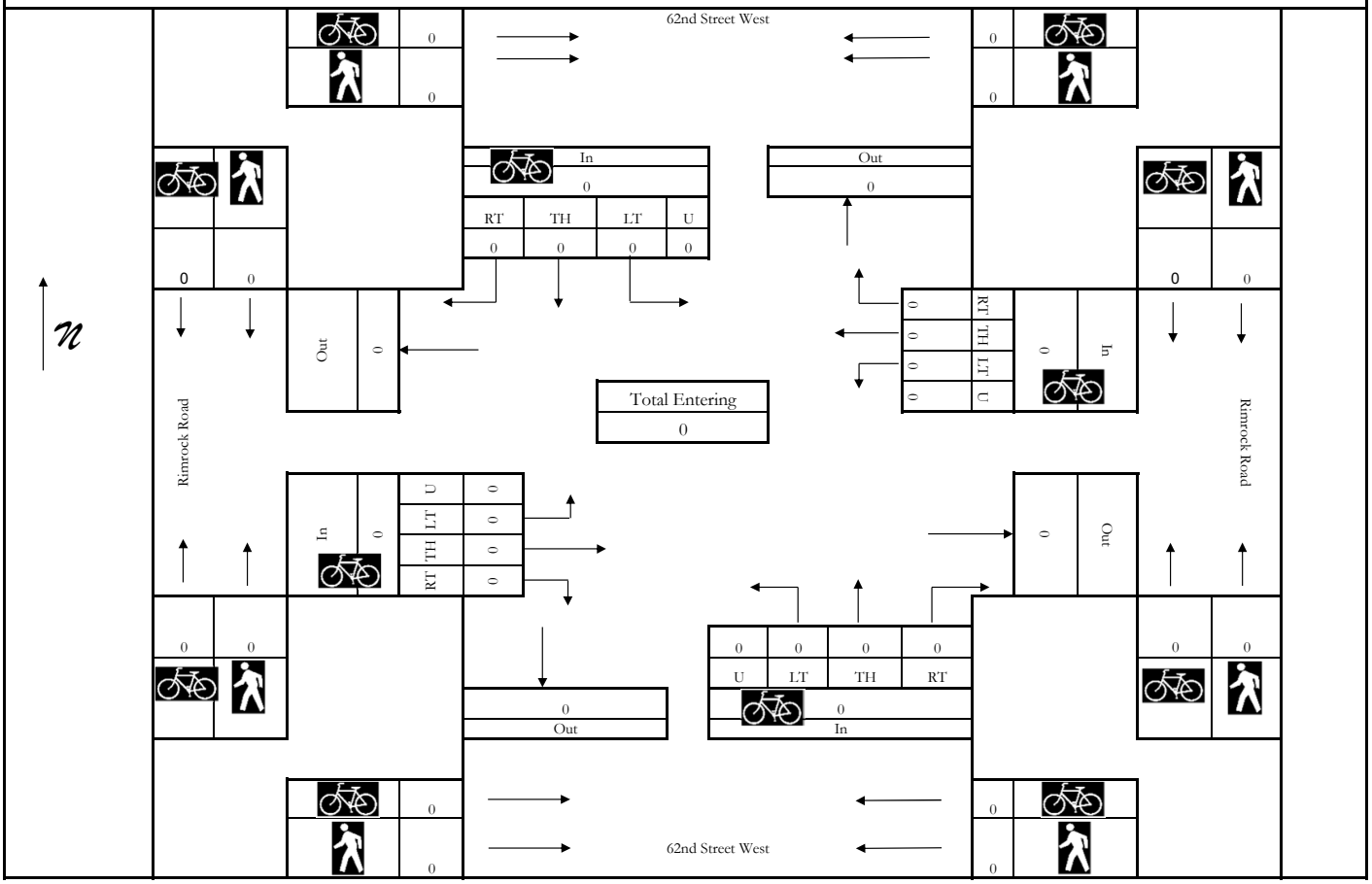
Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 62nd Street West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	62nd Street West	East/West Street:	Rimrock Road

Bikes in Roadway

	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	62nd Street West Southbound					62nd Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

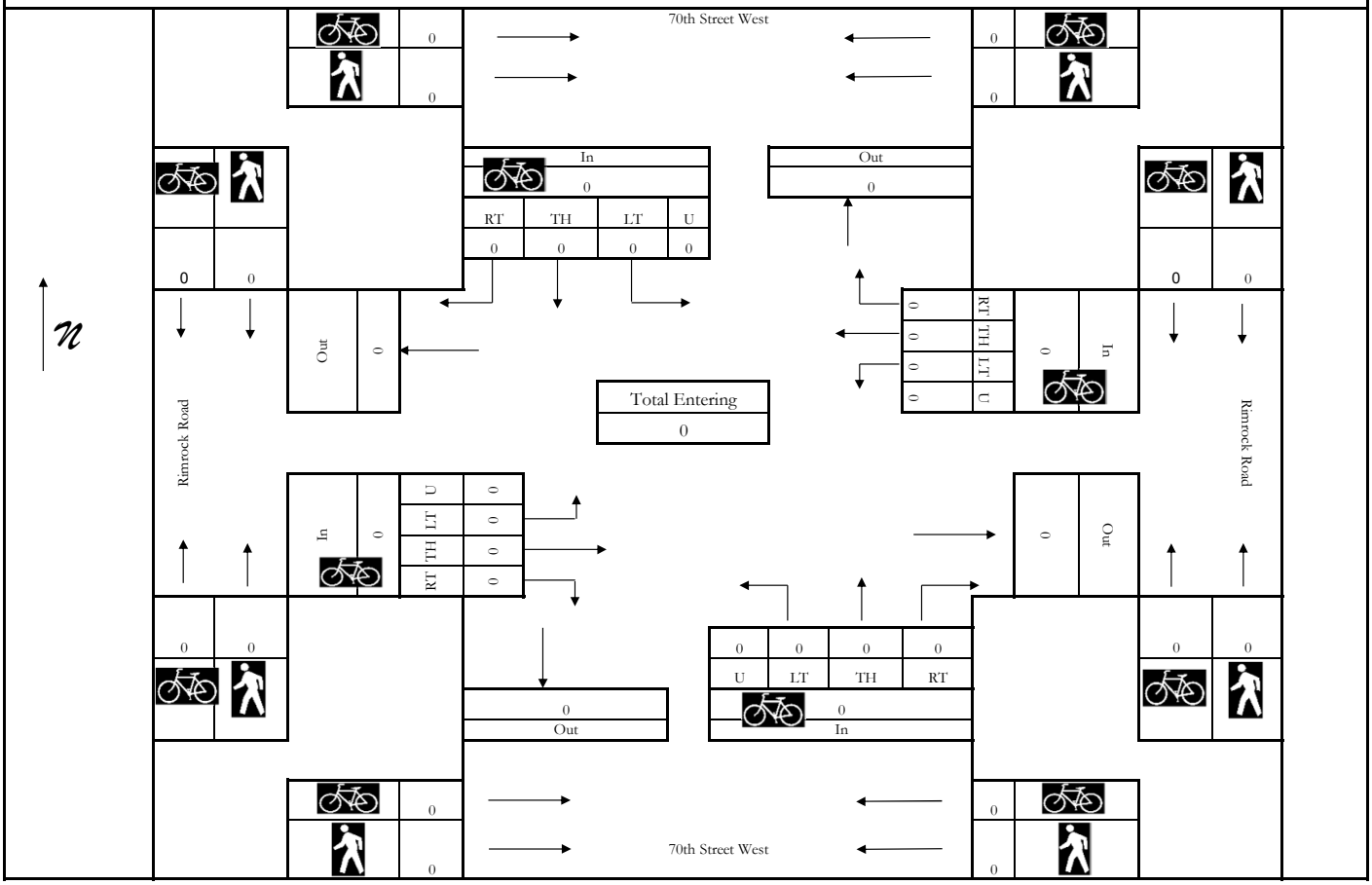
Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 70th Street West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	70th Street West	East/West Street:	Rimrock Road

Bikes in Roadway

	70th Street West Southbound					70th 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	70th Street West Southbound					70th Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

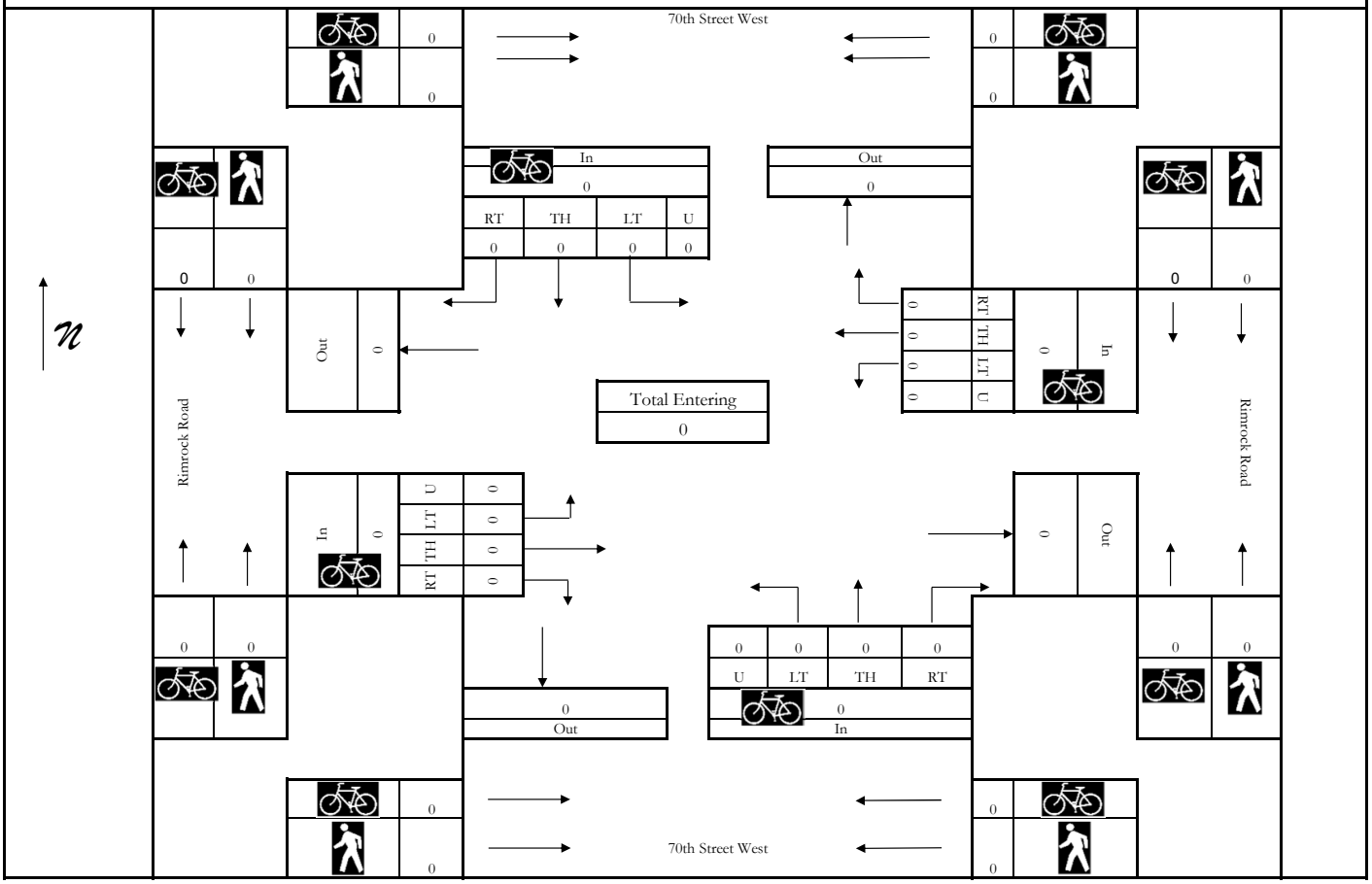
Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 70th Street West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	70th Street West	East/West Street:	Rimrock Road

Bikes in Roadway

	70th Street West Southbound					70th 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	70th Street West Southbound					70th Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

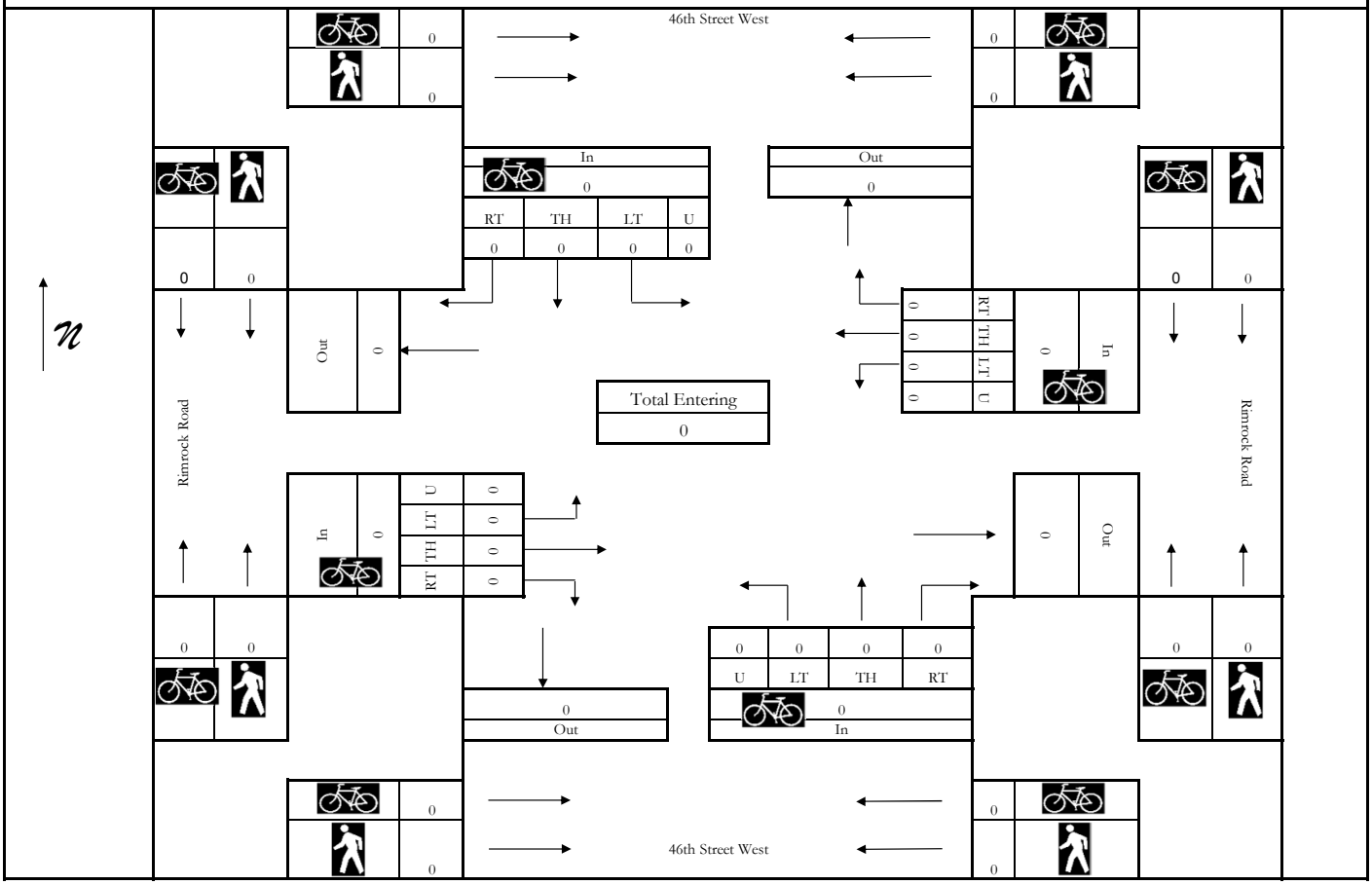
Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 46th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	46th Street West	East/West Street:	Rimrock Road

Bikes in Roadway

	46th Street West Southbound					46th 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	46th Street West Southbound					46th Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

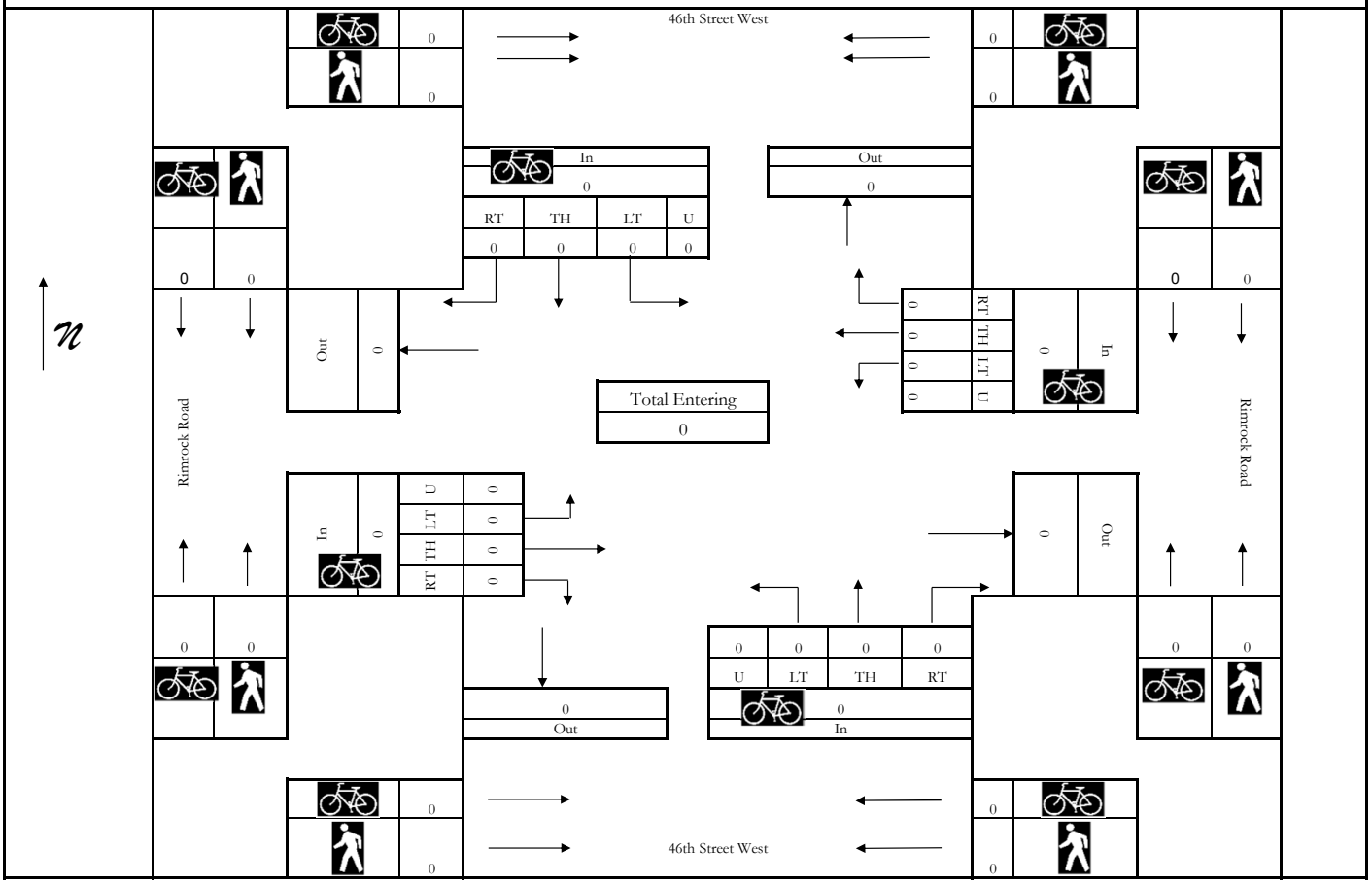
Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 46th Street West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	46th Street West	East/West Street:	Rimrock Road

Bikes in Roadway

	46th Street West Southbound					46th 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		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bikes & Pedestrians in Crosswalk

	46th Street West Southbound					46th Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	Total	CW Bike	CW Ped	CCW Bike	CCW Ped	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



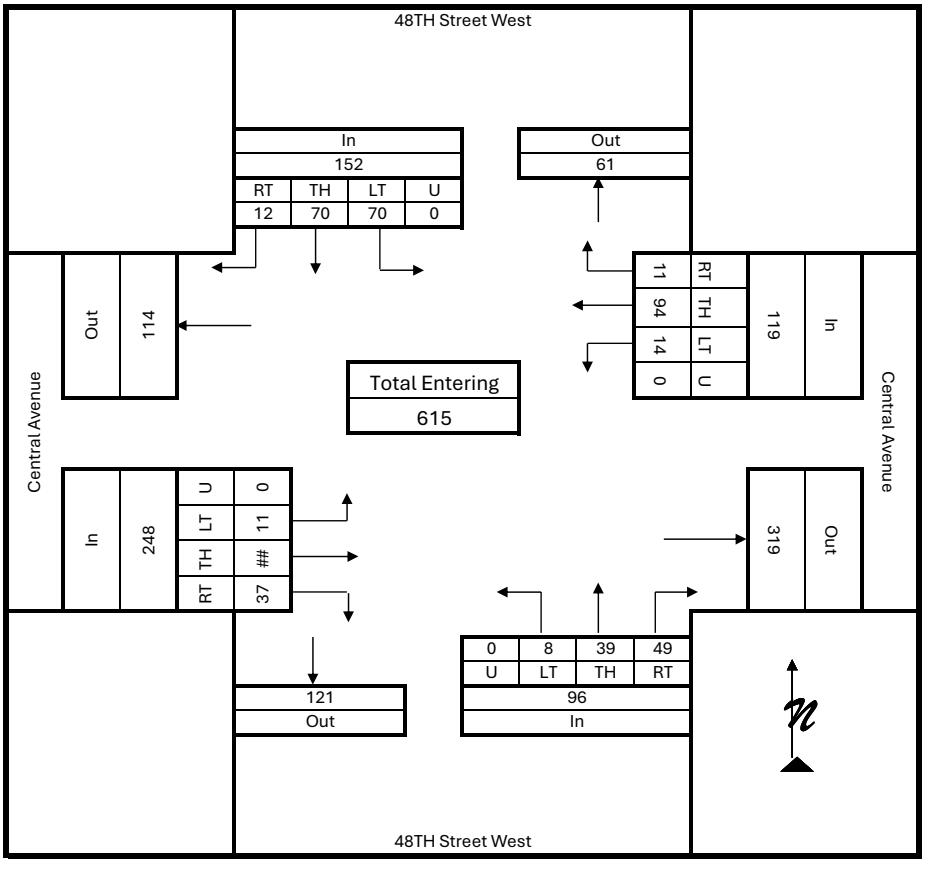
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Central Ave & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, August 8, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	Central Avenue

Vehicle Volumes and Adjustments

	48TH Street West Southbound					48TH 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	0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		
7:15 AM	2	13	18	0	33	12	7	2	0	21	10	49	7	0	66	2	27	2	0	31	151
7:30 AM	3	13	19	0	35	18	9	2	0	29	5	61	1	0	67	3	26	2	0	31	162
7:45 AM	3	25	21	0	49	9	10	1	0	20	12	47	1	0	60	3	24	5	0	32	161
8:00 AM	4	19	12	0	35	10	13	3	0	26	10	43	2	0	55	3	17	5	0	25	141
Grand Total	12	70	70	0	152	49	39	8	0	96	37	200	11	0	248	11	94	14	0	119	615
Medium Truck %	0.0	0.0	0.0	0.0	0.0	2.0	5.1	12.5	0.0	4.2	2.7	0.5	0.0	0.0	0.8	18.2	2.1	0.0	0.0	3.4	
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	1.1	0.0	0.0	0.8	
Total Truck %	0.0	0.0	0.0	0.0	0.0	2.0	5.1	12.5	0.0	4.2	2.7	0.5	0.0	0.0	0.8	18.2	3.2	0.0	0.0	4.2	
Total %	2.0	11.4	11.4	0.0	24.7	8.0	6.3	1.3	0.0	15.6	6.0	32.5	1.8	0.0	40.3	1.8	15.3	2.3	0.0	19.3	100.0
PHF	1.00	1.00	1.00			0.83	0.83	0.83			0.93	0.93	0.93			0.95	0.95	0.95			0.95



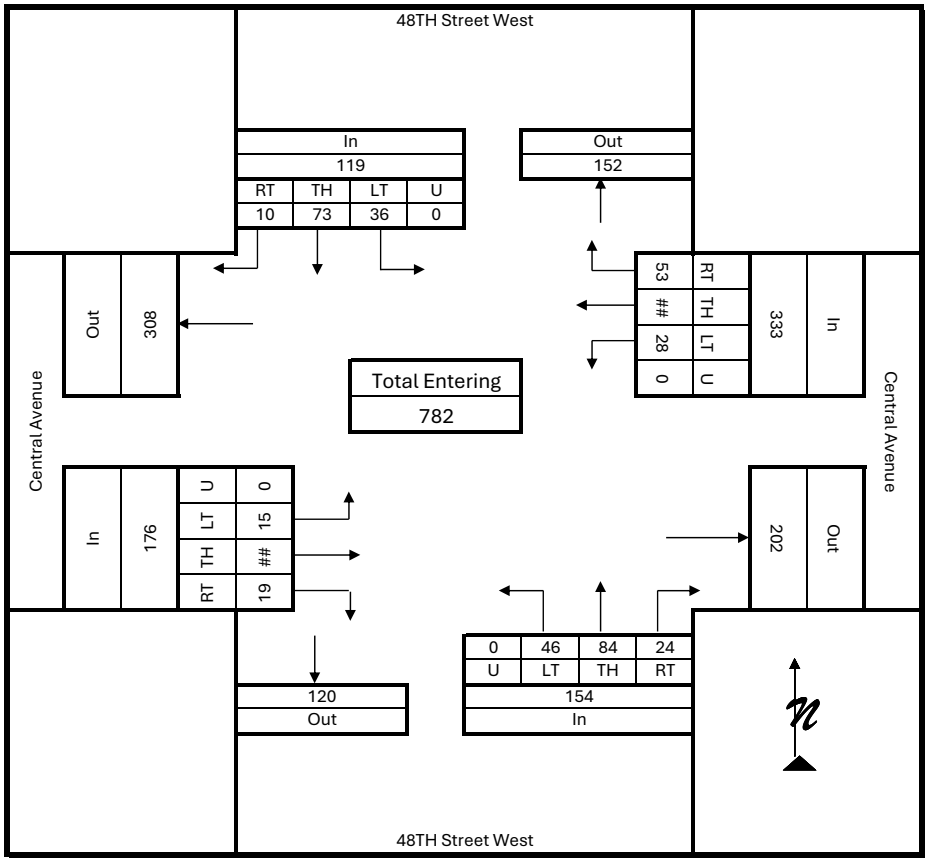
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Central Ave & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, August 8, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	Central Avenue

Vehicle Volumes and Adjustments

	48TH Street West Southbound					48TH 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	0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		
4:45 PM	2	21	13	0	36	6	12	8	0	26	7	35	8	0	50	14	56	3	0	73	185
5:00 PM	1	15	6	0	22	7	23	9	0	39	5	37	1	0	43	14	69	7	0	90	194
5:15 PM	3	19	12	0	34	5	29	19	0	53	5	39	2	0	46	17	59	12	0	88	221
5:30 PM	4	18	5	0	27	6	20	10	0	36	2	31	4	0	37	8	68	6	0	82	182
Grand Total	10	73	36	0	119	24	84	46	0	154	19	142	15	0	176	53	252	28	0	333	782
Medium Truck %	0.0	1.4	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	5.3	2.1	0.0	0.0	2.3	3.8	0.0	0.0	0.0	0.6	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.4	0.0	0.0	0.3	
Total Truck %	0.0	1.4	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	5.3	2.8	0.0	0.0	2.8	3.8	0.4	0.0	0.0	0.9	
Total %	1.3	9.3	4.6	0.0	15.2	3.1	10.7	5.9	0.0	19.7	2.4	18.2	1.9	0.0	22.5	6.8	32.2	3.6	0.0	42.6	100.0
PHF	0.88	0.88	0.88			0.72	0.72	0.72			0.96	0.96	0.96			0.95	0.95	0.95			0.88



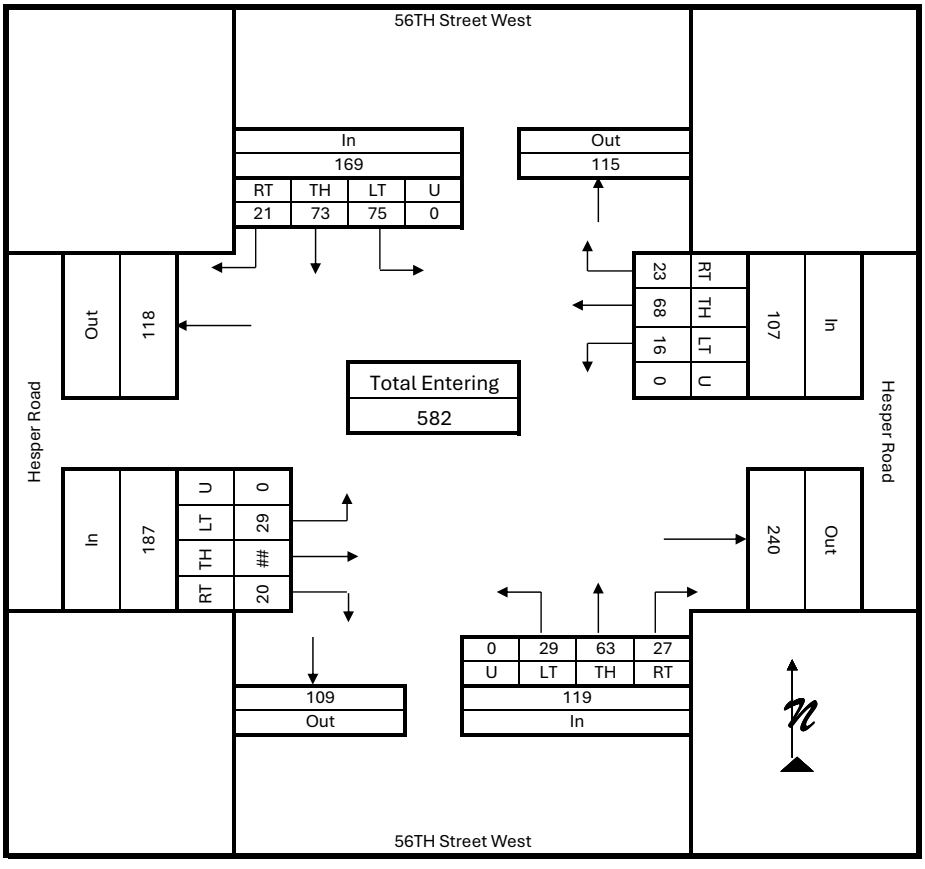
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Hesper RD & 56TH ST West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56TH Street West	East/West Street:	Hesper Road

Vehicle Volumes and Adjustments

	56TH Street West Southbound					56TH Street West Northbound					Hesper Road Eastbound					Hesper 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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
7:15 AM	4	13	14	0	31	6	15	1	0	22	3	32	2	0	37	8	10	3	0	21	111
7:30 AM	7	23	19	0	49	13	18	8	0	39	2	19	4	0	25	4	19	3	0	26	139
7:45 AM	7	19	26	0	52	3	10	19	0	32	6	54	19	0	79	7	26	9	0	42	205
8:00 AM	3	18	16	0	37	5	20	1	0	26	9	33	4	0	46	4	13	1	0	18	127
Grand Total	21	73	75	0	169	27	63	29	0	119	20	138	29	0	187	23	68	16	0	107	582
Medium Truck %	0.0	0.0	0.0	0.0	0.0	3.7	0.0	3.4	0.0	1.7	0.0	5.8	0.0	0.0	4.3	8.7	1.5	0.0	0.0	2.8	
Heavy Truck %	0.0	6.8	0.0	0.0	3.0	3.7	1.6	0.0	0.0	1.7	0.0	0.7	0.0	0.0	0.5	8.7	2.9	12.5	0.0	5.6	
Total Truck %	0.0	6.8	0.0	0.0	3.0	7.4	1.6	3.4	0.0	3.4	0.0	6.5	0.0	0.0	4.8	17.4	4.4	12.5	0.0	8.4	
Total %	3.6	12.5	12.9	0.0	29.0	4.6	10.8	5.0	0.0	20.4	3.4	23.7	5.0	0.0	32.1	4.0	11.7	2.7	0.0	18.4	100.0
PHF	0.81	0.81	0.81			0.93	0.93	0.93			0.60	0.60	0.60			0.64	0.64	0.64			0.71



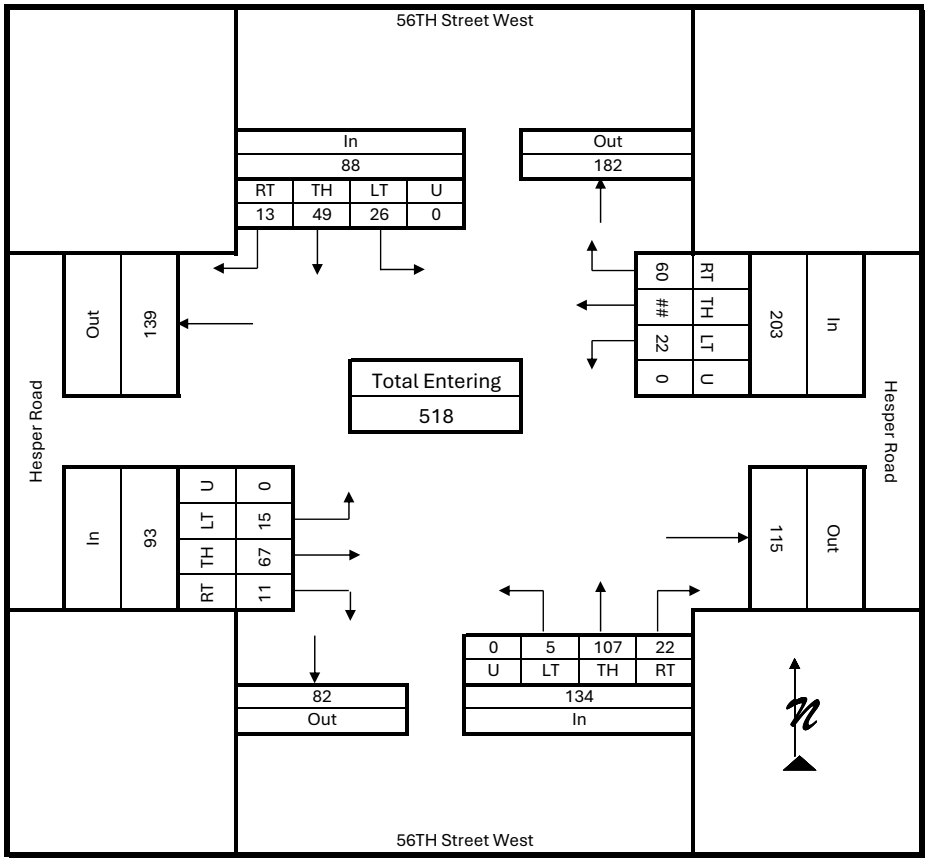
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Hesper RD & 56TH ST West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56TH Street West	East/West Street:	Hesper Road

Vehicle Volumes and Adjustments

	56TH Street West Southbound					56TH Street West Northbound					Hesper Road Eastbound					Hesper 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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
4:45 PM	5	9	8	0	22	4	19	2	0	25	1	18	4	0	23	11	33	6	0	50	120
5:00 PM	2	15	9	0	26	10	38	3	0	51	6	23	4	0	33	18	38	8	0	64	174
5:15 PM	5	16	4	0	25	6	21	0	0	27	3	14	5	0	22	21	27	2	0	50	124
5:30 PM	1	9	5	0	15	2	29	0	0	31	1	12	2	0	15	10	23	6	0	39	100
Grand Total	13	49	26	0	88	22	107	5	0	134	11	67	15	0	93	60	121	22	0	203	518
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	2.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	9.1	3.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	2.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	9.1	3.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	
Total %	2.5	9.5	5.0	0.0	17.0	4.2	20.7	1.0	0.0	25.9	2.1	12.9	2.9	0.0	18.0	11.6	23.4	4.2	0.0	39.2	100.0
PHF	0.85	0.85	0.85			0.66	0.66	0.66			0.70	0.70	0.70			0.79	0.79	0.79			0.74



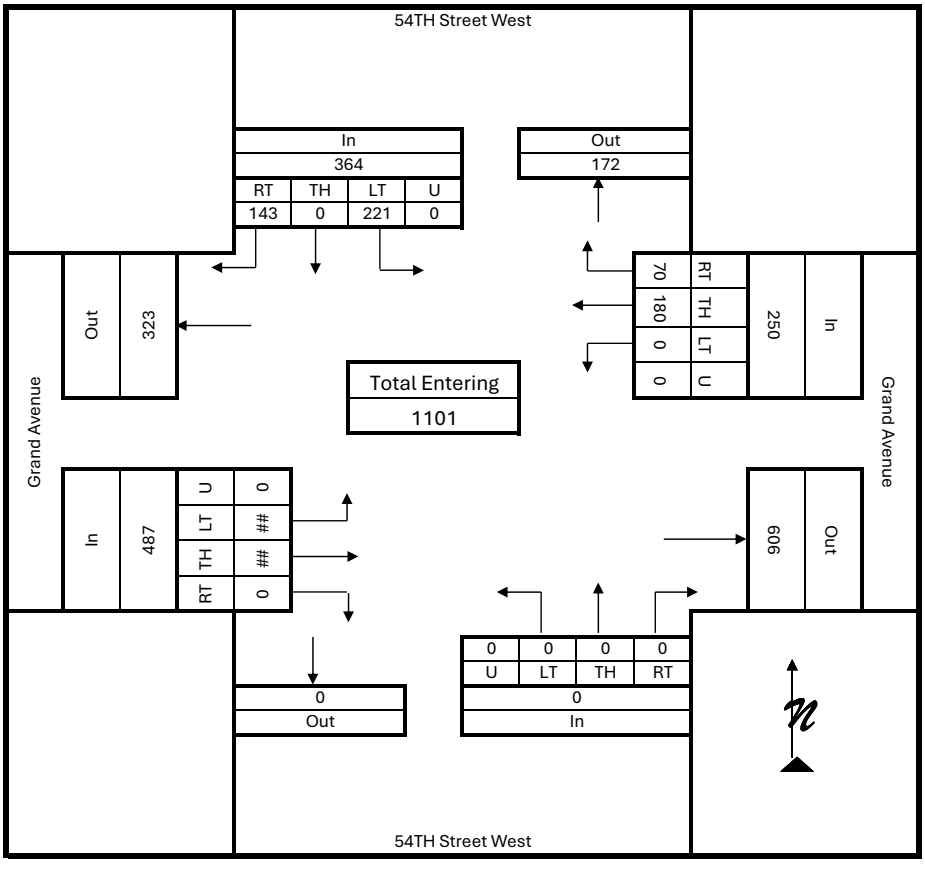
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Grand Ave & 54TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	54TH Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	54TH Street West Southbound					54TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	19	0	56	0	75	0	0	0	0	0	0	66	7	0	73	9	31	0	0	40	188
7:30 AM	52	0	66	0	118	0	0	0	0	0	0	104	23	0	127	8	46	0	0	54	299
7:45 AM	51	0	54	0	105	0	0	0	0	0	0	133	43	0	176	22	52	0	0	74	355
8:00 AM	21	0	45	0	66	0	0	0	0	0	0	82	29	0	111	31	51	0	0	82	259
Grand Total	143	0	221	0	364	0	0	0	0	0	0	385	102	0	487	70	180	0	0	250	1101
Medium Truck %	0.0	0.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	1.0	0.0	3.3	0.0	0.0	2.4	
Heavy Truck %	0.7	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.2	2.9	2.8	0.0	0.0	2.8	
Total Truck %	0.7	0.0	0.9	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0	0.0	1.2	2.9	6.1	0.0	0.0	5.2	
Total %	13.0	0.0	20.1	0.0	33.1	0.0	0.0	0.0	0.0	0.0	0.0	35.0	9.3	0.0	44.2	6.4	16.3	0.0	0.0	22.7	100.0
PHF	0.86	0.86	0.86			1.00	1.00	1.00			0.69	0.69	0.69			0.85	0.85	0.85			0.78



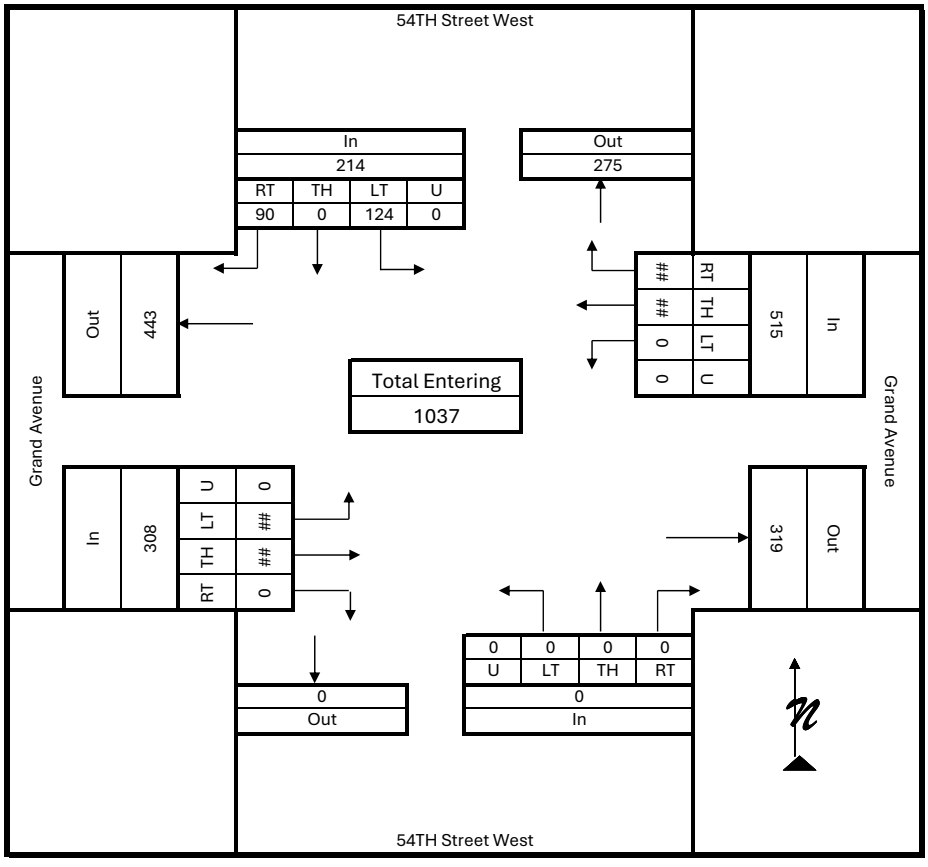
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Grand Ave & 54TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	54TH Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	54TH Street West Southbound					54TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	20	0	25	0	45	0	0	0	0	0	0	44	28	0	72	27	70	0	0	97	214
5:00 PM	28	0	45	0	73	0	0	0	0	0	0	58	29	0	87	35	80	0	0	115	275
5:15 PM	23	0	26	0	49	0	0	0	0	0	0	51	32	0	83	64	95	0	0	159	291
5:30 PM	19	0	28	0	47	0	0	0	0	0	0	42	24	0	66	36	108	0	0	144	257
Grand Total	90	0	124	0	214	0	0	0	0	0	0	195	113	0	308	162	353	0	0	515	1037
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	0.6	0.0	0.0	0.0	0.2	
Heavy Truck %	0.0	0.0	0.8	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.8	0.0	1.0	0.6	0.0	0.0	0.0	0.2	
Total Truck %	0.0	0.0	0.8	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.8	0.0	1.0	1.2	0.0	0.0	0.0	0.4	
Total %	8.7	0.0	12.0	0.0	20.6	0.0	0.0	0.0	0.0	0.0	0.0	18.8	10.9	0.0	29.7	15.6	34.0	0.0	0.0	49.7	100.0
PHF	1.00	1.00	1.00			1.00	1.00	1.00			0.93	0.93	0.93			0.81	0.81	0.81			0.89



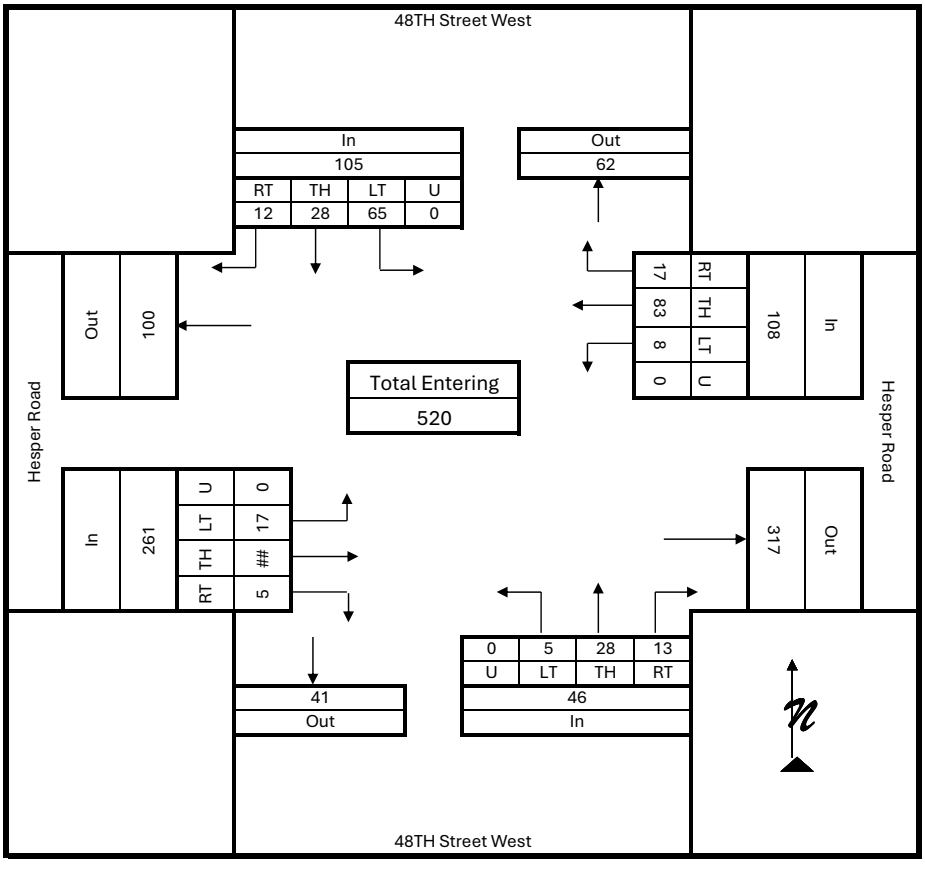
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Hesper Road & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	Hesper Road

Vehicle Volumes and Adjustments

	48TH Street West Southbound					48TH Street West Northbound					Hesper Road Eastbound					Hesper 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	0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		
7:15 AM	2	8	15	0	25	2	4	1	0	7	1	49	2	0	52	5	18	1	0	24	108
7:30 AM	3	3	8	0	14	5	10	3	0	18	0	65	4	0	69	4	21	2	0	27	128
7:45 AM	6	9	22	0	37	3	7	1	0	11	0	67	4	0	71	5	26	2	0	33	152
8:00 AM	1	8	20	0	29	3	7	0	0	10	4	58	7	0	69	3	18	3	0	24	132
Grand Total	12	28	65	0	105	13	28	5	0	46	5	239	17	0	261	17	83	8	0	108	520
Medium Truck %	8.3	3.6	0.0	0.0	1.9	0.0	0.0	20.0	0.0	2.2	0.0	3.3	5.9	0.0	3.4	0.0	2.4	0.0	0.0	1.9	
Heavy Truck %	0.0	0.0	1.5	0.0	1.0	7.7	3.6	0.0	0.0	4.3	0.0	2.1	0.0	0.0	1.9	5.9	7.2	0.0	0.0	6.5	
Total Truck %	8.3	3.6	1.5	0.0	2.9	7.7	3.6	20.0	0.0	6.5	0.0	5.4	5.9	0.0	5.4	5.9	9.6	0.0	0.0	8.3	
Total %	2.3	5.4	12.5	0.0	20.2	2.5	5.4	1.0	0.0	8.8	1.0	46.0	3.3	0.0	50.2	3.3	16.0	1.5	0.0	20.8	100.0
PHF	0.71	0.71	0.71			1.00	1.00	1.00			0.92	0.92	0.92			0.82	0.82	0.82			0.86



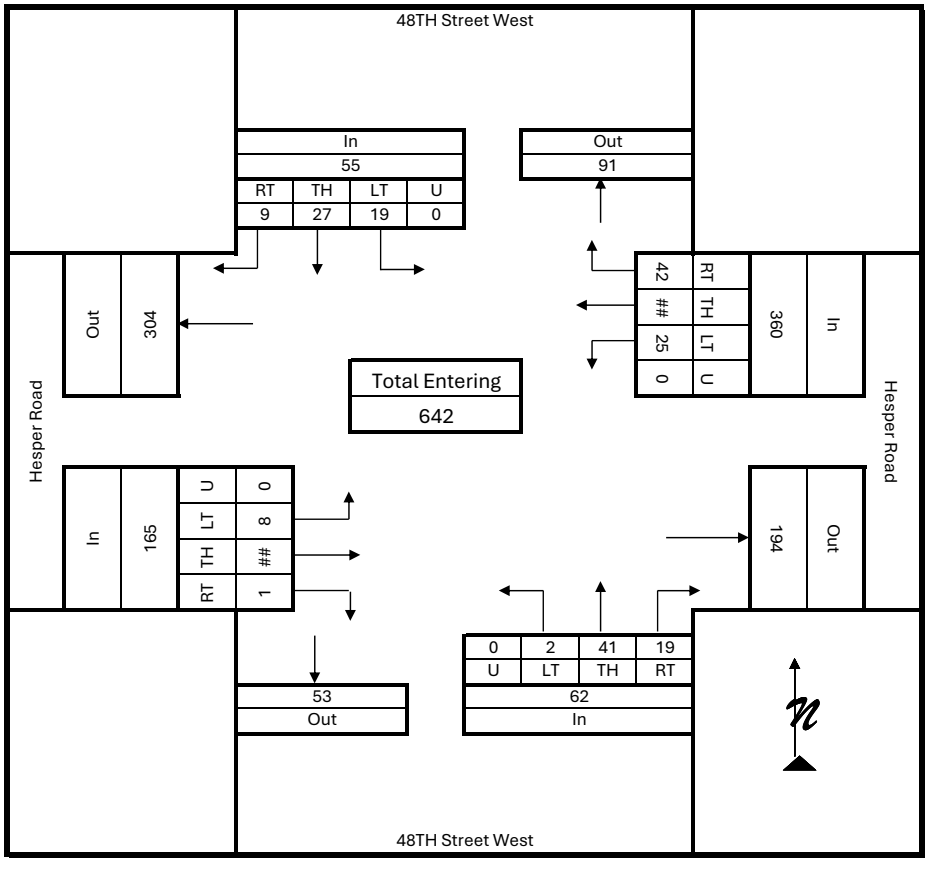
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Hesper Road & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	Hesper Road

Vehicle Volumes and Adjustments

	48TH Street West Southbound					48TH Street West Northbound					Hesper Road Eastbound					Hesper 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	0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		
4:45 PM	1	6	4	0	11	2	7	0	0	9	0	43	2	0	45	11	67	4	0	82	147
5:00 PM	4	4	5	0	13	8	18	1	0	27	0	29	2	0	31	17	75	6	0	98	169
5:15 PM	3	10	7	0	20	4	6	1	0	11	0	48	3	0	51	8	85	9	0	102	184
5:30 PM	1	7	3	0	11	5	10	0	0	15	1	36	1	0	38	6	66	6	0	78	142
Grand Total	9	27	19	0	55	19	41	2	0	62	1	156	8	0	165	42	293	25	0	360	642
Medium Truck %	0.0	0.0	5.3	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	1.2	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	0.6	12.5	0.0	1.2	0.0	0.7	0.0	0.0	0.6	
Total Truck %	0.0	0.0	5.3	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	1.9	12.5	0.0	2.4	0.0	0.7	0.0	0.0	0.6	
Total %	1.4	4.2	3.0	0.0	8.6	3.0	6.4	0.3	0.0	9.7	0.2	24.3	1.2	0.0	25.7	6.5	45.6	3.9	0.0	56.1	100.0
PHF	0.67	0.67	0.67			1.00	1.00	1.00			0.81	0.81	0.81			0.89	0.89	0.89			0.87



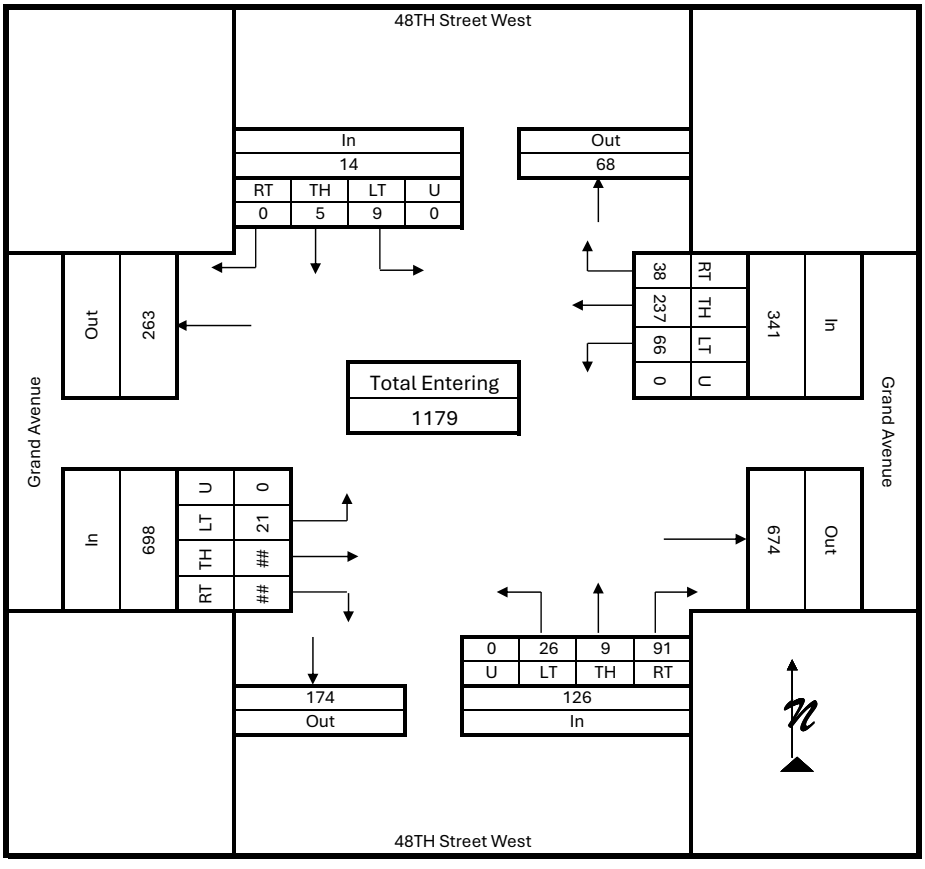
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Grand Ave & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	48TH Street West 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	0	0	0	0	22	0	4	0	26	16	126	0	0	142	1	37	9	0	47	215
7:30 AM	0	1	1	0	2	25	2	7	0	34	28	159	0	0	187	1	46	6	0	53	276
7:45 AM	0	1	1	0	2	32	2	12	0	46	35	162	0	0	197	6	71	14	0	91	336
8:00 AM	0	3	7	0	10	12	5	3	0	20	24	127	21	0	172	30	83	37	0	150	352
Grand Total	0	5	9	0	14	91	9	26	0	126	103	574	21	0	698	38	237	66	0	341	1179
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	1.6	1.0	0.7	0.0	0.0	0.7	0.0	1.7	1.5	0.0	1.5	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	1.6	0.0	0.5	0.0	0.0	0.4	0.0	2.1	0.0	0.0	1.5	
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	0.0	3.2	1.0	1.2	0.0	0.0	1.1	0.0	3.8	1.5	0.0	2.9	
Total %	0.0	0.4	0.8	0.0	1.2	7.7	0.8	2.2	0.0	10.7	8.7	48.7	1.8	0.0	59.2	3.2	20.1	5.6	0.0	28.9	100.0
PHF	0.35	0.35	0.35			1.00	1.00	1.00			1.00	1.00	1.00			0.57	0.57	0.57			0.84



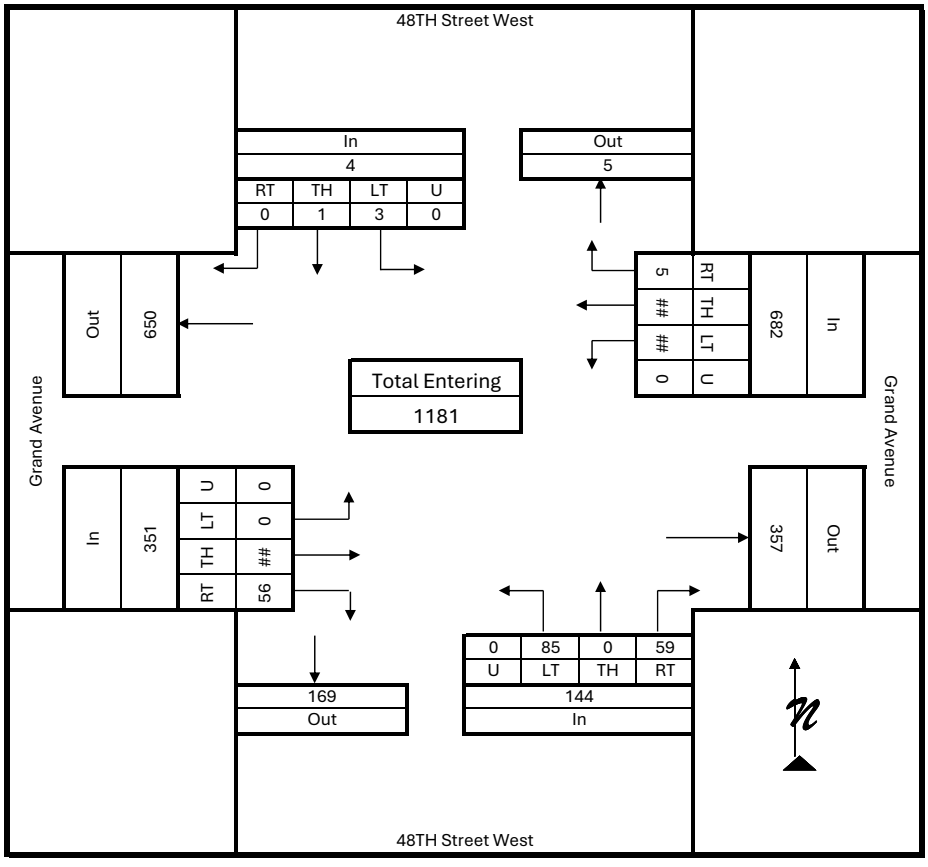
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Grand Ave & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	48TH Street West 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	0	0	3	0	3	12	0	8	0	20	9	74	0	0	83	3	118	22	0	143	249
5:00 PM	0	1	0	0	1	14	0	30	0	44	16	88	0	0	104	1	129	29	0	159	308
5:15 PM	0	0	0	0	0	7	0	23	0	30	21	72	0	0	93	1	177	37	0	215	338
5:30 PM	0	0	0	0	0	26	0	24	0	50	10	61	0	0	71	0	141	24	0	165	286
Grand Total	0	1	3	0	4	59	0	85	0	144	56	295	0	0	351	5	565	112	0	682	1181
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	1.2	0.0	0.7	0.0	0.7	0.0	0.0	0.6	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	1.2	0.0	0.7	0.0	0.7	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.1	0.3	0.0	0.3	5.0	0.0	7.2	0.0	12.2	4.7	25.0	0.0	0.0	29.7	0.4	47.8	9.5	0.0	57.7	100.0
PHF	1.00	1.00	1.00			1.00	1.00	1.00			0.95	0.95	0.95			0.79	0.79	0.79			0.87



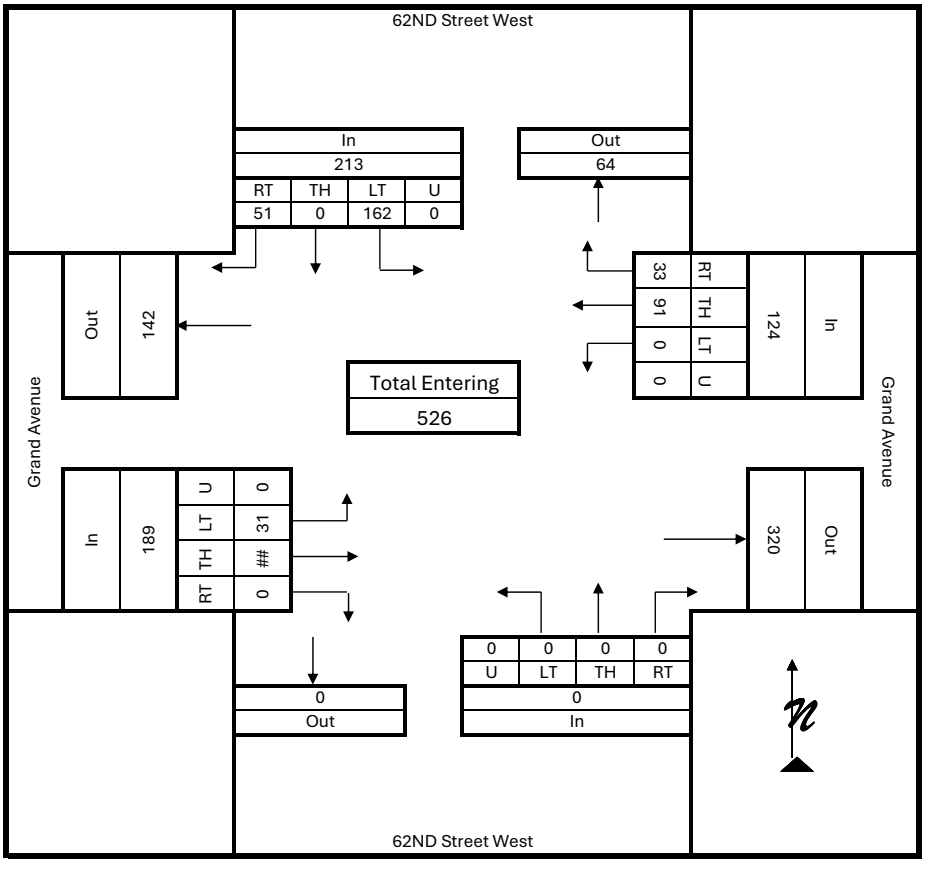
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Grand Ave & 62ND ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	62ND Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	62ND Street West Southbound					62ND 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	7	0	33	0	40	0	0	0	0	0	0	33	8	0	41	3	20	0	0	23	104
7:30 AM	10	0	48	0	58	0	0	0	0	0	0	47	7	0	54	6	15	0	0	21	133
7:45 AM	23	0	50	0	73	0	0	0	0	0	0	47	9	0	56	10	25	0	0	35	164
8:00 AM	11	0	31	0	42	0	0	0	0	0	0	31	7	0	38	14	31	0	0	45	125
Grand Total	51	0	162	0	213	0	0	0	0	0	0	158	31	0	189	33	91	0	0	124	526
Medium Truck %	0.0	0.0	0.6	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	1.1	6.1	3.3	0.0	0.0	4.0	
Heavy Truck %	0.0	0.0	0.6	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	3.3	0.0	0.0	4.0	
Total Truck %	0.0	0.0	1.2	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	1.1	12.1	6.6	0.0	0.0	8.1	
Total %	9.7	0.0	30.8	0.0	40.5	0.0	0.0	0.0	0.0	0.0	0.0	30.0	5.9	0.0	35.9	6.3	17.3	0.0	0.0	23.6	100.0
PHF	0.74	0.74	0.74			1.00	1.00	1.00			0.85	0.85	0.85			0.88	0.88	0.88			0.80



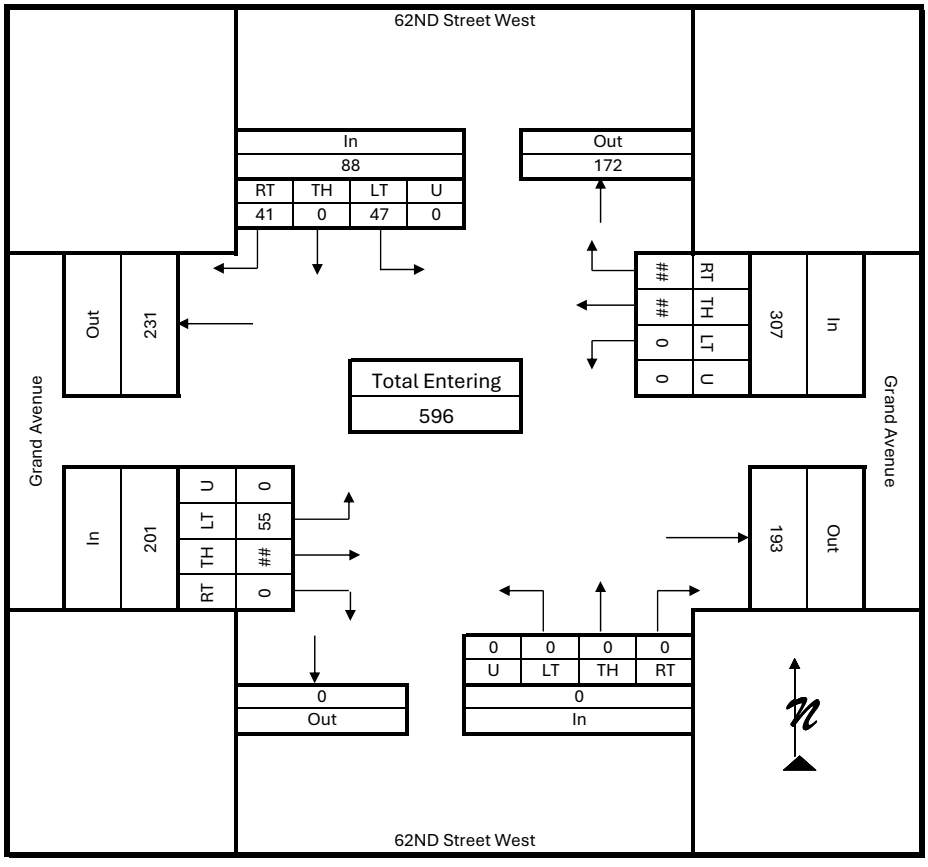
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Grand Ave & 62ND ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	62ND Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	62ND Street West Southbound					62ND 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	10	0	14	0	24	0	0	0	0	0	0	31	15	0	46	22	36	0	0	58	128
5:00 PM	7	0	7	0	14	0	0	0	0	0	0	42	15	0	57	23	49	0	0	72	143
5:15 PM	18	0	15	0	33	0	0	0	0	0	0	35	17	0	52	41	56	0	0	97	182
5:30 PM	6	0	11	0	17	0	0	0	0	0	0	38	8	0	46	31	49	0	0	80	143
Grand Total	41	0	47	0	88	0	0	0	0	0	0	146	55	0	201	117	190	0	0	307	596
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	1.4	0.0	0.0	1.0	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	0.0	1.4	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	
Total %	6.9	0.0	7.9	0.0	14.8	0.0	0.0	0.0	0.0	0.0	0.0	24.5	9.2	0.0	33.7	19.6	31.9	0.0	0.0	51.5	100.0
PHF	0.69	0.69	0.69			1.00	1.00	1.00			0.97	0.97	0.97			0.79	0.79	0.79			0.82



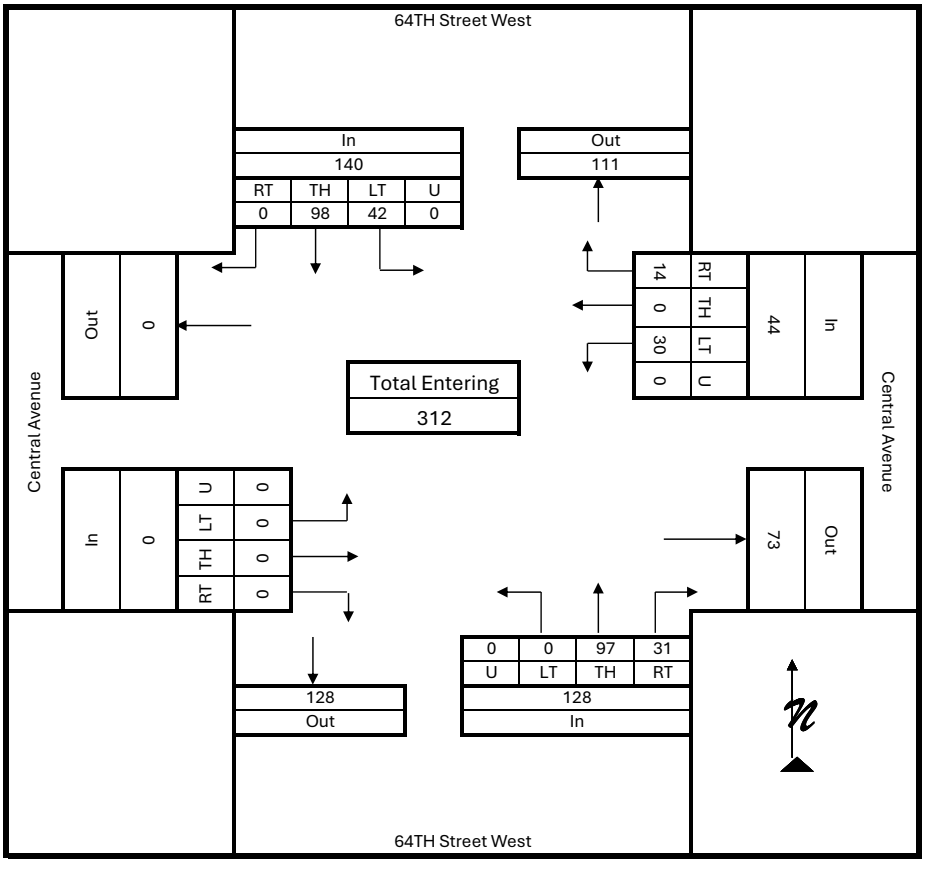
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Central Ave & 64TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64TH Street West	East/West Street:	Central Avenue

Vehicle Volumes and Adjustments

	64TH Street West Southbound					64TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	20	10	0	30	7	28	0	0	35	0	0	0	0	0	5	0	9	0	14	79
7:30 AM	0	20	16	0	36	5	14	0	0	19	0	0	0	0	0	1	0	5	0	6	61
7:45 AM	0	34	6	0	40	9	30	0	0	39	0	0	0	0	0	5	0	8	0	13	92
8:00 AM	0	24	10	0	34	10	25	0	0	35	0	0	0	0	0	3	0	8	0	11	80
Grand Total	0	98	42	0	140	31	97	0	0	128	0	0	0	0	0	14	0	30	0	44	312
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	4.1	2.4	0.0	3.6	0.0	1.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	7.1	0.0	3.3	0.0	4.5	
Total Truck %	0.0	4.1	2.4	0.0	3.6	0.0	1.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	7.1	0.0	3.3	0.0	4.5	
Total %	0.0	31.4	13.5	0.0	44.9	9.9	31.1	0.0	0.0	41.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	9.6	0.0	14.1	100.0
PHF	0.87	0.87	0.87			0.82	0.82	0.82			1.00	1.00	1.00			0.85	0.85	0.85			0.84



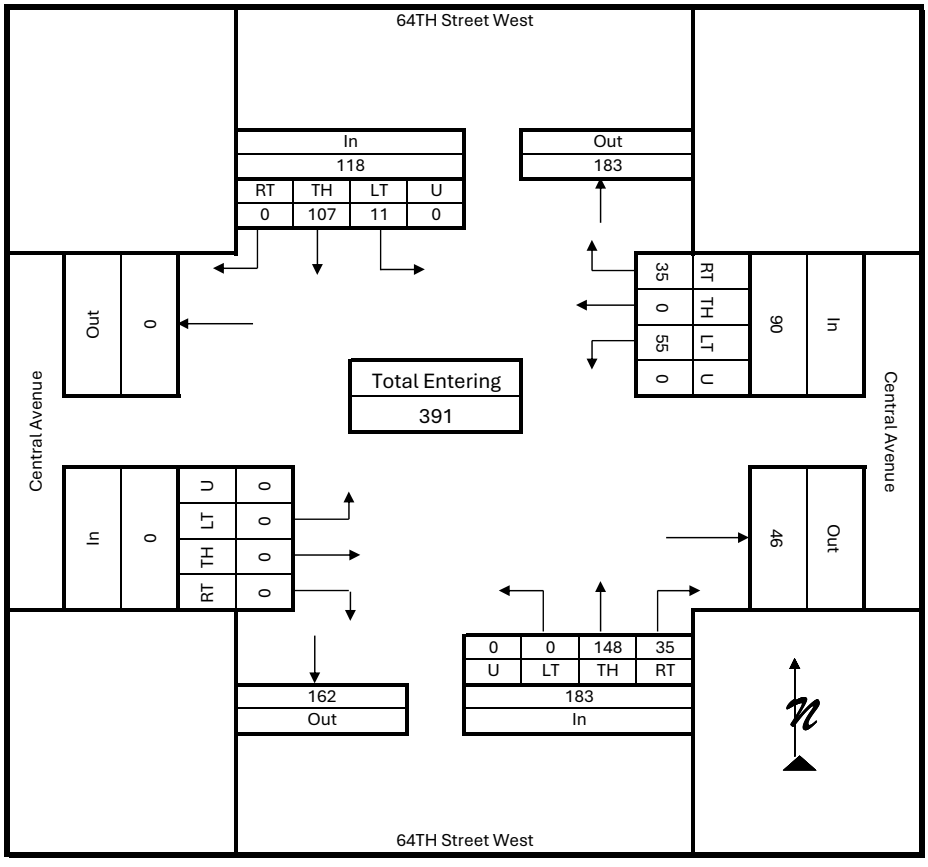
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Central Ave & 64TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64TH Street West	East/West Street:	Central Avenue

Vehicle Volumes and Adjustments

	64TH Street West Southbound					64TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	0	22	0	0	22	7	32	0	0	39	0	0	0	0	0	11	0	15	0	26	87
5:00 PM	0	30	6	0	36	17	42	0	0	59	0	0	0	0	0	10	0	12	0	22	117
5:15 PM	0	31	1	0	32	5	34	0	0	39	0	0	0	0	0	8	0	16	0	24	95
5:30 PM	0	24	4	0	28	6	40	0	0	46	0	0	0	0	0	6	0	12	0	18	92
Grand Total	0	107	11	0	118	35	148	0	0	183	0	0	0	0	0	35	0	55	0	90	391
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	1.9	0.0	0.0	1.7	0.0	1.4	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	1.9	0.0	0.0	1.7	0.0	1.4	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	27.4	2.8	0.0	30.2	9.0	37.9	0.0	0.0	46.8	0.0	0.0	0.0	0.0	0.0	9.0	0.0	14.1	0.0	23.0	100.0
PHF	0.81	0.81	0.81			0.79	0.79	0.79			1.00	1.00	1.00			1.00	1.00	1.00			0.84



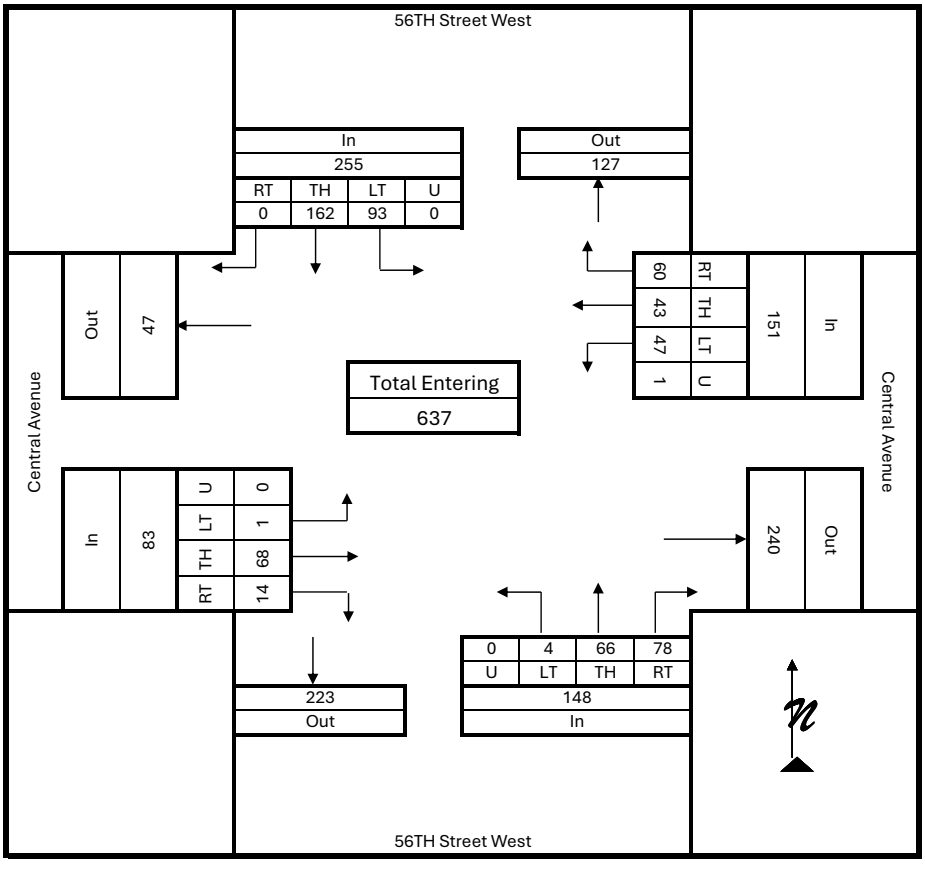
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Central Ave & 56TH ST West
Agency/Company:	Sanbell		
Date Performed:	Thursday, January 11, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	23	14	0	37	17	15	1	0	33	1	21	0	0	22	7	12	7	0	26	118
7:30 AM	0	54	21	0	75	25	16	0	0	41	6	16	0	0	22	23	5	12	0	40	178
7:45 AM	0	52	37	0	89	21	20	0	0	41	5	11	1	0	17	26	17	20	1	64	211
8:00 AM	0	33	21	0	54	15	15	3	0	33	2	20	0	0	22	4	9	8	0	21	130
Grand Total	0	162	93	0	255	78	66	4	0	148	14	68	1	0	83	60	43	47	1	151	637
Medium Truck %	0.0	0.6	1.1	0.0	0.8	0.0	1.5	25.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	2.6	
Heavy Truck %	0.0	1.2	1.1	0.0	1.2	0.0	4.5	50.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	3.3	4.7	2.1	0.0	3.3	
Total Truck %	0.0	1.9	2.2	0.0	2.0	0.0	6.1	75.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	10.0	4.7	2.1	0.0	6.0	
Total %	0.0	25.4	14.6	0.0	40.0	12.2	10.4	0.6	0.0	23.2	2.2	10.7	0.2	0.0	13.0	9.4	6.8	7.4	0.2	23.7	100.0
PHF	0.71	0.71	0.71			0.90	0.90	0.90			1.00	1.00	1.00			0.60	0.60	0.60			0.75



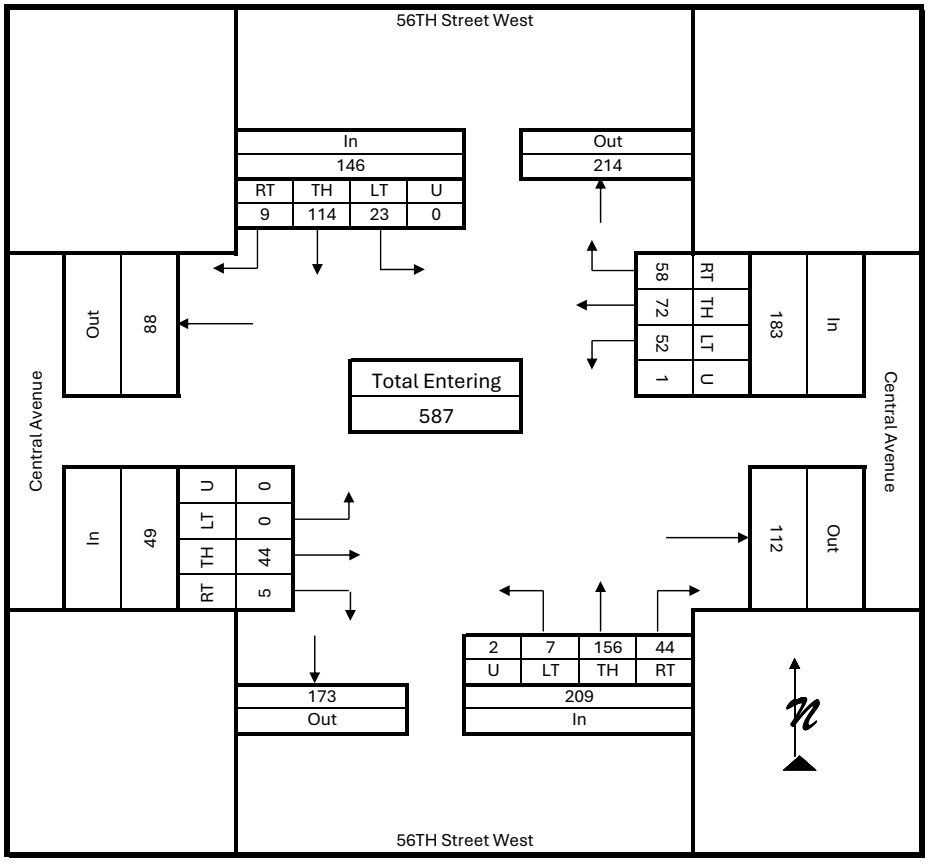
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Central Ave & 56TH ST West
Agency/Company:	Sanbell		
Date Performed:	Thursday, January 11, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	0	18	8	0	26	14	34	1	0	49	1	8	0	0	9	8	15	16	1	40	124
5:00 PM	3	41	6	0	50	15	44	2	2	63	2	22	0	0	24	18	22	20	0	60	197
5:15 PM	4	25	1	0	30	7	46	3	0	56	0	7	0	0	7	21	25	9	0	55	148
5:30 PM	2	30	8	0	40	8	32	1	0	41	2	7	0	0	9	11	10	7	0	28	118
Grand Total	9	114	23	0	146	44	156	7	2	209	5	44	0	0	49	58	72	52	1	183	587
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	0.7	0.0	0.0	0.0	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	0.9	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	0.0	0.0	0.0	0.0	0.0	
Total %	1.5	19.4	3.9	0.0	24.9	7.5	26.6	1.2	0.3	35.6	0.9	7.5	0.0	0.0	8.3	9.9	12.3	8.9	0.2	31.2	100.0
PHF	0.73	0.73	0.73			0.84	0.84	0.84			0.52	0.52	0.52			0.77	0.77	0.77			0.75



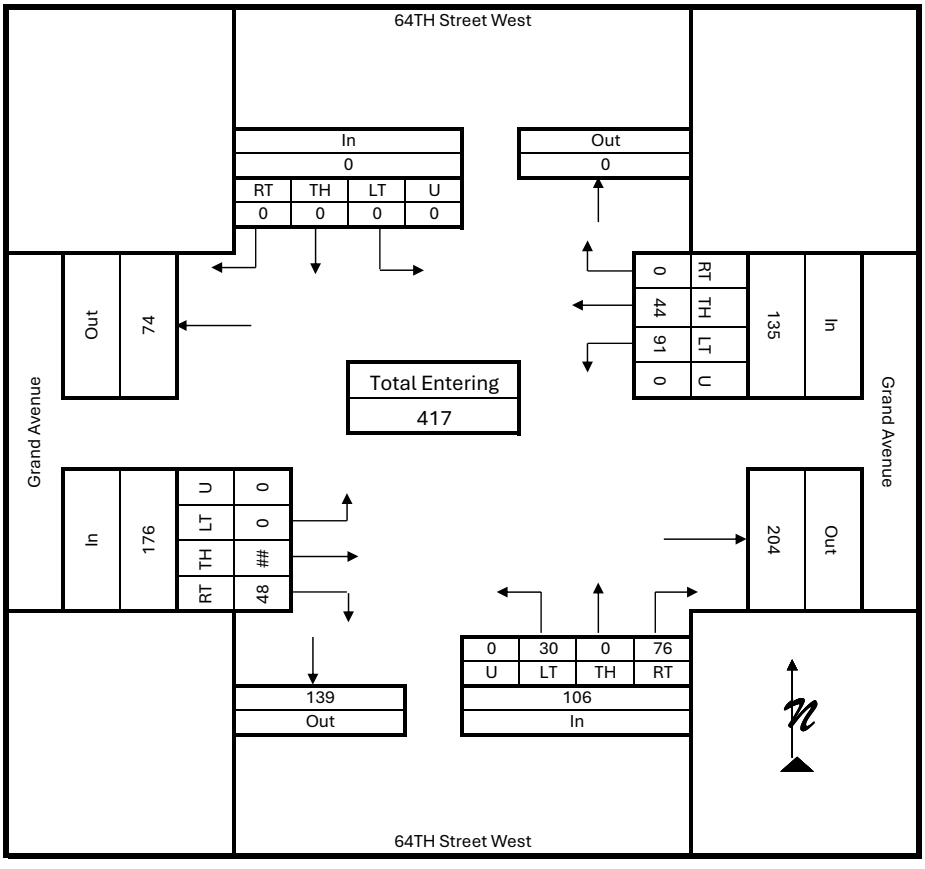
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Grand Ave & 64TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 16, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64TH Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	64TH Street West Southbound					64TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	0	0	0	0	14	0	3	0	17	16	32	0	0	48	0	6	24	0	30	95
7:30 AM	0	0	0	0	0	21	0	7	0	28	12	40	0	0	52	0	11	18	0	29	109
7:45 AM	0	0	0	0	0	23	0	9	0	32	14	35	0	0	49	0	10	21	0	31	112
8:00 AM	0	0	0	0	0	18	0	11	0	29	6	21	0	0	27	0	17	28	0	45	101
Grand Total	0	0	0	0	0	76	0	30	0	106	48	128	0	0	176	0	44	91	0	135	417
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.9	0.0	1.6	0.0	0.0	1.1	0.0	6.8	1.1	0.0	3.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	1.9	0.0	0.8	0.0	0.0	0.6	0.0	0.0	1.1	0.0	0.7	
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	2.8	0.0	2.3	0.0	0.0	1.7	0.0	6.8	2.2	0.0	3.7	
Total %	0.0	0.0	0.0	0.0	0.0	18.2	0.0	7.2	0.0	25.4	11.5	30.7	0.0	0.0	42.2	0.0	10.6	21.8	0.0	32.4	100.0
PHF	1.00	1.00	1.00			0.82	0.82	0.82			0.90	0.90	0.90			1.00	1.00	1.00			0.93



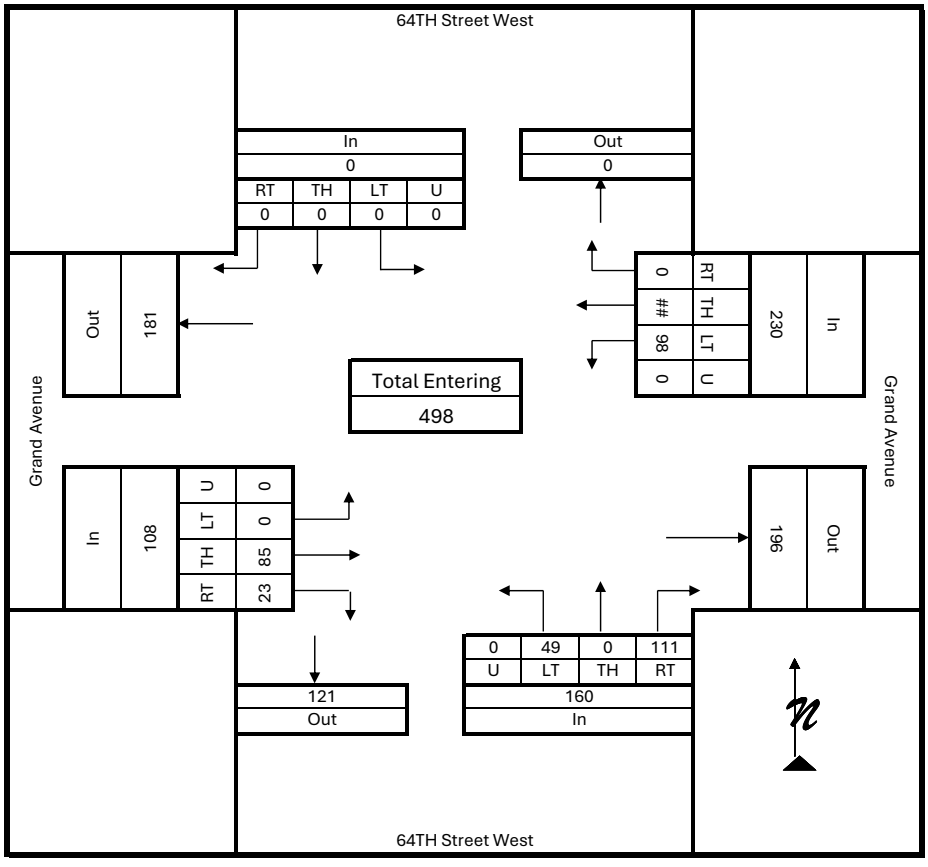
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Grand Ave & 64TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 16, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64TH Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	64TH Street West Southbound					64TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	0	0	0	0	0	20	0	16	0	36	5	26	0	0	31	0	34	21	0	55	122
5:00 PM	0	0	0	0	0	33	0	6	0	39	10	22	0	0	32	0	36	20	0	56	127
5:15 PM	0	0	0	0	0	34	0	17	0	51	3	20	0	0	23	0	28	23	0	51	125
5:30 PM	0	0	0	0	0	24	0	10	0	34	5	17	0	0	22	0	34	34	0	68	124
Grand Total	0	0	0	0	0	111	0	49	0	160	23	85	0	0	108	0	132	98	0	230	498
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	2.0	0.0	0.6	0.0	2.4	0.0	0.0	1.9	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	2.0	0.0	0.6	0.0	2.4	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	22.3	0.0	9.8	0.0	32.1	4.6	17.1	0.0	0.0	21.7	0.0	26.5	19.7	0.0	46.2	100.0
PHF	1.00	1.00	1.00			1.00	1.00	1.00			0.84	0.84	0.84			1.00	1.00	1.00			0.98



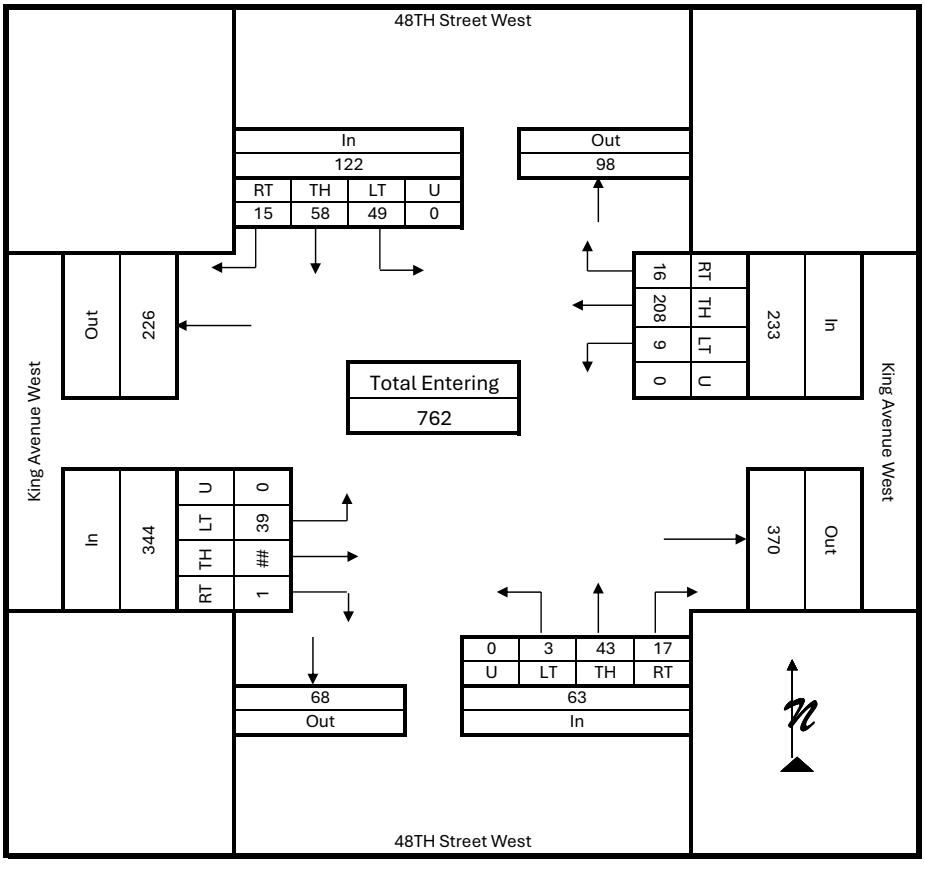
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	King Ave West & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, August 8, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	King Avenue West

Vehicle Volumes and Adjustments

	48TH Street West Southbound					48TH Street West Northbound					King Avenue West Eastbound					King Avenue West 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	0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		
7:15 AM	2	15	10	0	27	4	12	0	0	16	1	61	7	0	69	3	45	3	0	51	163
7:30 AM	3	9	4	0	16	5	13	2	0	20	0	83	12	0	95	6	54	2	0	62	193
7:45 AM	4	20	20	0	44	4	10	0	0	14	0	93	9	0	102	2	65	2	0	69	229
8:00 AM	6	14	15	0	35	4	8	1	0	13	0	67	11	0	78	5	44	2	0	51	177
Grand Total	15	58	49	0	122	17	43	3	0	63	1	304	39	0	344	16	208	9	0	233	762
Medium Truck %	0.0	1.7	0.0	0.0	0.8	0.0	4.7	33.3	0.0	4.8	0.0	4.9	2.6	0.0	4.7	6.3	4.8	0.0	0.0	4.7	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	4.9	0.0	5.8	0.0	0.0	5.2	
Total Truck %	0.0	1.7	0.0	0.0	0.8	0.0	4.7	33.3	0.0	4.8	0.0	10.5	2.6	0.0	9.6	6.3	10.6	0.0	0.0	9.9	
Total %	2.0	7.6	6.4	0.0	16.0	2.2	5.6	0.4	0.0	8.3	0.1	39.9	5.1	0.0	45.1	2.1	27.3	1.2	0.0	30.6	100.0
PHF	0.69	0.69	0.69			1.00	1.00	1.00			0.84	0.84	0.84			0.85	0.85	0.85			0.83



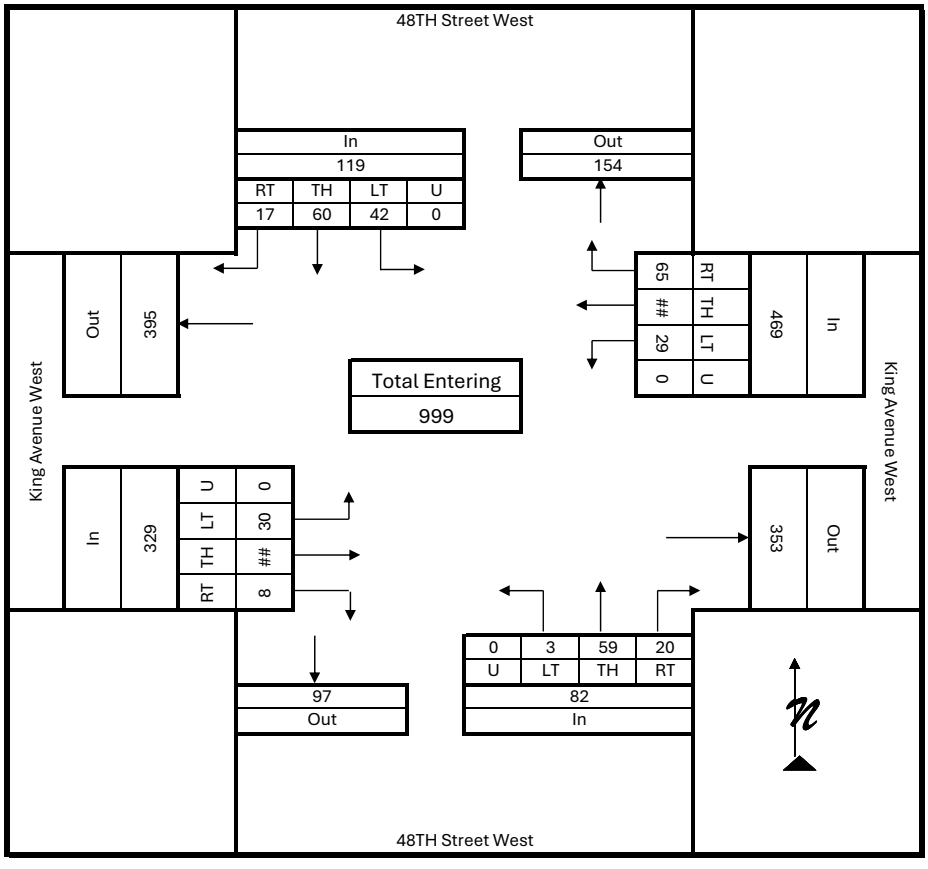
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	King Ave West & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, August 8, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	King Avenue West

Vehicle Volumes and Adjustments

	48TH Street West Southbound					48TH Street West Northbound					King Avenue West Eastbound					King Avenue West 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	0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		0.98	0.98	0.98	0.98		
4:45 PM	2	16	12	0	30	3	7	0	0	10	2	76	6	0	84	11	95	5	0	111	235
5:00 PM	7	14	12	0	33	5	15	0	0	20	3	80	8	0	91	18	76	7	0	101	245
5:15 PM	4	17	9	0	30	7	21	2	0	30	2	80	11	0	93	19	104	10	0	133	286
5:30 PM	4	13	9	0	26	5	16	1	0	22	1	55	5	0	61	17	100	7	0	124	233
Grand Total	17	60	42	0	119	20	59	3	0	82	8	291	30	0	329	65	375	29	0	469	999
Medium Truck %	0.0	3.3	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.6	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	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	3.3	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.9	0.0	0.3	0.0	0.0	0.2	
Total %	1.7	6.0	4.2	0.0	11.9	2.0	5.9	0.3	0.0	8.2	0.8	29.1	3.0	0.0	32.9	6.5	37.5	2.9	0.0	46.9	100.0
PHF	0.99	0.99	0.99			0.68	0.68	0.68			0.88	0.88	0.88			0.88	0.88	0.88			0.87



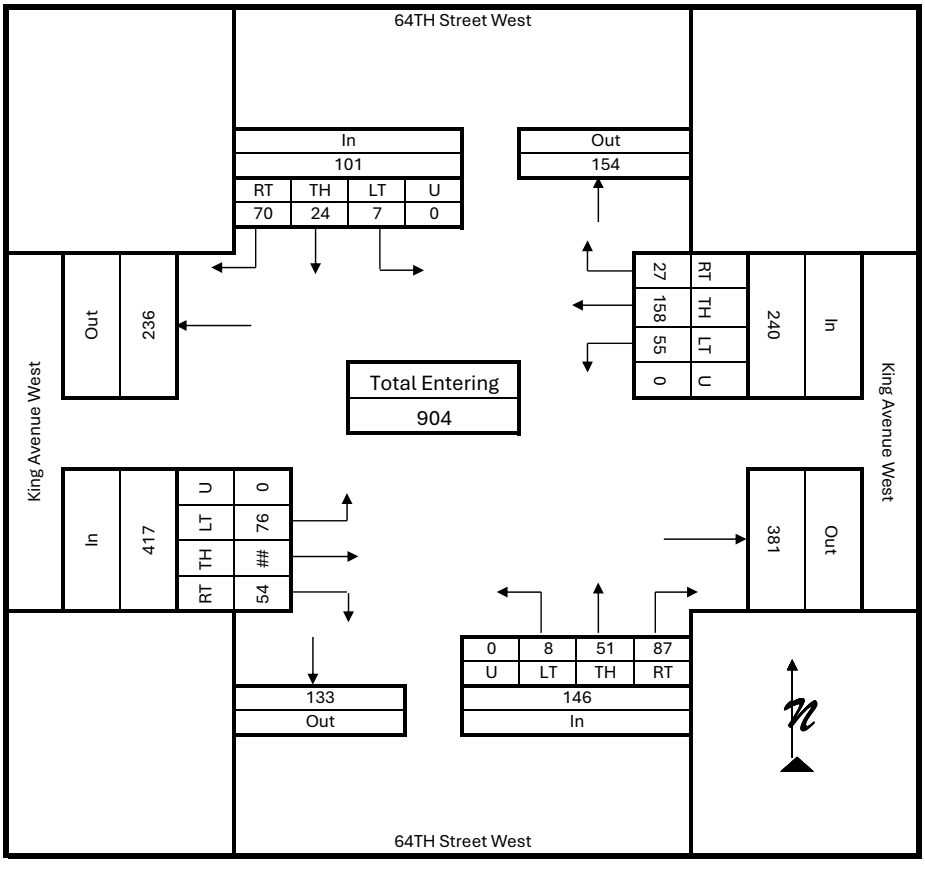
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	King Ave & 64TH ST West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64TH Street West	East/West Street:	King Avenue West

Vehicle Volumes and Adjustments

	64TH Street West Southbound					64TH Street West Northbound					King Avenue West Eastbound					King Avenue West 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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
7:15 AM	11	10	3	0	24	8	8	1	0	17	5	72	15	0	92	6	31	11	0	48	181
7:30 AM	21	5	0	0	26	17	5	0	0	22	21	80	25	0	126	4	39	18	0	61	235
7:45 AM	21	5	3	0	29	31	17	3	0	51	27	76	18	0	121	9	61	19	0	89	290
8:00 AM	17	4	1	0	22	31	21	4	0	56	1	59	18	0	78	8	27	7	0	42	198
Grand Total	70	24	7	0	101	87	51	8	0	146	54	287	76	0	417	27	158	55	0	240	904
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.3	0.0	0.0	1.2	0.0	0.0	1.8	0.0	0.4	
Heavy Truck %	0.0	0.0	14.3	0.0	1.0	1.1	3.9	0.0	0.0	2.1	0.0	3.1	6.6	0.0	3.4	0.0	1.9	1.8	0.0	1.7	
Total Truck %	0.0	0.0	14.3	0.0	1.0	1.1	3.9	0.0	0.0	2.1	7.4	3.5	6.6	0.0	4.6	0.0	1.9	3.6	0.0	2.1	
Total %	7.7	2.7	0.8	0.0	11.2	9.6	5.6	0.9	0.0	16.2	6.0	31.7	8.4	0.0	46.1	3.0	17.5	6.1	0.0	26.5	100.0
PHF	0.87	0.87	0.87			0.72	0.72	0.72			0.86	0.86	0.86			0.68	0.68	0.68			0.78



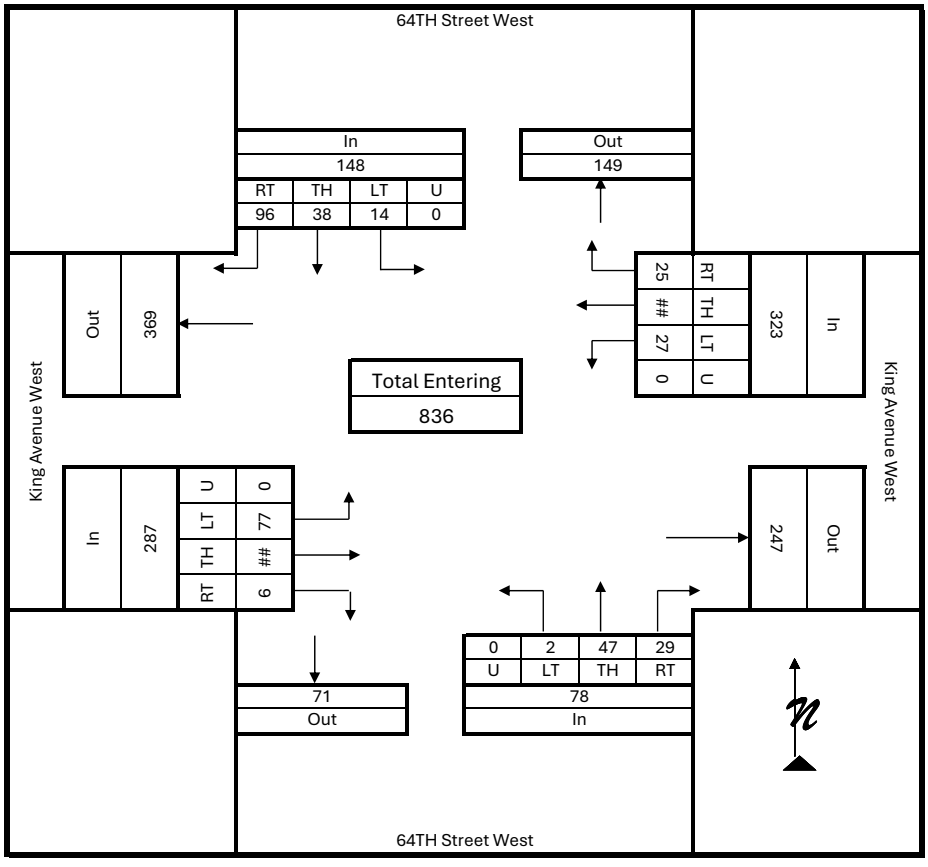
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	King Ave & 64TH ST West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	64TH Street West	East/West Street:	King Avenue West

Vehicle Volumes and Adjustments

	64TH Street West Southbound					64TH Street West Northbound					King Avenue West Eastbound					King Avenue West 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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
4:45 PM	23	10	3	0	36	7	15	1	0	23	3	49	19	0	71	7	67	10	0	84	214
5:00 PM	33	8	6	0	47	9	12	1	0	22	2	61	26	0	89	8	70	4	0	82	240
5:15 PM	18	12	4	0	34	6	10	0	0	16	1	59	13	0	73	4	92	10	0	106	229
5:30 PM	22	8	1	0	31	7	10	0	0	17	0	35	19	0	54	6	42	3	0	51	153
Grand Total	96	38	14	0	148	29	47	2	0	78	6	204	77	0	287	25	271	27	0	323	836
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	3.4	0.0	0.0	0.0	1.3	0.0	2.0	0.0	0.0	1.4	0.0	1.1	0.0	0.0	0.9	
Total Truck %	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	1.3	0.0	2.0	0.0	0.0	1.4	0.0	1.1	0.0	0.0	0.9	
Total %	11.5	4.5	1.7	0.0	17.7	3.5	5.6	0.2	0.0	9.3	0.7	24.4	9.2	0.0	34.3	3.0	32.4	3.2	0.0	38.6	100.0
PHF	0.79	0.79	0.79			0.89	0.89	0.89			0.81	0.81	0.81			0.99	0.99	0.99			0.87



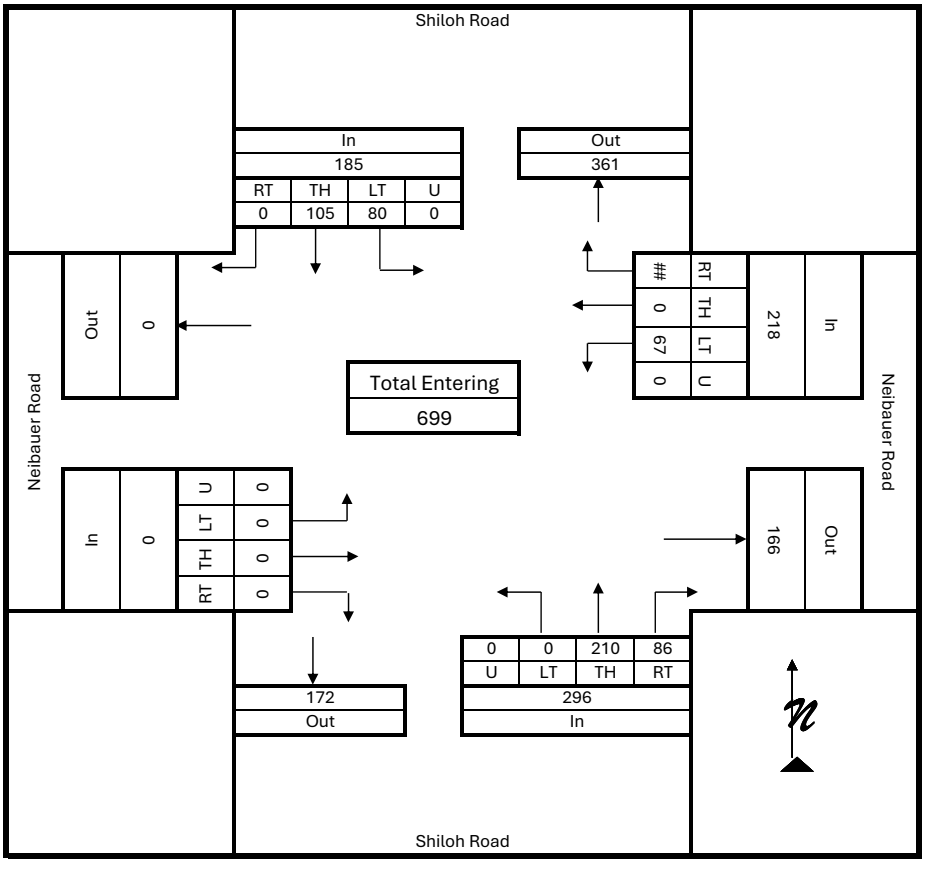
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Neibauer RD & Shiloh RD
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	Shiloh Road	East/West Street:	Neibauer Road

Vehicle Volumes and Adjustments

	Shiloh Road Southbound					Shiloh Road Northbound					Neibauer Road Eastbound					Neibauer 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	0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		
7:15 AM	0	23	22	0	45	14	47	0	0	61	0	0	0	0	0	27	0	12	0	39	145
7:30 AM	0	26	20	0	46	28	65	0	0	93	0	0	0	0	0	46	0	16	0	62	201
7:45 AM	0	29	20	0	49	30	51	0	0	81	0	0	0	0	0	46	0	19	0	65	195
8:00 AM	0	27	18	0	45	14	47	0	0	61	0	0	0	0	0	32	0	20	0	52	158
Grand Total	0	105	80	0	185	86	210	0	0	296	0	0	0	0	0	151	0	67	0	218	699
Medium Truck %	0.0	2.9	0.0	0.0	1.6	2.3	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.0	4.5	0.0	1.8	
Heavy Truck %	0.0	16.2	2.5	0.0	10.3	2.3	10.0	0.0	0.0	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	2.8	
Total Truck %	0.0	19.0	2.5	0.0	11.9	4.7	10.0	0.0	0.0	8.4	0.0	0.0	0.0	0.0	0.0	0.7	0.0	13.4	0.0	4.6	
Total %	0.0	15.0	11.4	0.0	26.5	12.3	30.0	0.0	0.0	42.3	0.0	0.0	0.0	0.0	0.0	21.6	0.0	9.6	0.0	31.2	100.0
PHF	1.00	1.00	1.00			0.80	0.80	0.80			1.00	1.00	1.00			0.88	0.88	0.88			0.87



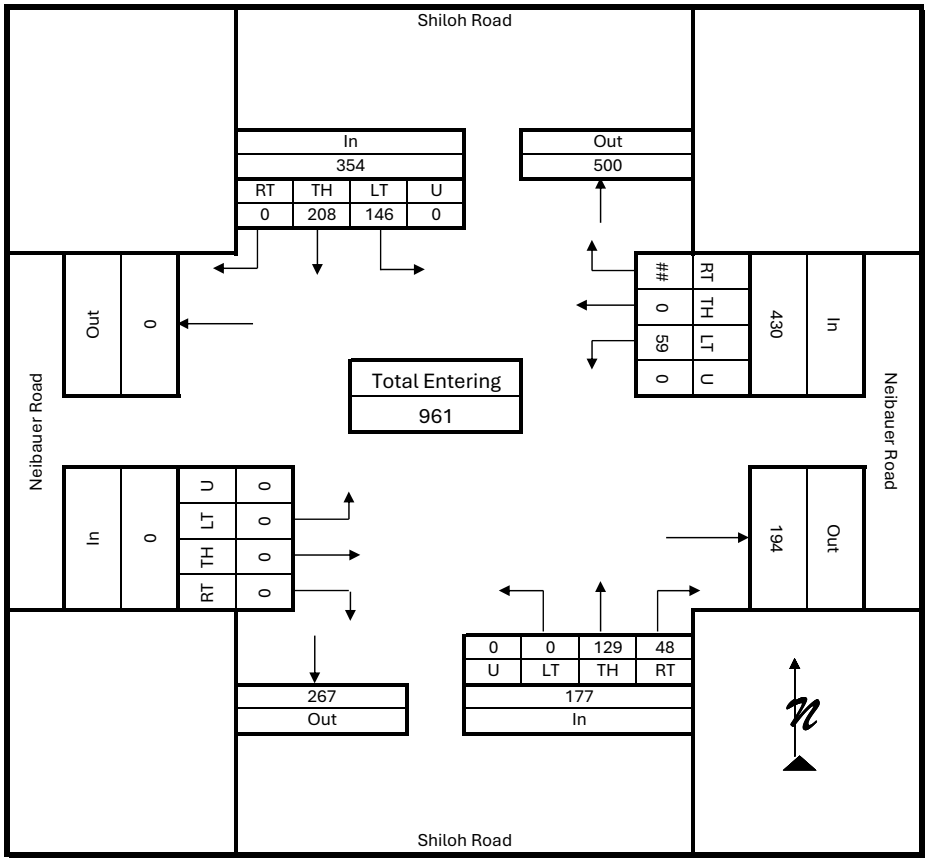
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Neibauer RD & Shiloh RD
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	Shiloh Road	East/West Street:	Neibauer Road

Vehicle Volumes and Adjustments

	Shiloh Road Southbound					Shiloh Road Northbound					Neibauer Road Eastbound					Neibauer 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	0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		
4:45 PM	0	45	29	0	74	11	42	0	0	53	0	0	0	0	0	143	0	11	0	154	281
5:00 PM	0	45	45	0	90	11	32	0	0	43	0	0	0	0	0	115	0	16	0	131	264
5:15 PM	0	61	46	0	107	16	29	0	0	45	0	0	0	0	0	74	0	20	0	94	246
5:30 PM	0	57	26	0	83	10	26	0	0	36	0	0	0	0	0	39	0	12	0	51	170
Grand Total	0	208	146	0	354	48	129	0	0	177	0	0	0	0	0	371	0	59	0	430	961
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.5	0.0	0.0	0.3	0.0	3.9	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	1.6	0.0	1.7	0.0	1.6	
Total Truck %	0.0	0.5	0.0	0.0	0.3	0.0	5.4	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	1.7	0.0	1.6	
Total %	0.0	21.6	15.2	0.0	36.8	5.0	13.4	0.0	0.0	18.4	0.0	0.0	0.0	0.0	0.0	38.6	0.0	6.1	0.0	44.7	100.0
PHF	1.00	1.00	1.00			0.83	0.83	0.83			1.00	1.00	1.00			0.70	0.70	0.70			0.85



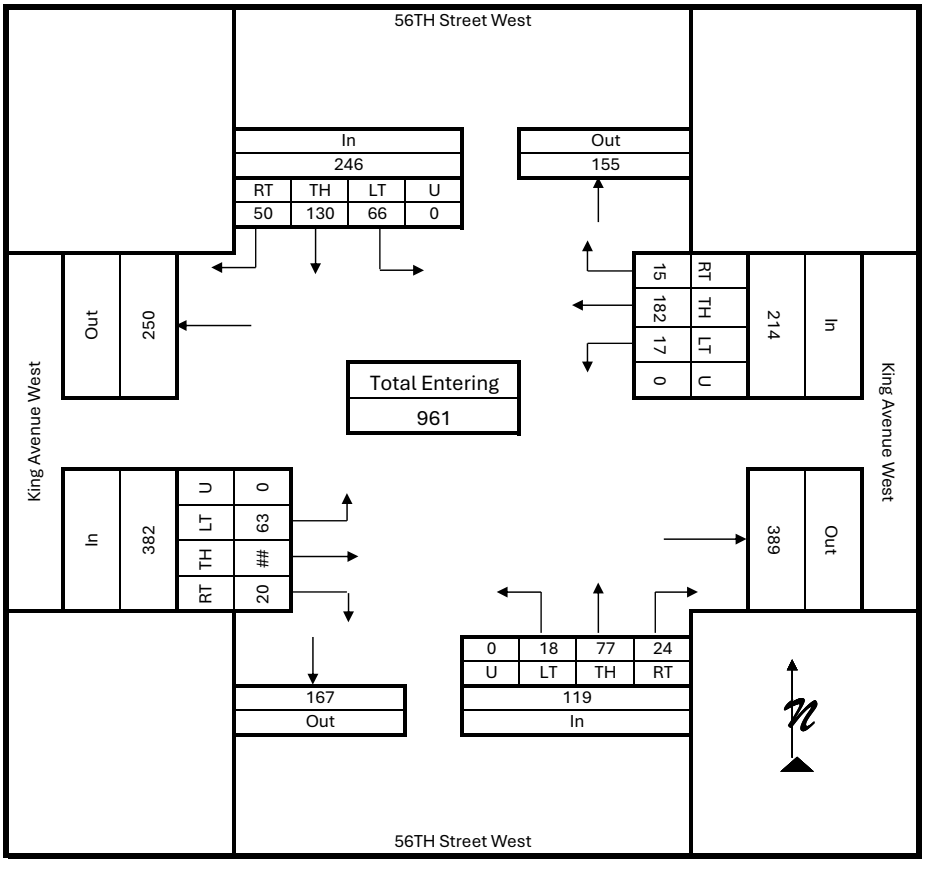
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	King Ave & 56TH ST West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56TH Street West	East/West Street:	King Avenue West

Vehicle Volumes and Adjustments

	56TH Street West Southbound					56TH Street West Northbound					King Avenue West Eastbound					King Avenue West 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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
7:15 AM	8	26	14	0	48	5	14	3	0	22	2	72	10	0	84	3	43	3	0	49	203
7:30 AM	14	30	17	0	61	5	15	7	0	27	10	67	19	0	96	4	41	5	0	50	234
7:45 AM	17	42	19	0	78	8	21	8	0	37	7	85	23	0	115	1	64	4	0	69	299
8:00 AM	11	32	16	0	59	6	27	0	0	33	1	75	11	0	87	7	34	5	0	46	225
Grand Total	50	130	66	0	246	24	77	18	0	119	20	299	63	0	382	15	182	17	0	214	961
Medium Truck %	0.0	0.0	1.5	0.0	0.4	0.0	2.6	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	
Heavy Truck %	0.0	0.8	1.5	0.0	0.8	4.2	1.3	0.0	0.0	1.7	10.0	1.3	6.3	0.0	2.6	20.0	2.2	5.9	0.0	3.7	
Total Truck %	0.0	0.8	3.0	0.0	1.2	4.2	3.9	0.0	0.0	3.4	10.0	1.3	6.3	0.0	2.6	20.0	2.7	5.9	0.0	4.2	
Total %	5.2	13.5	6.9	0.0	25.6	2.5	8.0	1.9	0.0	12.4	2.1	31.1	6.6	0.0	39.8	1.6	18.9	1.8	0.0	22.3	100.0
PHF	0.79	0.79	0.79			0.80	0.80	0.80			0.83	0.83	0.83			0.78	0.78	0.78			0.80



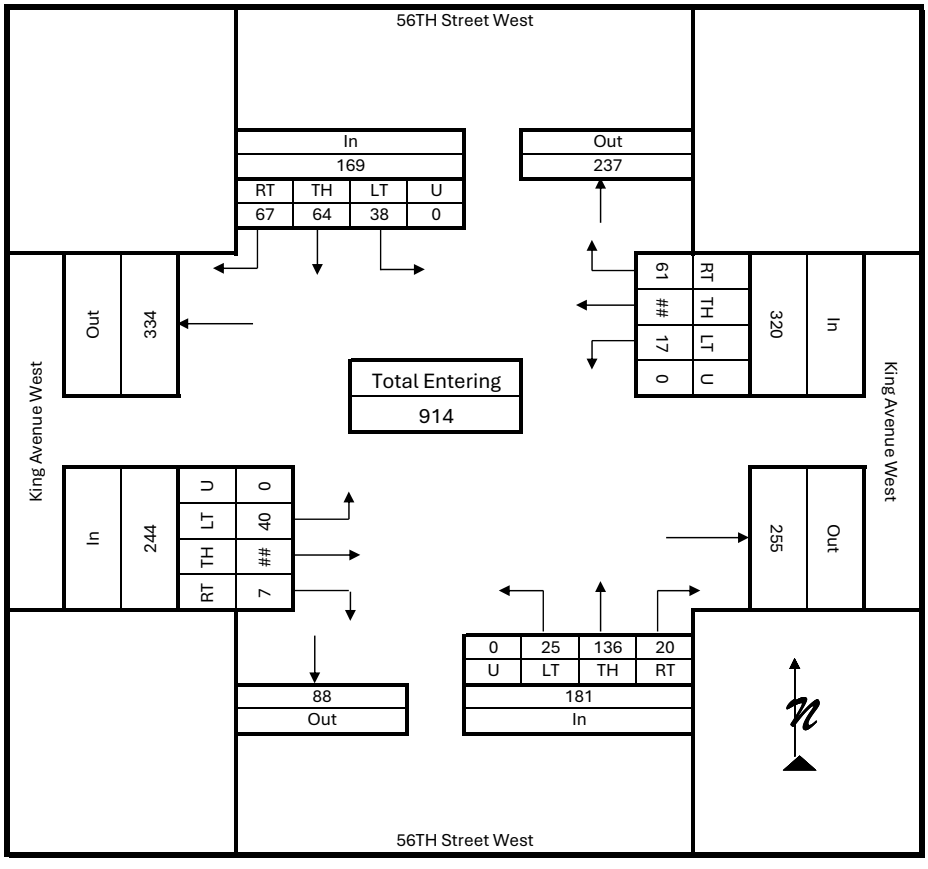
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	King Ave & 56TH ST West
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56TH Street West	East/West Street:	King Avenue West

Vehicle Volumes and Adjustments

	56TH Street West Southbound					56TH Street West Northbound					King Avenue West Eastbound					King Avenue West 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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
4:45 PM	15	16	10	0	41	7	21	3	0	31	1	46	14	0	61	11	63	4	0	78	211
5:00 PM	21	18	9	0	48	3	46	8	0	57	2	62	9	0	73	18	61	8	0	87	265
5:15 PM	21	18	11	0	50	3	40	11	0	54	1	58	8	0	67	20	69	4	0	93	264
5:30 PM	10	12	8	0	30	7	29	3	0	39	3	31	9	0	43	12	49	1	0	62	174
Grand Total	67	64	38	0	169	20	136	25	0	181	7	197	40	0	244	61	242	17	0	320	914
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	5.0	0.0	0.0	0.0	0.6	14.3	1.5	0.0	0.0	1.6	0.0	1.2	0.0	0.0	0.9	
Total Truck %	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.6	14.3	1.5	0.0	0.0	1.6	0.0	1.2	0.0	0.0	0.9	
Total %	7.3	7.0	4.2	0.0	18.5	2.2	14.9	2.7	0.0	19.8	0.8	21.6	4.4	0.0	26.7	6.7	26.5	1.9	0.0	35.0	100.0
PHF	0.88	0.88	0.88			0.79	0.79	0.79			0.84	0.84	0.84			0.92	0.92	0.92			0.86



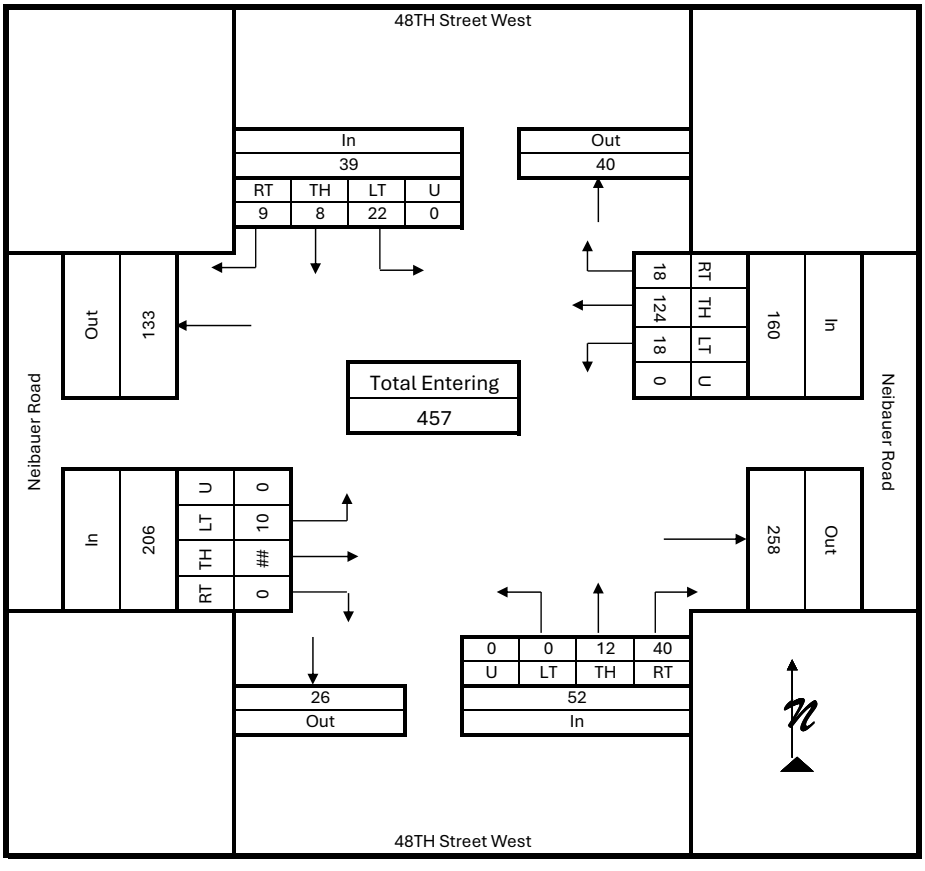
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Neibauer RD & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	Neibauer Road

Vehicle Volumes and Adjustments

	48TH Street West Southbound					48TH Street West Northbound					Neibauer Road Eastbound					Neibauer 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	0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		
7:15 AM	2	1	5	0	8	10	3	0	0	13	0	39	3	0	42	5	24	4	0	33	96
7:30 AM	2	3	5	0	10	10	5	0	0	15	0	67	1	0	68	6	31	3	0	40	133
7:45 AM	3	4	5	0	12	13	3	0	0	16	0	48	3	0	51	4	41	4	0	49	128
8:00 AM	2	0	7	0	9	7	1	0	0	8	0	42	3	0	45	3	28	7	0	38	100
Grand Total	9	8	22	0	39	40	12	0	0	52	0	196	10	0	206	18	124	18	0	160	457
Medium Truck %	0.0	12.5	0.0	0.0	2.6	2.5	0.0	0.0	0.0	1.9	0.0	1.0	0.0	0.0	1.0	5.6	4.0	0.0	0.0	3.8	
Heavy Truck %	0.0	0.0	4.5	0.0	2.6	2.5	0.0	0.0	0.0	1.9	0.0	11.2	0.0	0.0	10.7	0.0	16.1	0.0	0.0	12.5	
Total Truck %	0.0	12.5	4.5	0.0	5.1	5.0	0.0	0.0	0.0	3.8	0.0	12.2	0.0	0.0	11.7	5.6	20.2	0.0	0.0	16.3	
Total %	2.0	1.8	4.8	0.0	8.5	8.8	2.6	0.0	0.0	11.4	0.0	42.9	2.2	0.0	45.1	3.9	27.1	3.9	0.0	35.0	100.0
PHF	0.98	0.98	0.98			0.84	0.84	0.84			0.75	0.75	0.75			0.99	0.99	0.99			0.85



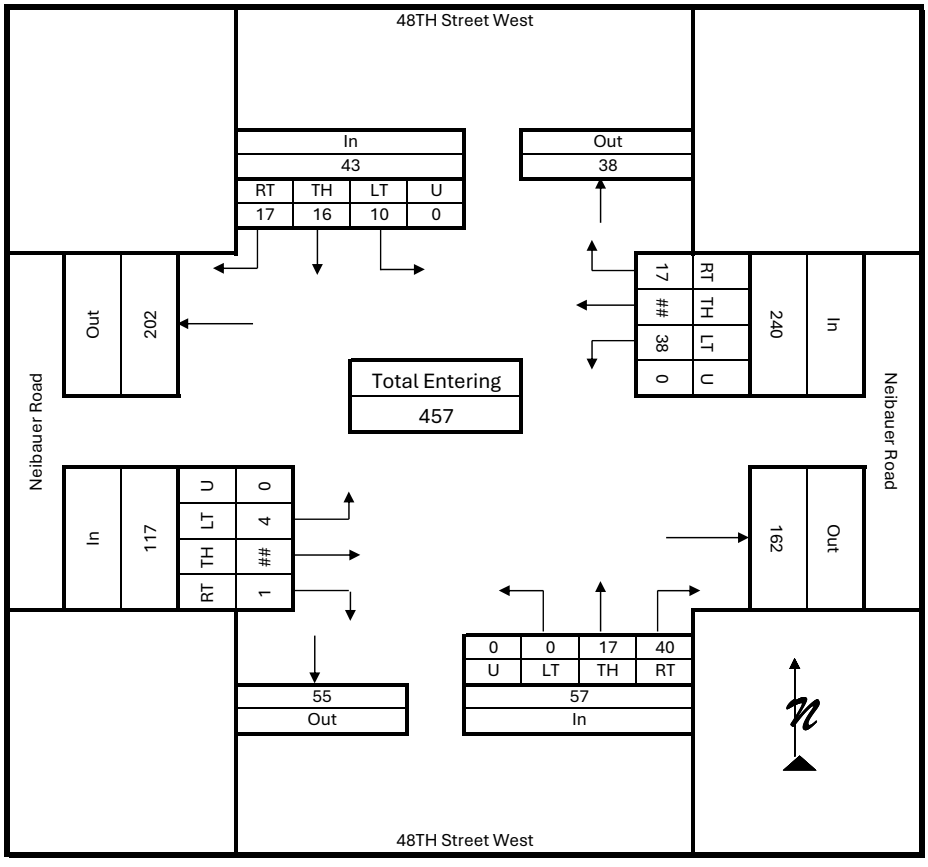
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Neibauer RD & 48TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	48TH Street West	East/West Street:	Neibauer Road

Vehicle Volumes and Adjustments

	48TH Street West Southbound					48TH Street West Northbound					Neibauer Road Eastbound					Neibauer 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	0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		
4:45 PM	4	1	3	0	8	10	3	0	0	13	0	36	1	0	37	5	36	7	0	48	106
5:00 PM	6	4	1	0	11	8	6	0	0	14	0	30	1	0	31	3	39	10	0	52	108
5:15 PM	6	6	3	0	15	10	4	0	0	14	1	23	1	0	25	6	61	9	0	76	130
5:30 PM	1	5	3	0	9	12	4	0	0	16	0	23	1	0	24	3	49	12	0	64	113
Grand Total	17	16	10	0	43	40	17	0	0	57	1	112	4	0	117	17	185	38	0	240	457
Medium Truck %	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	1.8	0.0	0.9	0.0	0.0	0.9	0.0	0.5	0.0	0.0	0.4	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	1.8	0.0	5.4	0.0	0.0	5.1	0.0	0.0	2.6	0.0	0.4	
Total Truck %	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	3.5	0.0	6.3	0.0	0.0	6.0	0.0	0.5	2.6	0.0	0.8	
Total %	3.7	3.5	2.2	0.0	9.4	8.8	3.7	0.0	0.0	12.5	0.2	24.5	0.9	0.0	25.6	3.7	40.5	8.3	0.0	52.5	100.0
PHF	0.72	0.72	0.72			1.00	1.00	1.00			1.00	1.00	1.00			0.80	0.80	0.80			0.89



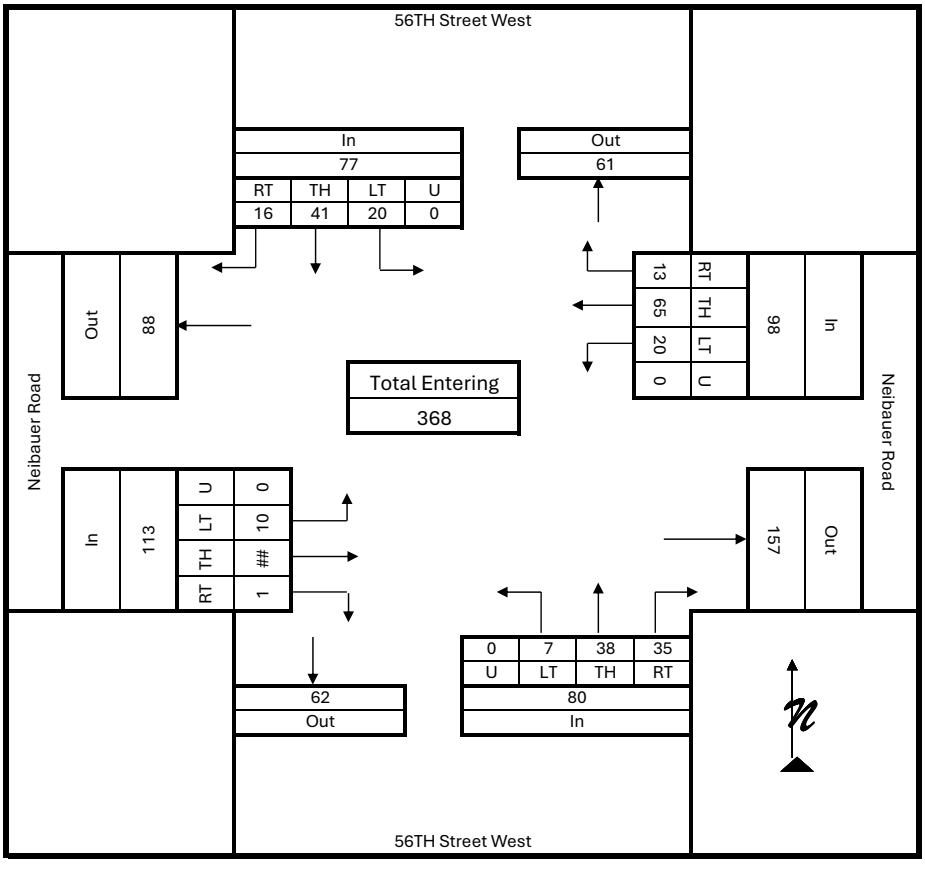
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Neibauer RD & 56TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56TH Street West	East/West Street:	Neibauer Road

Vehicle Volumes and Adjustments

	56TH Street West Southbound					56TH Street West Northbound					Neibauer Road Eastbound					Neibauer 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	0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		
7:15 AM	3	8	1	0	12	13	6	1	0	20	0	20	1	0	21	3	10	5	0	18	71
7:30 AM	7	13	6	0	26	11	11	1	0	23	0	29	1	0	30	4	16	6	0	26	105
7:45 AM	4	13	6	0	23	6	11	2	0	19	0	26	5	0	31	5	26	3	0	34	107
8:00 AM	2	7	7	0	16	5	10	3	0	18	1	27	3	0	31	1	13	6	0	20	85
Grand Total	16	41	20	0	77	35	38	7	0	80	1	102	10	0	113	13	65	20	0	98	368
Medium Truck %	6.3	0.0	0.0	0.0	1.3	0.0	0.0	14.3	0.0	1.3	0.0	1.0	0.0	0.0	0.9	0.0	4.6	0.0	0.0	3.1	
Heavy Truck %	0.0	31.7	5.0	0.0	18.2	34.3	18.4	14.3	0.0	25.0	0.0	9.8	0.0	0.0	8.8	23.1	10.8	60.0	0.0	22.4	
Total Truck %	6.3	31.7	5.0	0.0	19.5	34.3	18.4	28.6	0.0	26.3	0.0	10.8	0.0	0.0	9.7	23.1	15.4	60.0	0.0	25.5	
Total %	4.3	11.1	5.4	0.0	20.9	9.5	10.3	1.9	0.0	21.7	0.3	27.7	2.7	0.0	30.7	3.5	17.7	5.4	0.0	26.6	100.0
PHF	0.73	0.73	0.73			0.85	0.85	0.85			0.92	0.92	0.92			0.94	0.94	0.94			0.86



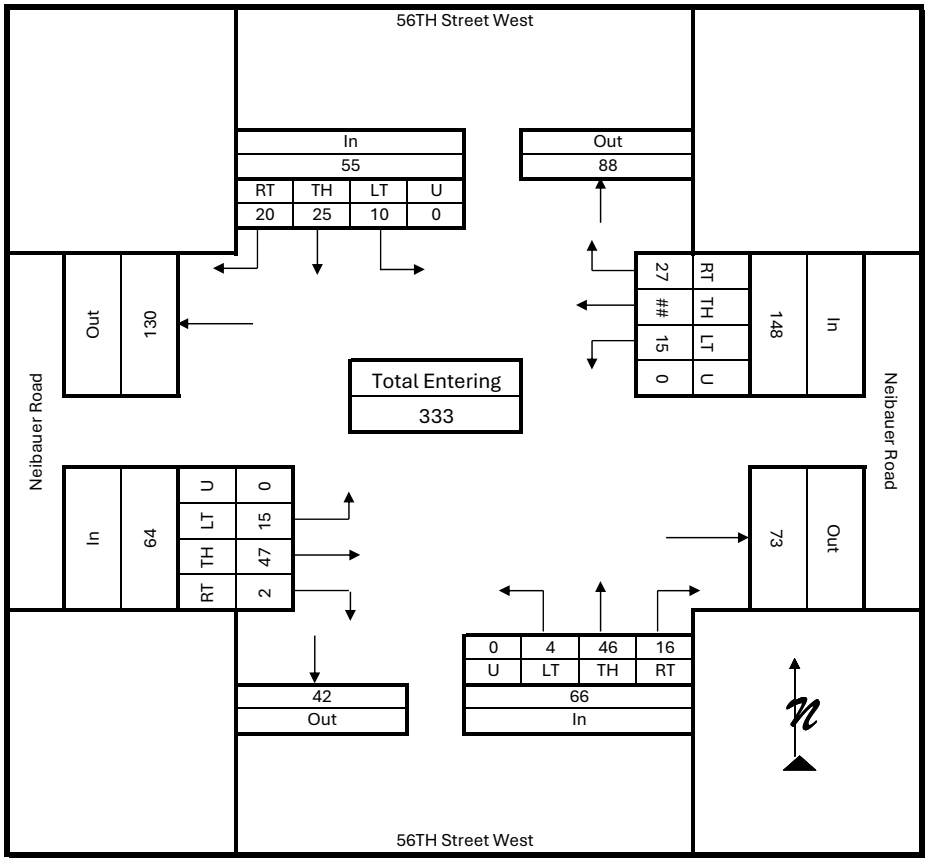
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Neibauer RD & 56TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, September 12, 2023	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	56TH Street West	East/West Street:	Neibauer Road

Vehicle Volumes and Adjustments

	56TH Street West Southbound					56TH Street West Northbound					Neibauer Road Eastbound					Neibauer 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	0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		0.95	0.95	0.95	0.95		
4:45 PM	2	7	3	0	12	3	10	3	0	16	0	16	2	0	18	6	23	3	0	32	78
5:00 PM	4	7	1	0	12	5	15	0	0	20	0	14	5	0	19	3	22	3	0	28	79
5:15 PM	8	4	4	0	16	5	8	1	0	14	1	7	3	0	11	7	38	5	0	50	91
5:30 PM	6	7	2	0	15	3	13	0	0	16	1	10	5	0	16	11	23	4	0	38	85
Grand Total	20	25	10	0	55	16	46	4	0	66	2	47	15	0	64	27	106	15	0	148	333
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 %	5.0	0.0	0.0	0.0	1.8	18.8	4.3	0.0	0.0	7.6	0.0	4.3	0.0	0.0	3.1	3.7	0.0	0.0	0.0	0.7	
Total Truck %	5.0	0.0	0.0	0.0	1.8	18.8	4.3	0.0	0.0	7.6	0.0	4.3	0.0	0.0	3.1	3.7	0.0	0.0	0.0	0.7	
Total %	6.0	7.5	3.0	0.0	16.5	4.8	13.8	1.2	0.0	19.8	0.6	14.1	4.5	0.0	19.2	8.1	31.8	4.5	0.0	44.4	100.0
PHF	0.86	0.86	0.86			1.00	1.00	1.00			1.00	1.00	1.00			0.74	0.74	0.74			0.92



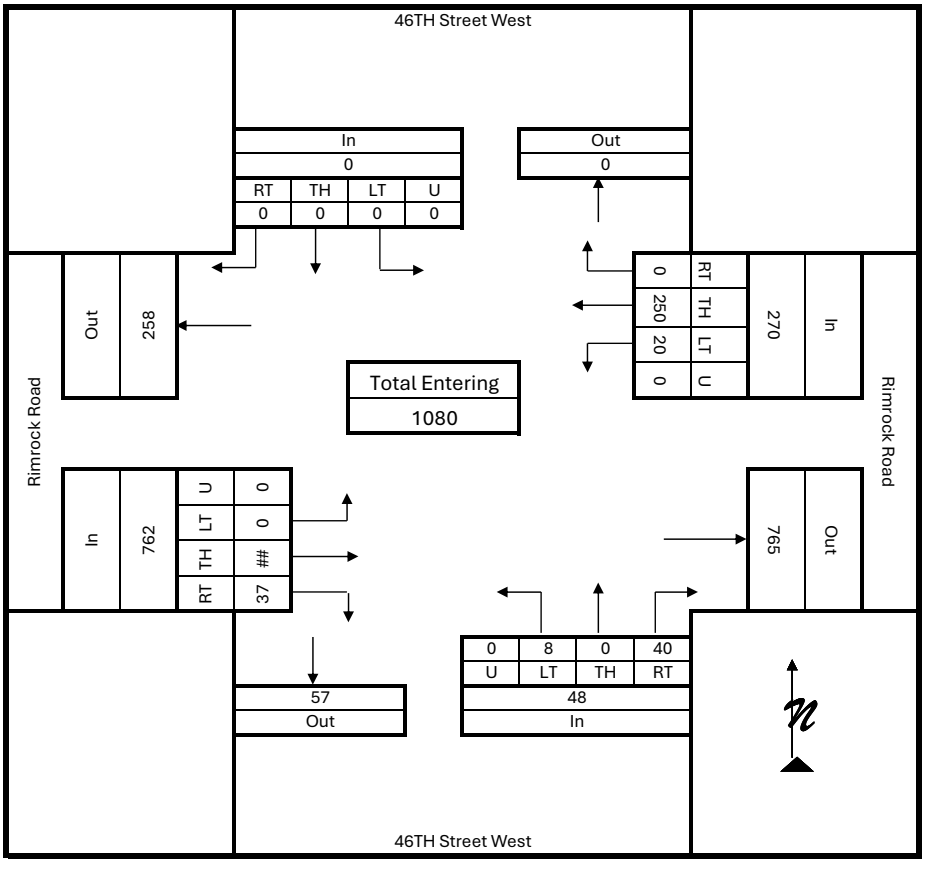
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 46TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	46TH Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	46TH Street West Southbound					46TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	0	0	0	0	7	0	1	0	8	1	183	0	0	184	0	41	3	0	44	236
7:30 AM	0	0	0	0	0	10	0	2	0	12	4	212	0	0	216	0	63	3	0	66	294
7:45 AM	0	0	0	0	0	14	0	4	0	18	18	157	0	0	175	0	70	6	0	76	269
8:00 AM	0	0	0	0	0	9	0	1	0	10	14	173	0	0	187	0	76	8	0	84	281
Grand Total	0	0	0	0	0	40	0	8	0	48	37	725	0	0	762	0	250	20	0	270	1080
Medium Truck %	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.1	2.7	1.5	0.0	0.0	1.6	0.0	2.0	0.0	0.0	1.9	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	1.2	0.0	0.0	1.1	
Total Truck %	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.1	2.7	1.7	0.0	0.0	1.7	0.0	3.2	0.0	0.0	3.0	
Total %	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.7	0.0	4.4	3.4	67.1	0.0	0.0	70.6	0.0	23.1	1.9	0.0	25.0	100.0
PHF	1.00	1.00	1.00			0.98	0.98	0.98			0.88	0.88	0.88			1.00	1.00	1.00			0.91



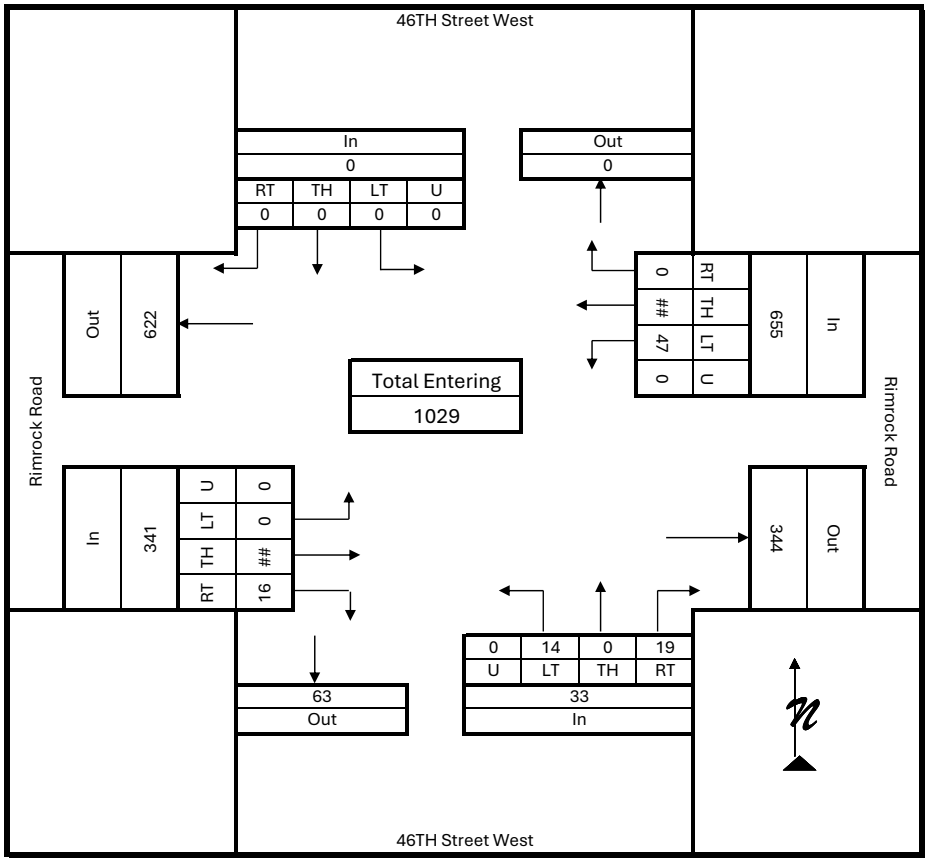
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 46TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	46TH Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	46TH Street West Southbound					46TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	0	0	0	0	0	3	0	4	0	7	3	76	0	0	79	0	148	8	0	156	242
5:00 PM	0	0	0	0	0	8	0	3	0	11	6	85	0	0	91	0	132	7	0	139	241
5:15 PM	0	0	0	0	0	3	0	3	0	6	6	83	0	0	89	0	168	22	0	190	285
5:30 PM	0	0	0	0	0	5	0	4	0	9	1	81	0	0	82	0	160	10	0	170	261
Grand Total	0	0	0	0	0	19	0	14	0	33	16	325	0	0	341	0	608	47	0	655	1029
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	5.3	0.0	0.0	0.0	3.0	0.0	1.2	0.0	0.0	1.2	0.0	0.2	0.0	0.0	0.2	
Total Truck %	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	3.0	0.0	1.2	0.0	0.0	1.2	0.0	0.2	0.0	0.0	0.2	
Total %	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.4	0.0	3.2	1.6	31.6	0.0	0.0	33.1	0.0	59.1	4.6	0.0	63.7	100.0
PHF	1.00	1.00	1.00			1.00	1.00	1.00			0.96	0.96	0.96			0.86	0.86	0.86			0.90



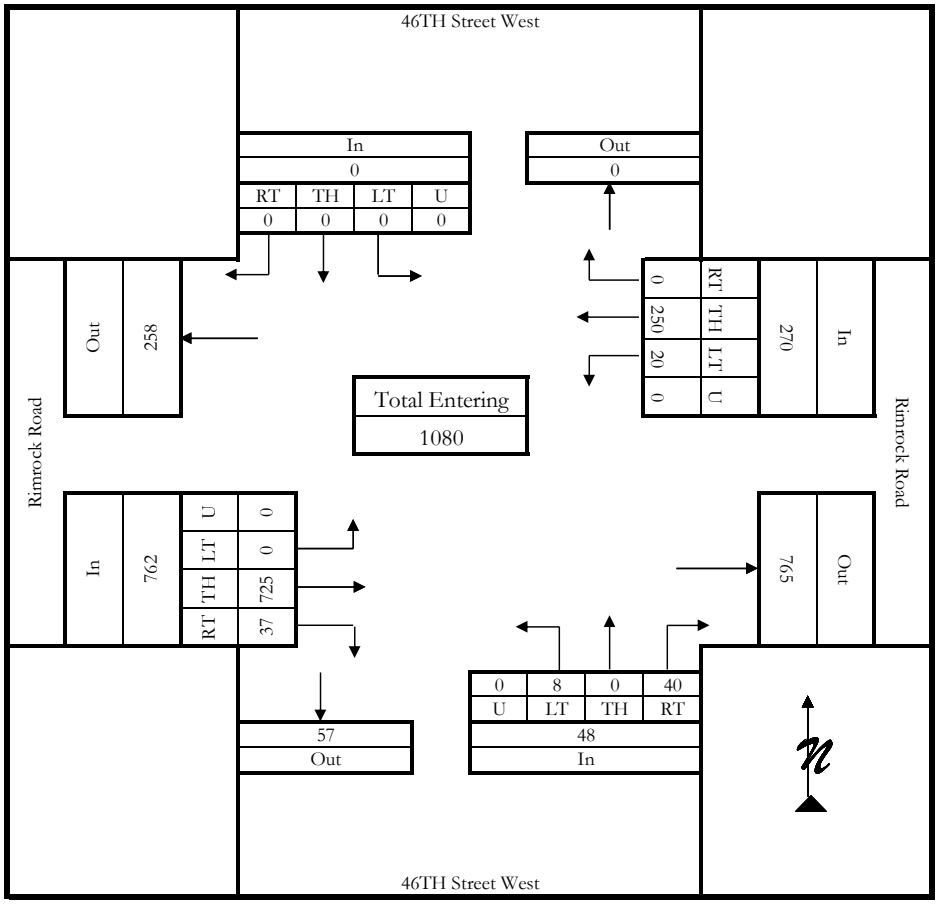
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 46TH ST West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	46TH Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	46TH Street West Southbound					46TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	0	0	0	0	7	0	1	0	8	1	183	0	0	184	0	41	3	0	44	236
7:30 AM	0	0	0	0	0	10	0	2	0	12	4	212	0	0	216	0	63	3	0	66	294
7:45 AM	0	0	0	0	0	14	0	4	0	18	18	157	0	0	175	0	70	6	0	76	269
8:00 AM	0	0	0	0	0	9	0	1	0	10	14	173	0	0	187	0	76	8	0	84	281
Grand Total	0	0	0	0	0	40	0	8	0	48	37	725	0	0	762	0	250	20	0	270	1080
Medium Truck %	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.1	2.7	1.5	0.0	0.0	1.6	0.0	2.0	0.0	0.0	1.9	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	1.2	0.0	0.0	1.1	
Total Truck %	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.1	2.7	1.7	0.0	0.0	1.7	0.0	3.2	0.0	0.0	3.0	
Total %	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.7	0.0	4.4	3.4	67.1	0.0	0.0	70.6	0.0	23.1	1.9	0.0	25.0	100.0
PHF	1.00	1.00	1.00			0.98	0.98	0.98			0.88	0.88	0.88			1.00	1.00	1.00			0.91



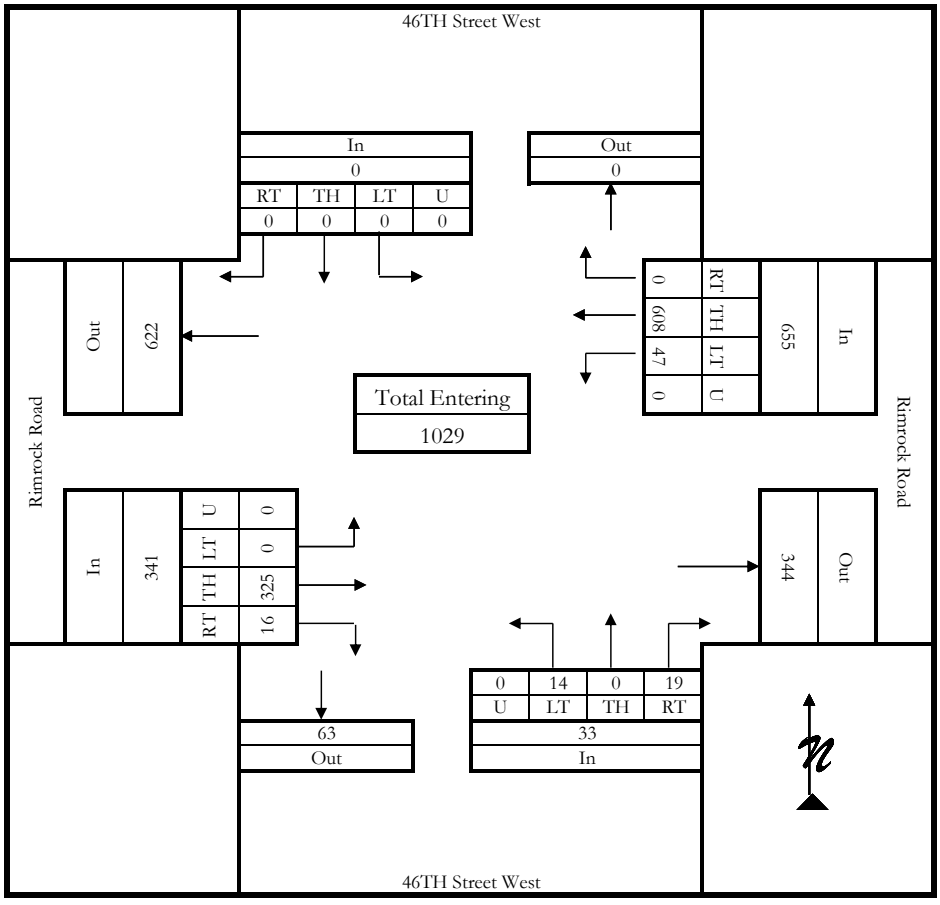
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 46TH ST West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	46TH Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	46TH Street West Southbound					46TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	0	0	0	0	0	3	0	4	0	7	3	76	0	0	79	0	148	8	0	156	242
5:00 PM	0	0	0	0	0	8	0	3	0	11	6	85	0	0	91	0	132	7	0	139	241
5:15 PM	0	0	0	0	0	3	0	3	0	6	6	83	0	0	89	0	168	22	0	190	285
5:30 PM	0	0	0	0	0	5	0	4	0	9	1	81	0	0	82	0	160	10	0	170	261
Grand Total	0	0	0	0	0	19	0	14	0	33	16	325	0	0	341	0	608	47	0	655	1029
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	5.3	0.0	0.0	0.0	3.0	0.0	1.2	0.0	0.0	1.2	0.0	0.2	0.0	0.0	0.2	
Total Truck %	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	3.0	0.0	1.2	0.0	0.0	1.2	0.0	0.2	0.0	0.0	0.2	
Total %	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.4	0.0	3.2	1.6	31.6	0.0	0.0	33.1	0.0	59.1	4.6	0.0	63.7	100.0
PHF	1.00	1.00	1.00			1.00	1.00	1.00			0.96	0.96	0.96			0.86	0.86	0.86			0.90



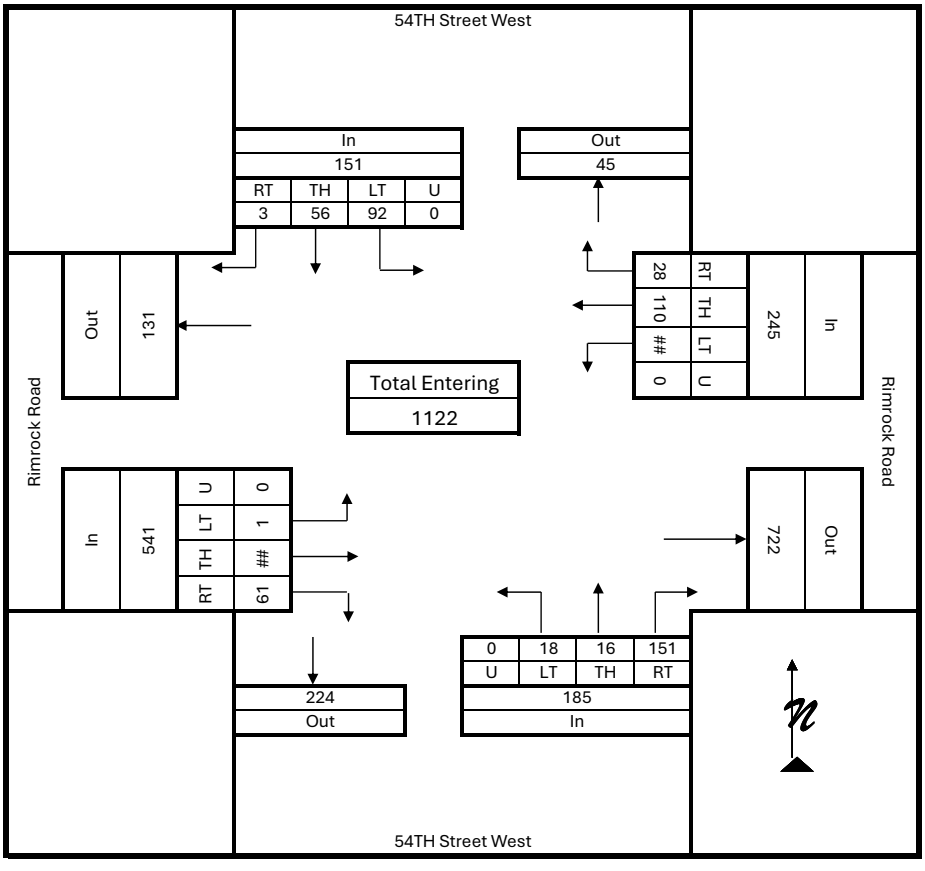
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 54TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	11	22	0	33	28	1	2	0	31	16	134	1	0	151	7	10	18	0	35	250
7:30 AM	1	15	25	0	41	41	1	3	0	45	16	147	0	0	163	7	23	32	0	62	311
7:45 AM	1	23	24	0	48	47	8	4	0	59	18	119	0	0	137	5	33	37	0	75	319
8:00 AM	1	7	21	0	29	35	6	9	0	50	11	79	0	0	90	9	44	20	0	73	242
Grand Total	3	56	92	0	151	151	16	18	0	185	61	479	1	0	541	28	110	107	0	245	1122
Medium Truck %	0.0	0.0	3.3	0.0	2.0	0.7	0.0	0.0	0.0	0.5	0.0	1.9	100.0	0.0	1.8	3.6	2.7	0.0	0.0	1.6	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.5	0.0	0.2	0.0	0.0	0.2	7.1	0.9	1.9	0.0	2.0	
Total Truck %	0.0	0.0	3.3	0.0	2.0	0.7	0.0	5.6	0.0	1.1	0.0	2.1	100.0	0.0	2.0	10.7	3.6	1.9	0.0	3.7	
Total %	0.3	5.0	8.2	0.0	13.5	13.5	1.4	1.6	0.0	16.5	5.4	42.7	0.1	0.0	48.2	2.5	9.8	9.5	0.0	21.8	100.0
PHF	0.79	0.79	0.79			0.79	0.79	0.79			0.99	0.99	0.99			0.81	0.81	0.81			0.88



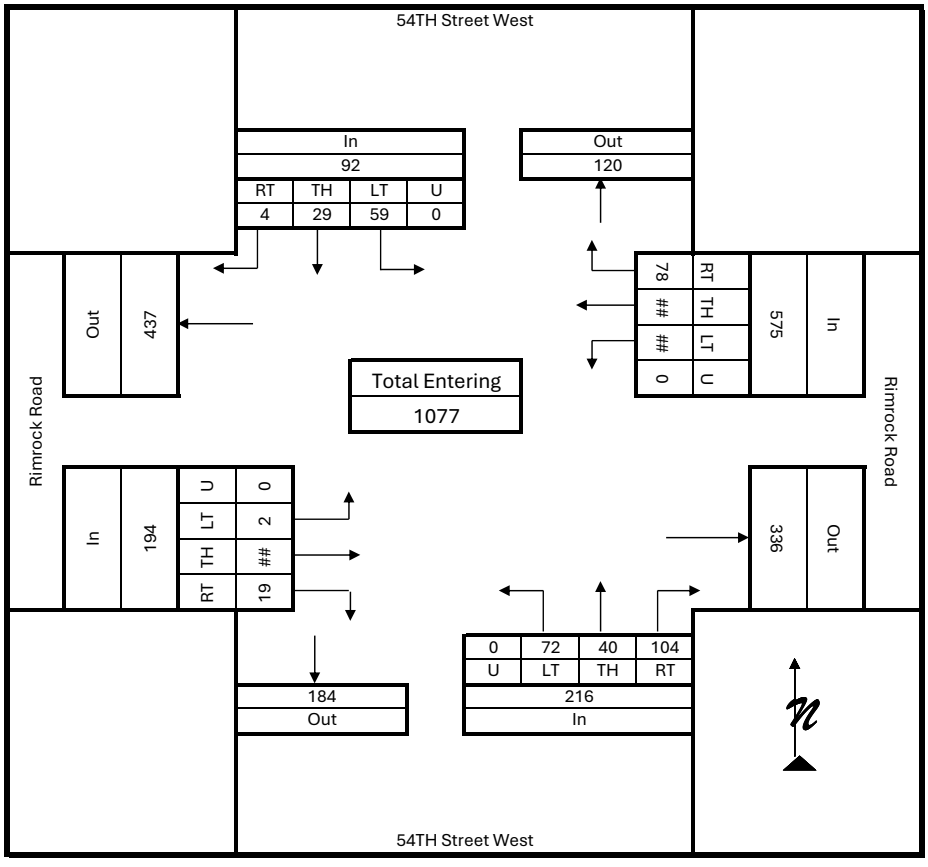
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 54TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	1	10	15	0	26	19	5	22	0	46	4	50	1	0	55	23	79	35	0	137	264
5:00 PM	0	7	11	0	18	26	12	17	0	55	8	46	1	0	55	19	85	30	0	134	262
5:15 PM	2	2	12	0	16	31	14	17	0	62	6	40	0	0	46	12	104	36	0	152	276
5:30 PM	1	10	21	0	32	28	9	16	0	53	1	37	0	0	38	24	93	35	0	152	275
Grand Total	4	29	59	0	92	104	40	72	0	216	19	173	2	0	194	78	361	136	0	575	1077
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	3.4	0.0	2.2	2.9	0.0	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	0.0	3.4	0.0	2.2	2.9	0.0	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 %	0.4	2.7	5.5	0.0	8.5	9.7	3.7	6.7	0.0	20.1	1.8	16.1	0.2	0.0	18.0	7.2	33.5	12.6	0.0	53.4	100.0
PHF	1.00	1.00	1.00			0.88	0.88	0.88			1.00	1.00	1.00			0.94	0.94	0.94			0.98



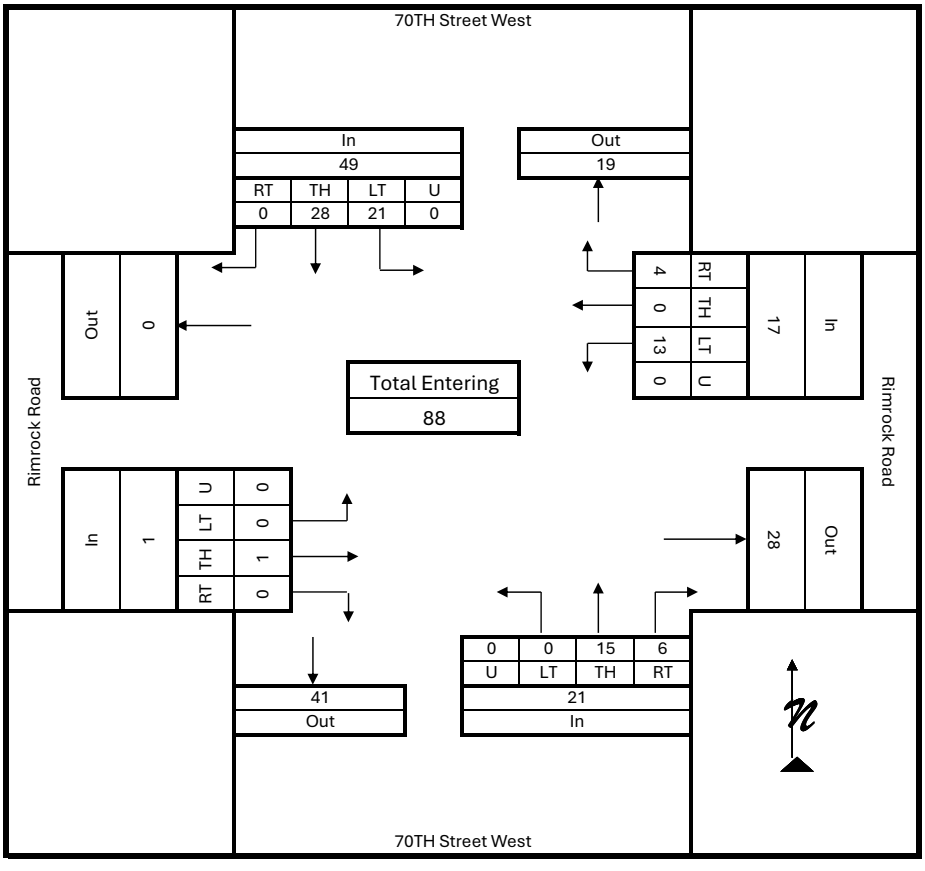
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 70TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	70TH Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	70TH Street West Southbound					70TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	6	5	0	11	0	2	0	0	2	0	0	0	0	0	0	0	2	0	2	15
7:30 AM	0	11	7	0	18	2	3	0	0	5	0	1	0	0	1	1	0	8	0	9	33
7:45 AM	0	6	5	0	11	3	4	0	0	7	0	0	0	0	0	2	0	2	0	4	22
8:00 AM	0	5	4	0	9	1	6	0	0	7	0	0	0	0	0	1	0	1	0	2	18
Grand Total	0	28	21	0	49	6	15	0	0	21	0	1	0	0	1	4	0	13	0	17	88
Medium Truck %	0.0	3.6	0.0	0.0	2.0	16.7	6.7	0.0	0.0	9.5	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	6.7	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	5.9	
Total Truck %	0.0	3.6	0.0	0.0	2.0	16.7	13.3	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	5.9	
Total %	0.0	31.8	23.9	0.0	55.7	6.8	17.0	0.0	0.0	23.9	0.0	1.1	0.0	0.0	1.1	4.5	0.0	14.8	0.0	19.3	100.0
PHF	0.68	0.68	0.68			1.00	1.00	1.00			0.25	0.25	0.25			0.47	0.47	0.47			0.67



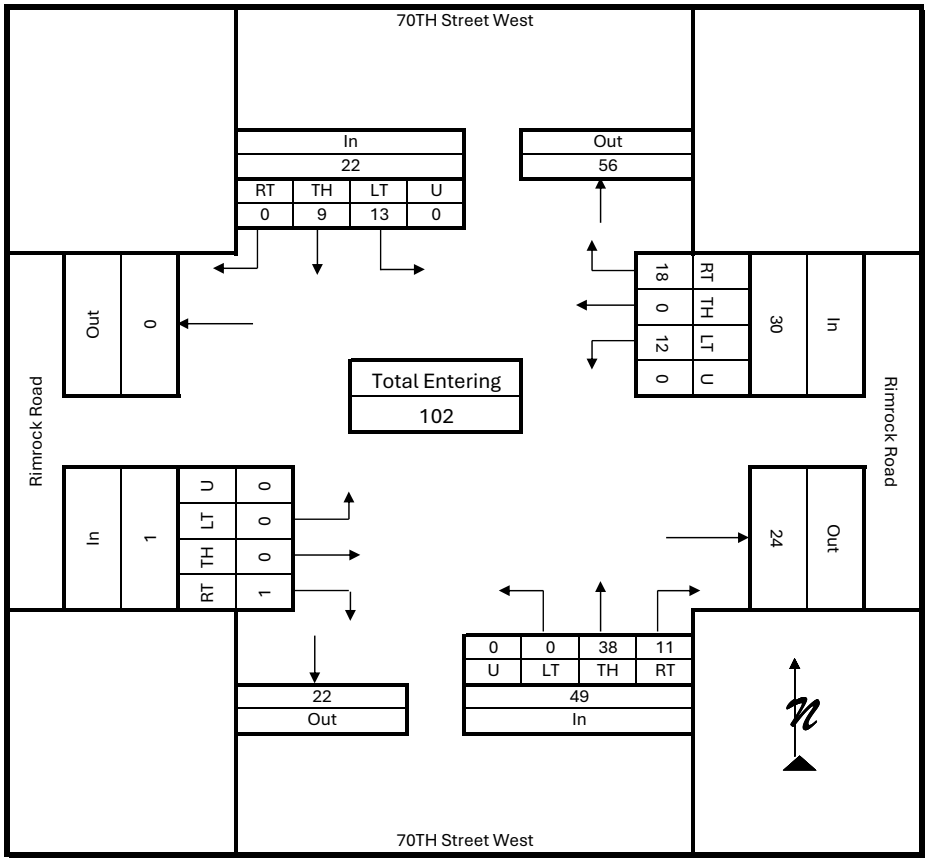
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 70TH ST West
Agency/Company:	Sanbell		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
North/South Street:	70TH Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	70TH Street West Southbound					70TH 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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	0	2	3	0	5	5	5	0	0	10	1	0	0	0	1	3	0	4	0	7	23
5:00 PM	0	2	2	0	4	2	8	0	0	10	0	0	0	0	0	2	0	1	0	3	17
5:15 PM	0	3	3	0	6	2	9	0	0	11	0	0	0	0	0	3	0	2	0	5	22
5:30 PM	0	2	5	0	7	2	16	0	0	18	0	0	0	0	0	10	0	5	0	15	40
Grand Total	0	9	13	0	22	11	38	0	0	49	1	0	0	0	1	18	0	12	0	30	102
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	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	8.8	12.7	0.0	21.6	10.8	37.3	0.0	0.0	48.0	1.0	0.0	0.0	0.0	1.0	17.6	0.0	11.8	0.0	29.4	100.0
PHF	0.79	0.79	0.79			0.71	0.71	0.71			1.00	1.00	1.00			0.50	0.50	0.50			0.65



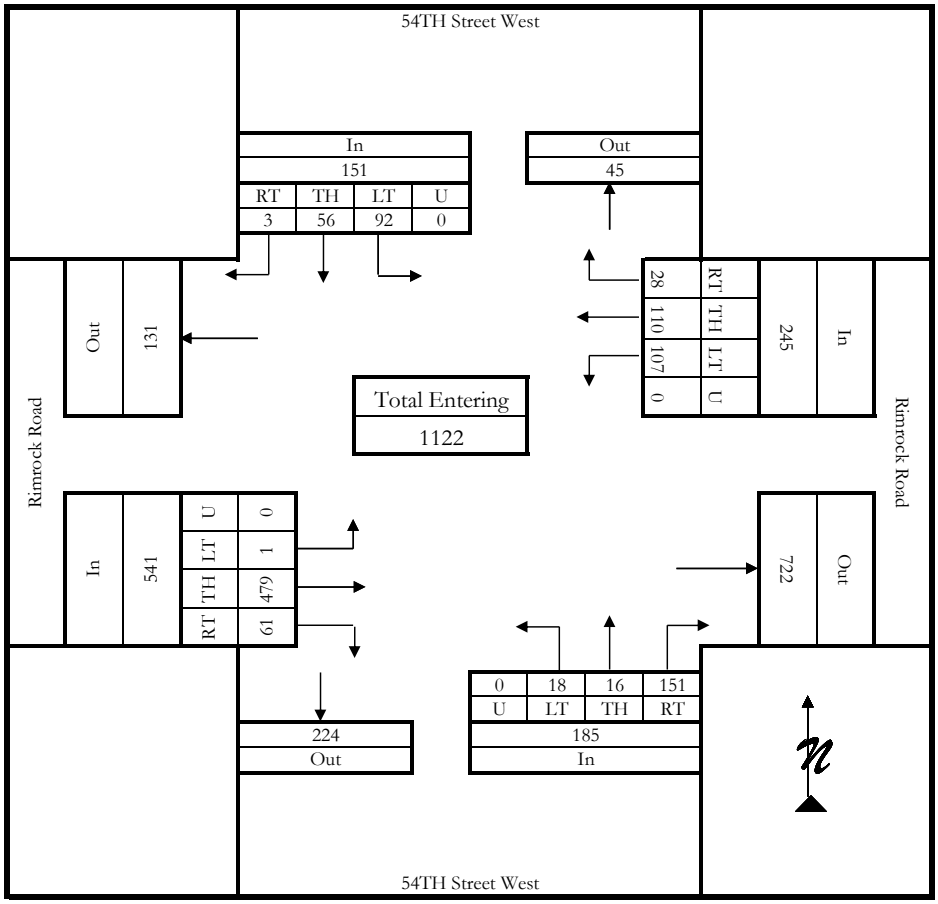
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 54TH ST West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
7:15 AM	0	11	22	0	33	28	1	2	0	31	16	134	1	0	151	7	10	18	0	35	250
7:30 AM	1	15	25	0	41	41	1	3	0	45	16	147	0	0	163	7	23	32	0	62	311
7:45 AM	1	23	24	0	48	47	8	4	0	59	18	119	0	0	137	5	33	37	0	75	319
8:00 AM	1	7	21	0	29	35	6	9	0	50	11	79	0	0	90	9	44	20	0	73	242
Grand Total	3	56	92	0	151	151	16	18	0	185	61	479	1	0	541	28	110	107	0	245	1122
Medium Truck %	0.0	0.0	3.3	0.0	2.0	0.7	0.0	0.0	0.0	0.5	0.0	1.9	100.0	0.0	1.8	3.6	2.7	0.0	0.0	1.6	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.5	0.0	0.2	0.0	0.0	0.2	7.1	0.9	1.9	0.0	2.0	
Total Truck %	0.0	0.0	3.3	0.0	2.0	0.7	0.0	5.6	0.0	1.1	0.0	2.1	100.0	0.0	2.0	10.7	3.6	1.9	0.0	3.7	
Total %	0.3	5.0	8.2	0.0	13.5	13.5	1.4	1.6	0.0	16.5	5.4	42.7	0.1	0.0	48.2	2.5	9.8	9.5	0.0	21.8	100.0
PHF	0.79	0.79	0.79			0.79	0.79	0.79			0.99	0.99	0.99			0.81	0.81	0.81			0.88



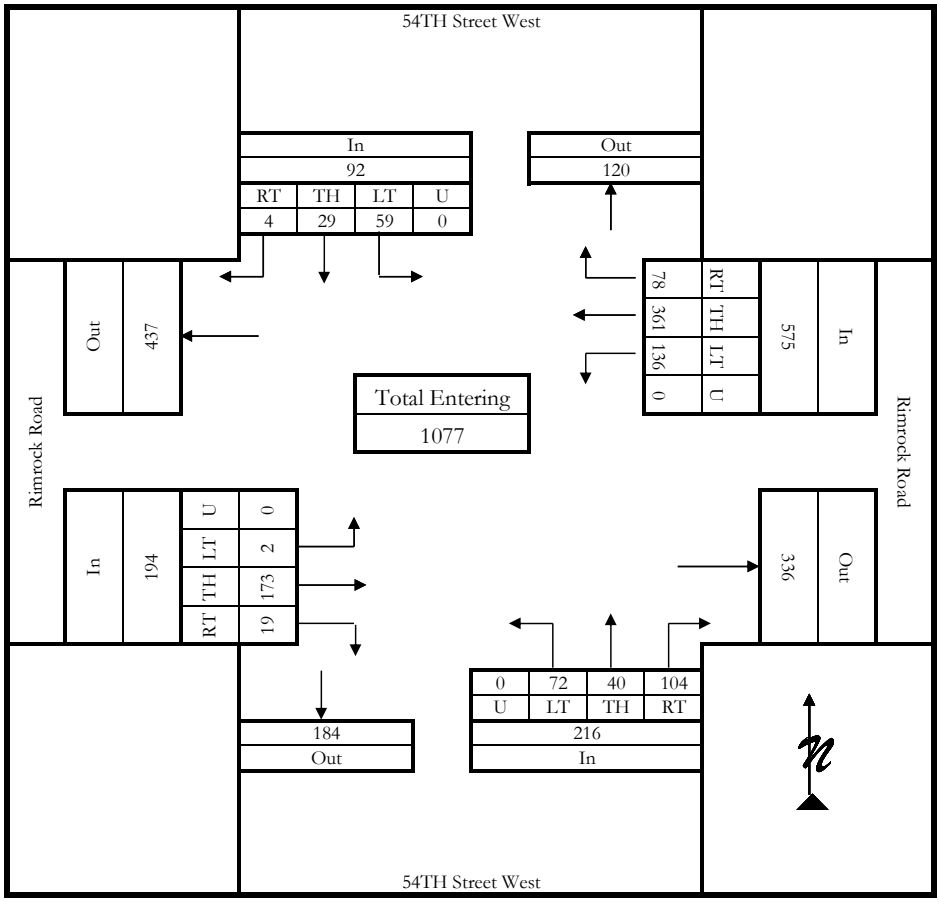
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Road & 54TH ST West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, January 9, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		1.04	1.04	1.04	1.04		
4:45 PM	1	10	15	0	26	19	5	22	0	46	4	50	1	0	55	23	79	35	0	137	264
5:00 PM	0	7	11	0	18	26	12	17	0	55	8	46	1	0	55	19	85	30	0	134	262
5:15 PM	2	2	12	0	16	31	14	17	0	62	6	40	0	0	46	12	104	36	0	152	276
5:30 PM	1	10	21	0	32	28	9	16	0	53	1	37	0	0	38	24	93	35	0	152	275
Grand Total	4	29	59	0	92	104	40	72	0	216	19	173	2	0	194	78	361	136	0	575	1077
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	3.4	0.0	2.2	2.9	0.0	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	0.0	3.4	0.0	2.2	2.9	0.0	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 %	0.4	2.7	5.5	0.0	8.5	9.7	3.7	6.7	0.0	20.1	1.8	16.1	0.2	0.0	18.0	7.2	33.5	12.6	0.0	53.4	100.0
PHF	1.00	1.00	1.00			0.88	0.88	0.88			1.00	1.00	1.00			0.94	0.94	0.94			0.98



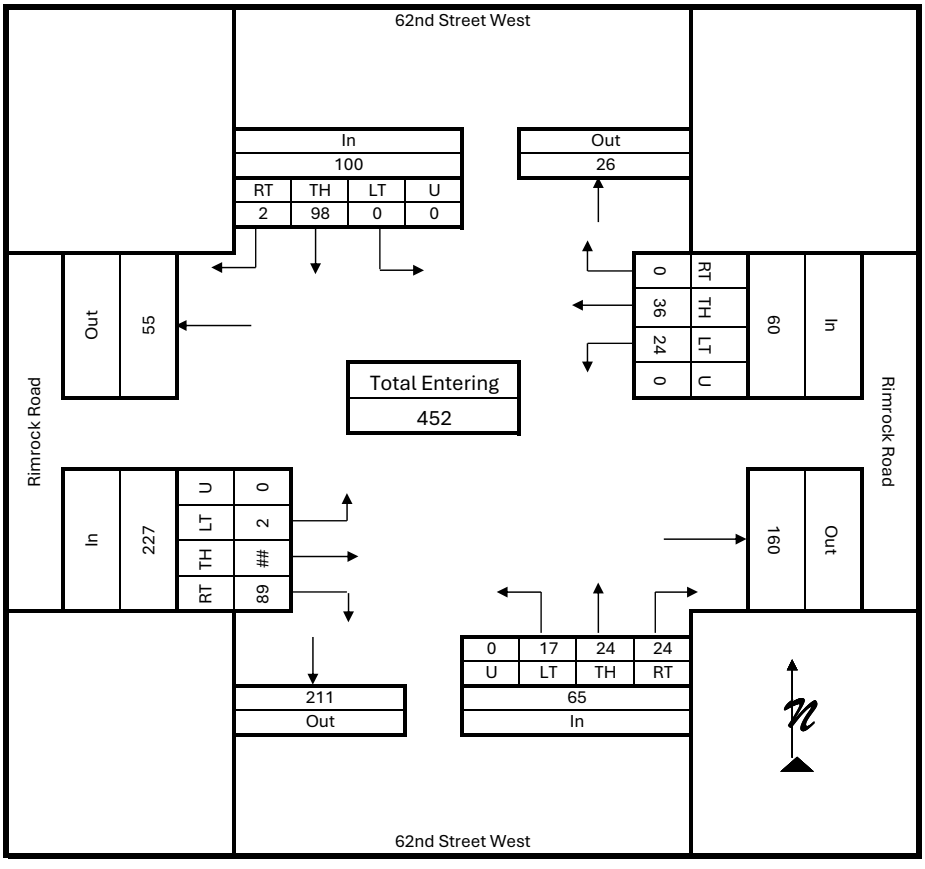
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Rd & 62nd St W - South Leg
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
7:15 AM	0	11	0	0	11	11	3	2	0	16	26	41	1	0	68	0	2	3	0	5	100
7:30 AM	1	24	0	0	25	3	2	4	0	9	34	34	1	0	69	0	7	8	0	15	118
7:45 AM	1	39	0	0	40	7	7	7	0	21	17	27	0	0	44	0	13	9	0	22	127
8:00 AM	0	24	0	0	24	3	12	4	0	19	12	34	0	0	46	0	14	4	0	18	107
Grand Total	2	98	0	0	100	24	24	17	0	65	89	136	2	0	227	0	36	24	0	60	452
Medium Truck %	0.0	1.0	0.0	0.0	1.0	0.0	0.0	11.8	0.0	3.1	0.0	2.2	0.0	0.0	1.3	0.0	5.6	0.0	0.0	3.3	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	4.2	16.7	0.0	0.0	7.7	1.1	0.7	0.0	0.0	0.9	0.0	11.1	4.2	0.0	8.3	
Total Truck %	0.0	1.0	0.0	0.0	1.0	4.2	16.7	11.8	0.0	10.8	1.1	2.9	0.0	0.0	2.2	0.0	16.7	4.2	0.0	11.7	
Total %	0.4	21.7	0.0	0.0	22.1	5.3	5.3	3.8	0.0	14.4	19.7	30.1	0.4	0.0	50.2	0.0	8.0	5.3	0.0	13.3	100.0
PHF	0.63	0.63	0.63			0.77	0.77	0.77			1.00	1.00	1.00			0.68	0.68	0.68			0.89



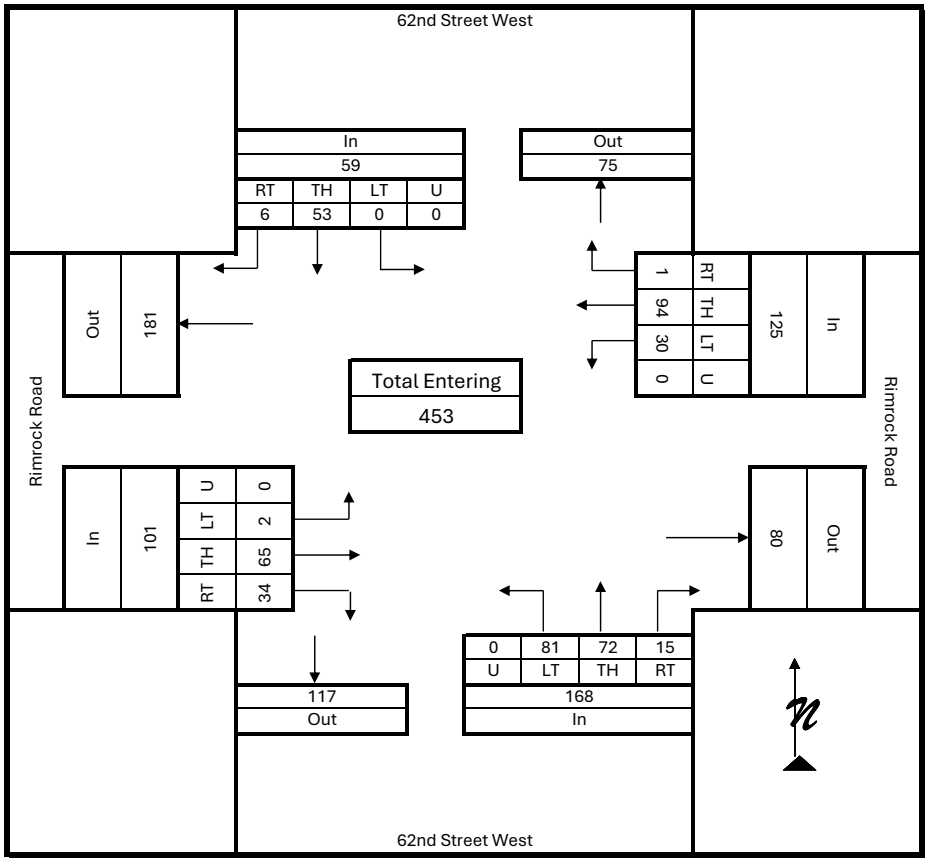
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Rd & 62nd St W - South Leg
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
4:45 PM	1	13	0	0	14	1	15	18	0	34	9	17	1	0	27	1	23	11	0	35	110
5:00 PM	0	13	0	0	13	8	24	19	0	51	12	18	0	0	30	0	23	6	0	29	123
5:15 PM	5	12	0	0	17	3	14	20	0	37	7	15	0	0	22	0	28	8	0	36	112
5:30 PM	0	15	0	0	15	3	19	24	0	46	6	15	1	0	22	0	20	5	0	25	108
Grand Total	6	53	0	0	59	15	72	81	0	168	34	65	2	0	101	1	94	30	0	125	453
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	1.5	0.0	0.0	1.0	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	0.0	1.5	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	
Total %	1.3	11.7	0.0	0.0	13.0	3.3	15.9	17.9	0.0	37.1	7.5	14.3	0.4	0.0	22.3	0.2	20.8	6.6	0.0	27.6	100.0
PHF	1.00	1.00	1.00			0.82	0.82	0.82			0.84	0.84	0.84			1.00	1.00	1.00			0.92



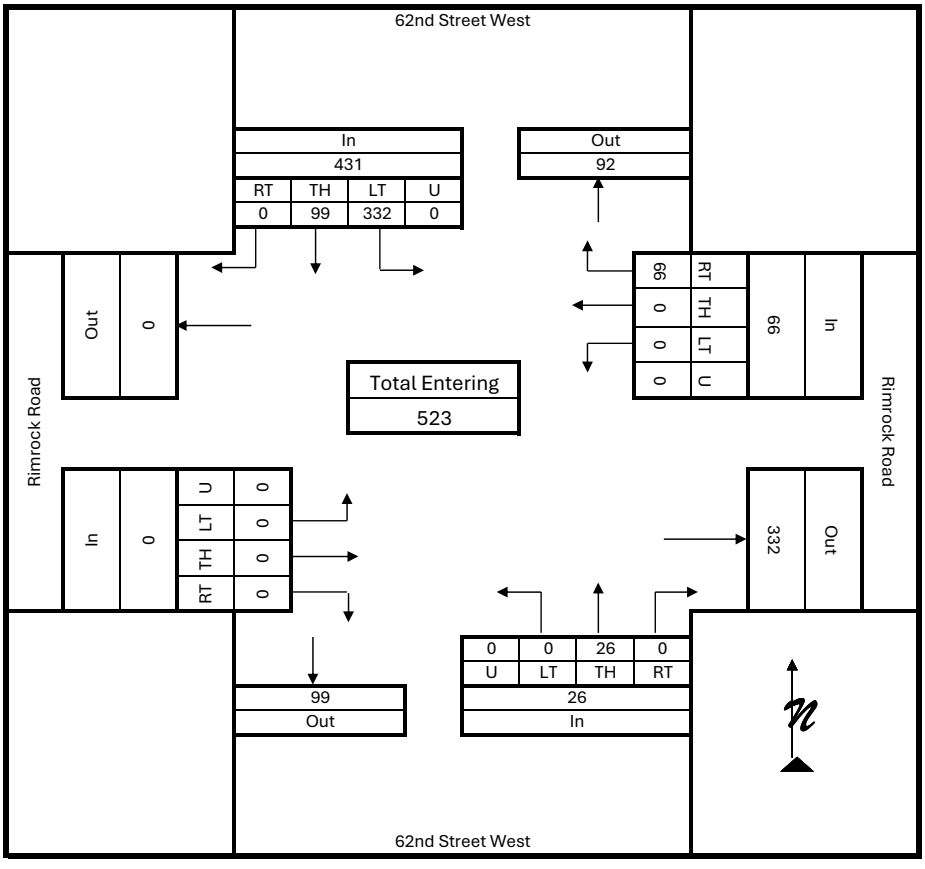
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Rd & 62nd St W - North Leg
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
7:15 AM	0	12	91	0	103	0	4	0	0	4	0	0	0	0	0	7	0	0	0	7	114
7:30 AM	0	24	88	0	112	0	3	0	0	3	0	0	0	0	0	16	0	0	0	16	131
7:45 AM	0	39	80	0	119	0	7	0	0	7	0	0	0	0	0	12	0	0	0	12	138
8:00 AM	0	24	73	0	97	0	12	0	0	12	0	0	0	0	0	31	0	0	0	31	140
Grand Total	0	99	332	0	431	0	26	0	0	26	0	0	0	0	0	66	0	0	0	66	523
Medium Truck %	0.0	1.0	2.1	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	4.5	
Heavy Truck %	0.0	1.0	0.0	0.0	0.2	0.0	11.5	0.0	0.0	11.5	0.0	0.0	0.0	0.0	0.0	6.1	0.0	0.0	0.0	6.1	
Total Truck %	0.0	2.0	2.1	0.0	2.1	0.0	11.5	0.0	0.0	11.5	0.0	0.0	0.0	0.0	0.0	10.6	0.0	0.0	0.0	10.6	
Total %	0.0	18.9	63.5	0.0	82.4	0.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	12.6	0.0	0.0	0.0	12.6	100.0
PHF	1.00	1.00	1.00			0.54	0.54	0.54			1.00	1.00	1.00			0.53	0.53	0.53			0.93



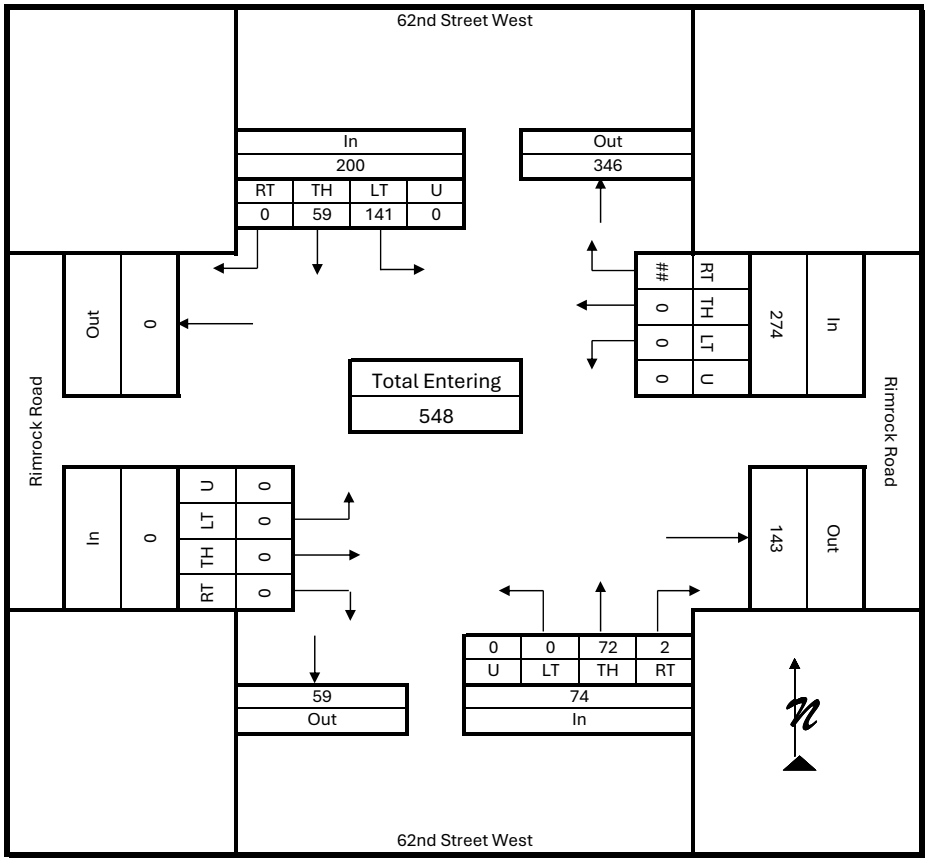
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Rd & 62nd St W - North Leg
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
4:45 PM	0	14	41	0	55	1	16	0	0	17	0	0	0	0	0	68	0	0	0	68	140
5:00 PM	0	13	36	0	49	1	20	0	0	21	0	0	0	0	0	64	0	0	0	64	134
5:15 PM	0	17	30	0	47	0	16	0	0	16	0	0	0	0	0	77	0	0	0	77	140
5:30 PM	0	15	34	0	49	0	20	0	0	20	0	0	0	0	0	65	0	0	0	65	134
Grand Total	0	59	141	0	200	2	72	0	0	74	0	0	0	0	0	274	0	0	0	274	548
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	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	10.8	25.7	0.0	36.5	0.4	13.1	0.0	0.0	13.5	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	50.0	100.0
PHF	0.91	0.91	0.91			1.00	1.00	1.00			1.00	1.00	1.00			1.00	1.00	1.00			0.98



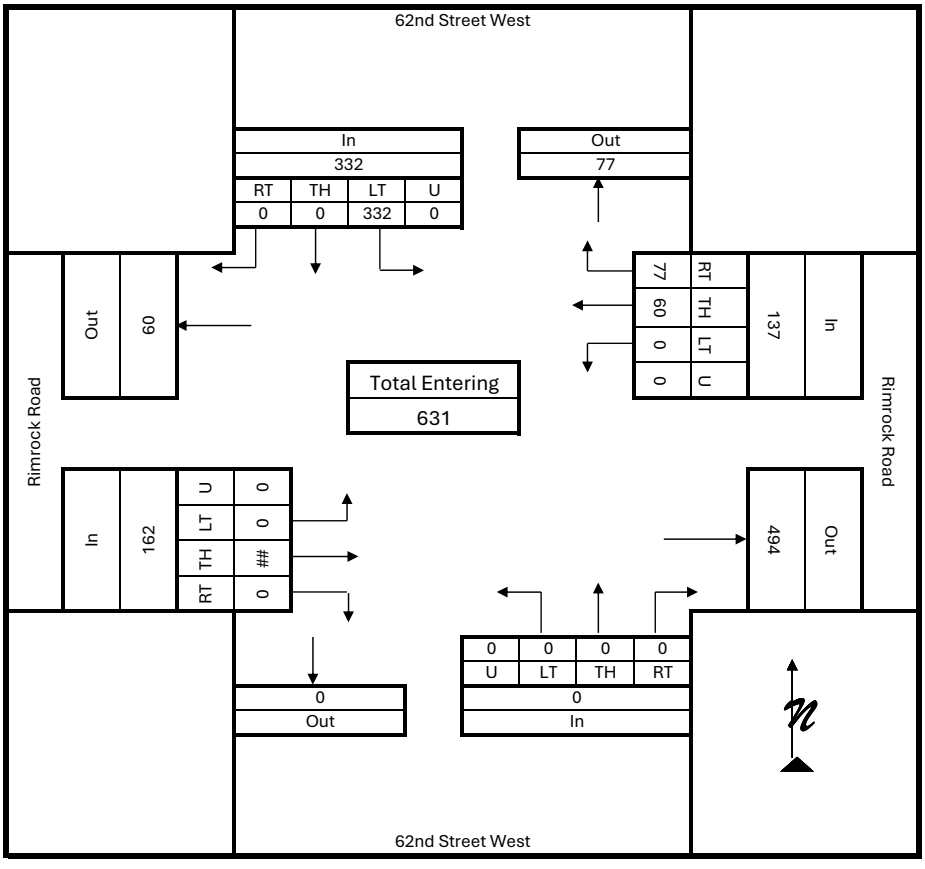
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Rd & 62nd St W - East Leg
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
7:15 AM	0	0	92	0	92	0	0	0	0	0	0	54	0	0	54	9	4	0	0	13	159
7:30 AM	0	0	87	0	87	0	0	0	0	0	0	36	0	0	36	20	15	0	0	35	158
7:45 AM	0	0	80	0	80	0	0	0	0	0	0	35	0	0	35	15	23	0	0	38	153
8:00 AM	0	0	73	0	73	0	0	0	0	0	0	37	0	0	37	33	18	0	0	51	161
Grand Total	0	0	332	0	332	0	0	0	0	0	0	162	0	0	162	77	60	0	0	137	631
Medium Truck %	0.0	0.0	2.1	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	1.9	3.9	3.3	0.0	0.0	3.6	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	1.2	6.5	8.3	0.0	0.0	7.3	
Total Truck %	0.0	0.0	2.1	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	3.1	10.4	11.7	0.0	0.0	10.9	
Total %	0.0	0.0	52.6	0.0	52.6	0.0	0.0	0.0	0.0	0.0	0.0	25.7	0.0	0.0	25.7	12.2	9.5	0.0	0.0	21.7	100.0
PHF	1.00	1.00	1.00			1.00	1.00	1.00			1.00	1.00	1.00			0.67	0.67	0.67			0.98



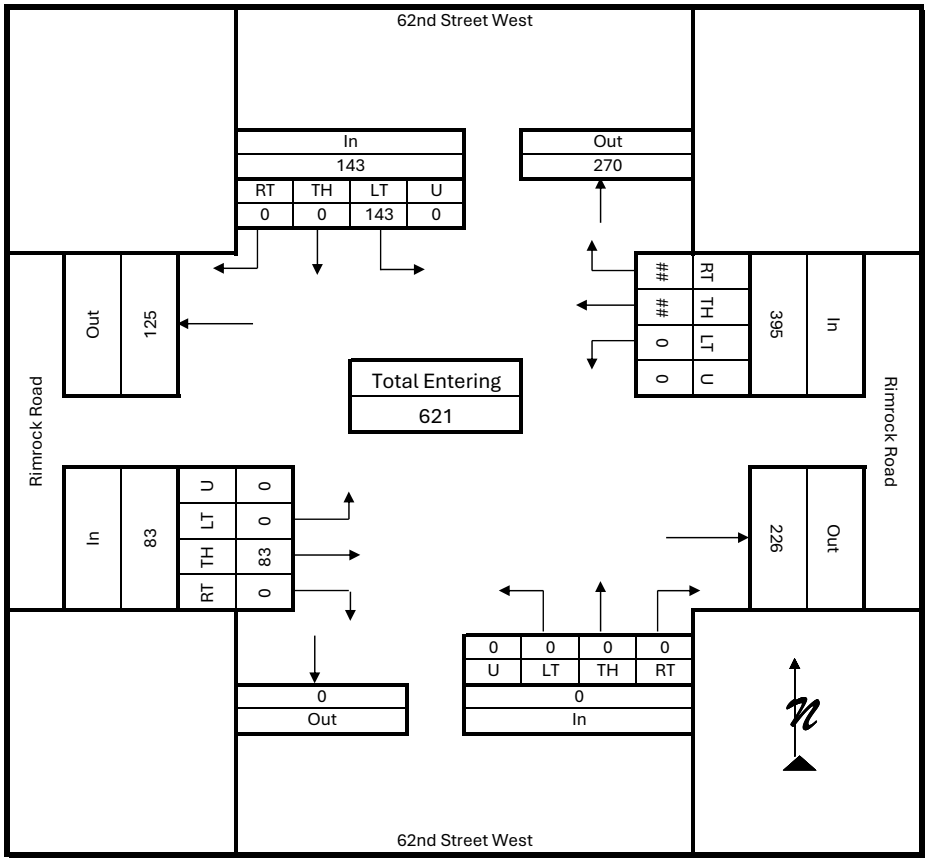
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Rd & 62nd St W - East Leg
Agency/Company:	Sanbell		
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
4:45 PM	0	0	43	0	43	0	0	0	0	0	0	19	0	0	19	69	35	0	0	104	166
5:00 PM	0	0	37	0	37	0	0	0	0	0	0	24	0	0	24	63	30	0	0	93	154
5:15 PM	0	0	28	0	28	0	0	0	0	0	0	21	0	0	21	74	35	0	0	109	158
5:30 PM	0	0	35	0	35	0	0	0	0	0	0	19	0	0	19	64	25	0	0	89	143
Grand Total	0	0	143	0	143	0	0	0	0	0	0	83	0	0	83	270	125	0	0	395	621
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	1.2	0.0	0.0	1.2	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	0.0	1.2	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	23.0	0.0	23.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	0.0	0.0	13.4	43.5	20.1	0.0	0.0	63.6	100.0
PHF	0.83	0.83	0.83			1.00	1.00	1.00			1.00	1.00	1.00			0.95	0.95	0.95			0.93



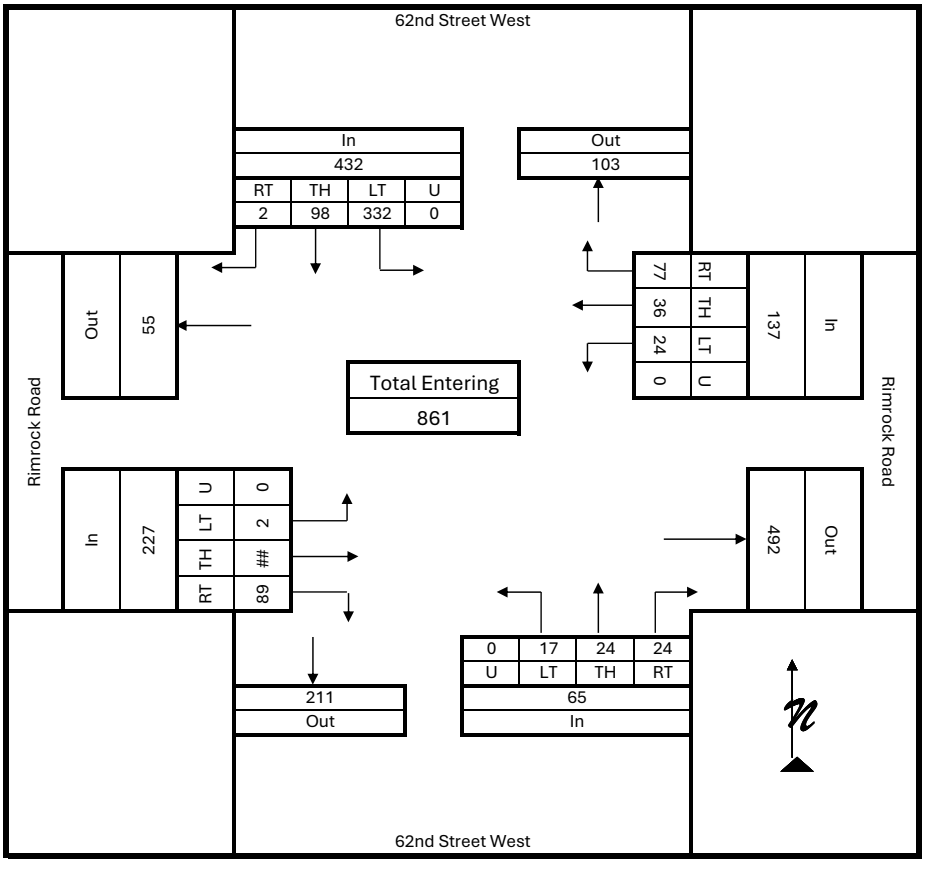
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Rd & 62nd St W - Combined
Agency/Company:	Sanbell		Manually mapulated to show one single intersection
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
7:15 AM	0	11	91	0	102	11	3	2	0	16	26	41	1	0	68	9	2	3	0	14	200
7:30 AM	1	24	88	0	113	3	2	4	0	9	34	34	1	0	69	20	7	8	0	35	226
7:45 AM	1	39	80	0	120	7	7	7	0	21	17	27	0	0	44	15	13	9	0	37	222
8:00 AM	0	24	73	0	97	3	12	4	0	19	12	34	0	0	46	33	14	4	0	51	213
Grand Total	2	98	332	0	432	24	24	17	0	65	89	136	2	0	227	77	36	24	0	137	861
Medium Truck %	0.0	1.0	2.1	0.0	1.9	0.0	0.0	11.8	0.0	3.1	0.0	2.2	0.0	0.0	1.3	3.9	5.6	0.0	0.0	3.6	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	4.2	16.7	0.0	0.0	7.7	1.1	0.7	0.0	0.0	0.9	6.5	11.1	4.2	0.0	7.3	
Total Truck %	0.0	1.0	2.1	0.0	1.9	4.2	16.7	11.8	0.0	10.8	1.1	2.9	0.0	0.0	2.2	10.4	16.7	4.2	0.0	10.9	
Total %	0.2	11.4	38.6	0.0	50.2	2.8	2.8	2.0	0.0	7.5	10.3	15.8	0.2	0.0	26.4	8.9	4.2	2.8	0.0	15.9	100.0
PHF	0.96	0.96	0.96			1.00	1.00	1.00			0.82	0.82	0.82			0.98	0.98	0.98			0.95



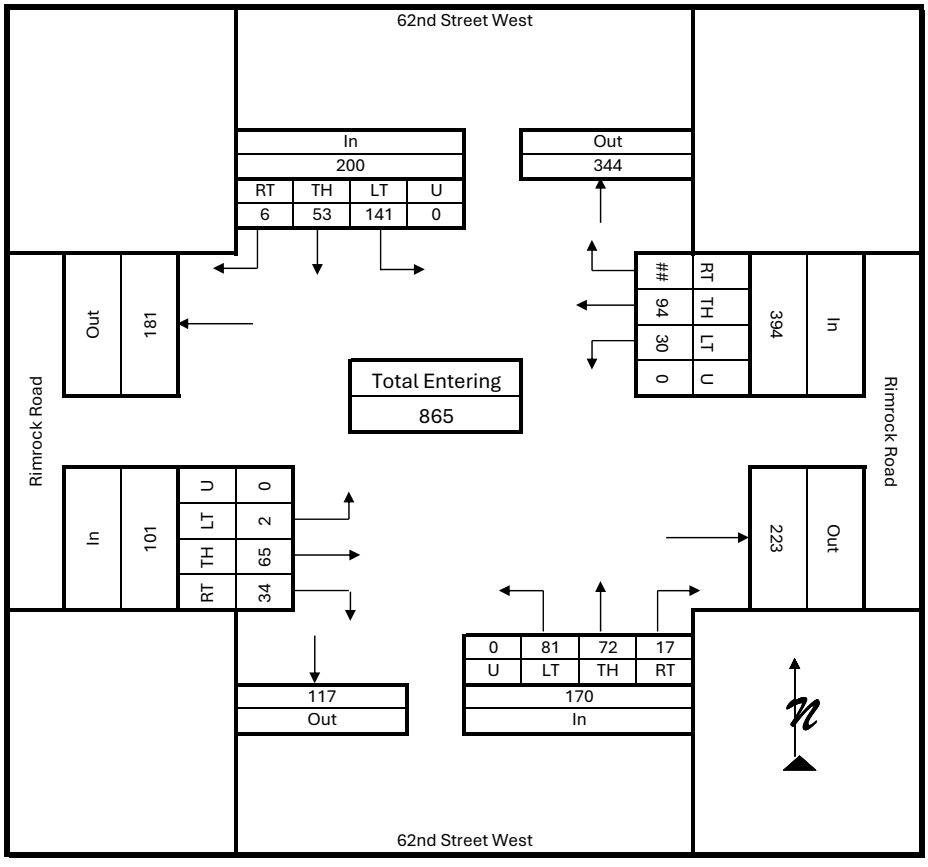
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Rafael Teixeira	Intersection:	Rimrock Rd & 62nd St W - Combined
Agency/Company:	Sanbell		Manually mapulated to show one single intersection
Date Performed:	Thursday, February 8, 2024	Jurisdiction:	City of Billings, MT / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	23379	Project Description:	West Billings Neighborhood Plan
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	1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		1.01	1.01	1.01	1.01		
4:45 PM	1	13	41	0	55	2	15	18	0	35	9	17	1	0	27	69	23	11	0	103	220
5:00 PM	0	13	36	0	49	9	24	19	0	52	12	18	0	0	30	63	23	6	0	92	223
5:15 PM	5	12	30	0	47	3	14	20	0	37	7	15	0	0	22	74	28	8	0	110	216
5:30 PM	0	15	34	0	49	3	19	24	0	46	6	15	1	0	22	64	20	5	0	89	206
Grand Total	6	53	141	0	200	17	72	81	0	170	34	65	2	0	101	270	94	30	0	394	865
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	1.5	0.0	0.0	1.0	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	0.0	1.5	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.7	6.1	16.3	0.0	23.1	2.0	8.3	9.4	0.0	19.7	3.9	7.5	0.2	0.0	11.7	31.2	10.9	3.5	0.0	45.5	100.0
PHF	1.00	1.00	1.00			0.82	0.82	0.82			0.84	0.84	0.84			1.00	1.00	1.00			0.97



APPENDIX D

EXISTING CONDITIONS (2025) CAPACITY CALCULATIONS

Appendix D Contents

Existing Conditions (2025) Capacity Calculations 318

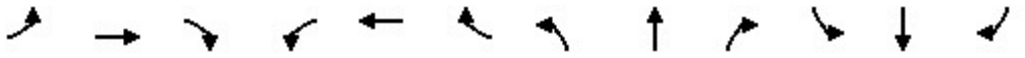
Existing Conditions (2025) Capacity Calculations

Existing AM Capacity:

Queues
2: 54th Street West & Rimrock Road 10/19/2025

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1	546	132	136	35	23	211	116	75
v/c Ratio	0.00	0.64	0.30	0.13	0.04	0.11	0.49	0.78	0.24
Control Delay (s/veh)	7.0	21.2	8.2	8.9	0.1	29.7	10.3	66.8	30.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.0	21.2	8.2	8.9	0.1	29.7	10.3	66.8	30.4
Queue Length 50th (ft)	0	209	23	24	0	11	9	63	34
Queue Length 95th (ft)	4	394	52	74	0	28	44	105	61
Internal Link Dist (ft)		4323		924			5202		920
Turn Bay Length (ft)	250		250		250	200		150	
Base Capacity (vph)	377	857	455	1080	899	386	623	271	576
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	0.00	0.64	0.29	0.13	0.04	0.06	0.34	0.43	0.13

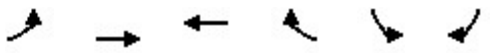
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	479	61	107	110	28	18	16	151	92	56	3
Future Volume (veh/h)	1	479	61	107	110	28	18	16	151	92	56	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	385	1723	1750	1723	1695	1600	1668	1750	1736	1709	1750	1750
Adj Flow Rate, veh/h	1	484	62	132	136	35	23	20	191	116	71	4
Peak Hour Factor	0.99	0.99	0.99	0.81	0.81	0.81	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	100	2	0	2	4	11	6	0	1	3	0	0
Cap, veh/h	210	716	92	375	911	729	352	35	336	223	405	23
Arrive On Green	0.00	0.48	0.48	0.06	0.54	0.54	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	367	1496	192	1641	1695	1356	1283	143	1362	1161	1641	92
Grp Volume(v), veh/h	1	0	546	132	136	35	23	0	211	116	0	75
Grp Sat Flow(s),veh/h/ln	367	0	1688	1641	1695	1356	1283	0	1505	1161	0	1733
Q Serve(g_s), s	0.1	0.0	22.6	3.6	3.7	1.1	1.3	0.0	11.2	8.8	0.0	3.1
Cycle Q Clear(g_c), s	0.1	0.0	22.6	3.6	3.7	1.1	4.4	0.0	11.2	20.0	0.0	3.1
Prop In Lane	1.00		0.11	1.00		1.00	1.00		0.91	1.00		0.05
Lane Grp Cap(c), veh/h	210	0	808	375	911	729	352	0	371	223	0	427
V/C Ratio(X)	0.00	0.00	0.68	0.35	0.15	0.05	0.07	0.00	0.57	0.52	0.00	0.18
Avail Cap(c_a), veh/h	243	0	808	430	911	729	438	0	472	301	0	544
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	12.3	0.0	18.3	13.7	10.6	10.0	28.7	0.0	30.0	38.8	0.0	27.0
Incr Delay (d2), s/veh	0.0	0.0	4.5	0.6	0.3	0.1	0.1	0.0	1.4	1.9	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	0.0	0.0	8.4	1.2	1.3	0.3	0.4	0.0	3.9	2.6	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	12.3	0.0	22.8	14.2	10.9	10.1	28.8	0.0	31.4	40.6	0.0	27.2
LnGrp LOS	B		C	B	B	B	C		C	D		C
Approach Vol, veh/h		547			303			234			191	
Approach Delay, s/veh		22.7			12.3			31.1			35.3	
Approach LOS		C			B			C			D	

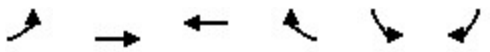
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.0	50.0		28.9	6.6	55.3		28.9				
Change Period (Y+Rc), s	6.5	6.5		6.5	6.5	6.5		6.5				
Max Green Setting (Gmax), s	8.5	43.5		28.5	8.5	43.5		28.5				
Max Q Clear Time (g_c+I1), s	5.6	24.6		22.0	2.1	5.7		13.2				
Green Ext Time (p_c), s	0.1	2.9		0.4	0.0	0.8		1.0				

Intersection Summary		
HCM 7th Control Delay, s/veh	23.7	
HCM 7th LOS	C	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	148	558	212	82	257	166
v/c Ratio	0.20	0.49	0.27	0.07	0.75	0.24
Control Delay (s/veh)	6.8	10.7	17.5	1.0	49.1	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	6.8	10.7	17.5	1.0	49.1	3.4
Queue Length 50th (ft)	27	149	75	0	143	0
Queue Length 95th (ft)	46	186	144	10	224	30
Internal Link Dist (ft)		1579	3521		5202	
Turn Bay Length (ft)	400			400		250
Base Capacity (vph)	990	1688	783	1409	781	1172
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	0.15	0.33	0.27	0.06	0.33	0.14

Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	102	385	180	70	221	143
Future Volume (veh/h)	102	385	180	70	221	143
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1736	1736	1668	1709	1736	1736
Adj Flow Rate, veh/h	148	558	212	82	257	166
Peak Hour Factor	0.69	0.69	0.85	0.85	0.86	0.86
Percent Heavy Veh, %	1	1	6	3	1	1
Cap, veh/h	707	1139	895	1052	313	373
Arrive On Green	0.06	0.66	0.54	0.54	0.19	0.19
Sat Flow, veh/h	1654	1736	1668	1448	1654	1471
Grp Volume(v), veh/h	148	558	212	82	257	166
Grp Sat Flow(s),veh/h/ln	1654	1736	1668	1448	1654	1471
Q Serve(g_s), s	3.0	13.3	5.5	1.3	12.1	7.7
Cycle Q Clear(g_c), s	3.0	13.3	5.5	1.3	12.1	7.7
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	707	1139	895	1052	313	373
V/C Ratio(X)	0.21	0.49	0.24	0.08	0.82	0.45
Avail Cap(c_a), veh/h	1526	1998	895	1052	887	884
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	6.7	7.1	10.0	3.2	31.7	25.6
Incr Delay (d2), s/veh	0.1	0.3	0.6	0.1	5.3	0.8
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	3.6	1.8	0.6	5.0	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	6.8	7.4	10.6	3.4	37.0	26.4
LnGrp LOS	A	A	B	A	D	C
Approach Vol, veh/h		706	294		423	
Approach Delay, s/veh		7.3	8.6		32.9	
Approach LOS		A	A		C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		59.7		21.7	9.7	50.0
Change Period (Y+Rc), s		6.3		6.3	4.5	6.3
Max Green Setting (Gmax), s		93.7		43.7	45.5	43.7
Max Q Clear Time (g_c+I1), s		15.3		14.1	5.0	7.5
Green Ext Time (p_c), s		3.7		1.3	0.4	1.4

Intersection Summary	
HCM 7th Control Delay, s/veh	15.2
HCM 7th LOS	B

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	480	134	88	274	0	28	0	98	0	0	0
Future Vol, veh/h	0	480	134	88	274	0	28	0	98	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	200	-	-	200	-	-	200	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	93	93	93	66	66	66	100	100	100
Heavy Vehicles, %	0	1	4	8	3	0	11	0	9	0	0	0
Mvmt Flow	0	640	179	95	295	0	42	0	148	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	295	0	0	819	0	0	1213	1213	729	1124	1303	295
Stage 1	-	-	-	-	-	-	729	729	-	484	484	-
Stage 2	-	-	-	-	-	-	484	484	-	640	819	-
Critical Hdwy	4.1	-	-	4.18	-	-	7.21	6.5	6.29	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.21	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.21	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.272	-	-	3.599	4	3.381	3.5	4	3.3
Pot Cap-1 Maneuver	1278	-	-	784	-	-	152	183	411	184	162	749
Stage 1	-	-	-	-	-	-	400	431	-	568	556	-
Stage 2	-	-	-	-	-	-	548	556	-	467	392	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1278	-	-	784	-	-	134	161	411	104	143	749
Mov Cap-2 Maneuver	-	-	-	-	-	-	134	161	-	104	143	-
Stage 1	-	-	-	-	-	-	400	431	-	499	489	-
Stage 2	-	-	-	-	-	-	482	489	-	298	392	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	2.48	24.25	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	134	411	1278	-	-	784	-	-	-
HCM Lane V/C Ratio	0.317	0.361	-	-	-	0.121	-	-	-
HCM Ctrl Dly (s/v)	44	18.6	0	-	-	10.2	-	-	0
HCM Lane LOS	E	C	A	-	-	B	-	-	A
HCM 95th %tile Q(veh)	1.3	1.6	0	-	-	0.4	-	-	-

Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	698	599	35	91	40
v/c Ratio	0.56	0.62	0.26	0.37	0.26
Control Delay (s/veh)	7.3	9.3	30.6	11.4	29.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.3	9.3	30.6	11.4	29.9
Queue Length 50th (ft)	113	107	13	0	14
Queue Length 95th (ft)	224	94	36	35	15
Internal Link Dist (ft)	3521	424	5188		424
Turn Bay Length (ft)				120	
Base Capacity (vph)	1242	966	816	1049	938
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	0.56	0.62	0.04	0.09	0.04

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	574	103	66	237	38	26	9	91	9	5	0
Future Volume (veh/h)	21	574	103	66	237	38	26	9	91	9	5	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1736	1723	1695	1750	1545	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	21	574	103	116	416	67	26	9	91	26	14	0
Peak Hour Factor	1.00	1.00	1.00	0.57	0.57	0.57	1.00	1.00	1.00	0.35	0.35	0.35
Percent Heavy Veh, %	0	1	1	2	4	0	15	0	0	0	0	0
Cap, veh/h	74	991	174	222	743	113	195	52	139	166	67	0
Arrive On Green	0.70	0.70	0.70	0.70	0.70	0.70	0.09	0.09	0.09	0.09	0.09	0.00
Sat Flow, veh/h	20	1406	247	216	1054	160	1000	552	1483	748	713	0
Grp Volume(v), veh/h	698	0	0	599	0	0	35	0	91	40	0	0
Grp Sat Flow(s),veh/h/ln	1674	0	0	1430	0	0	1552	0	1483	1461	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.4	0.0	0.0
Cycle Q Clear(g_c), s	12.8	0.0	0.0	10.4	0.0	0.0	1.2	0.0	3.7	1.5	0.0	0.0
Prop In Lane	0.03		0.15	0.19		0.11	0.74		1.00	0.65		0.00
Lane Grp Cap(c), veh/h	1239	0	0	1077	0	0	246	0	139	233	0	0
V/C Ratio(X)	0.56	0.00	0.00	0.56	0.00	0.00	0.14	0.00	0.66	0.17	0.00	0.00
Avail Cap(c_a), veh/h	1239	0	0	1077	0	0	1167	0	1052	1120	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	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.6	0.0	0.0	4.2	0.0	0.0	26.0	0.0	27.1	26.1	0.0	0.0
Incr Delay (d2), s/veh	1.9	0.0	0.0	2.1	0.0	0.0	0.3	0.0	5.2	0.3	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	3.0	0.0	0.0	2.5	0.0	0.0	0.5	0.0	1.4	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.5	0.0	0.0	6.3	0.0	0.0	26.2	0.0	32.3	26.4	0.0	0.0
LnGrp LOS	A			A			C		C	C		
Approach Vol, veh/h		698			599			126			40	
Approach Delay, s/veh		6.5			6.3			30.6			26.4	
Approach LOS		A			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.9		50.0		11.9		50.0				
Change Period (Y+Rc), s		6.1		6.4		6.1		6.4				
Max Green Setting (Gmax), s		43.9		43.6		43.9		43.6				
Max Q Clear Time (g_c+I1), s		5.7		14.8		3.5		12.4				
Green Ext Time (p_c), s		0.5		5.4		0.2		5.2				

Intersection Summary												
HCM 7th Control Delay, s/veh			9.0									
HCM 7th LOS			A									

Intersection	
Int Delay, s/veh	4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	128	48	91	44	30	76
Future Vol, veh/h	128	48	91	44	30	76
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	100	100	82	82
Heavy Vehicles, %	2	0	2	7	10	0
Mvmt Flow	142	53	91	44	37	93

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	196	0	395	169
Stage 1	-	-	-	-	169	-
Stage 2	-	-	-	-	226	-
Critical Hdwy	-	-	4.12	-	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	-	-	2.218	-	3.59	3.3
Pot Cap-1 Maneuver	-	-	1377	-	595	880
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	793	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1377	-	554	880
Mov Cap-2 Maneuver	-	-	-	-	554	-
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	739	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	5.26	10.75
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	755	-	-	1213	-
HCM Lane V/C Ratio	0.171	-	-	0.066	-
HCM Ctrl Dly (s/v)	10.8	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	200	37	14	94	11	8	39	49	70	70	12
Future Vol, veh/h	11	200	37	14	94	11	8	39	49	70	70	12
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.83	0.83	0.83	1.00	1.00	1.00
Heavy Vehicles, %	0	1	3	0	3	18	13	5	2	0	0	0
Mvmt Flow	12	215	40	15	99	12	10	47	59	70	70	12
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	10.1	8.9	9	9.5
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	4%	12%	46%
Vol Thru, %	41%	81%	79%	46%
Vol Right, %	51%	15%	9%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	248	119	152
LT Vol	8	11	14	70
Through Vol	39	200	94	70
RT Vol	49	37	11	12
Lane Flow Rate	116	267	125	152
Geometry Grp	1	1	1	1
Degree of Util (X)	0.159	0.344	0.169	0.212
Departure Headway (Hd)	4.959	4.64	4.859	5.019
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	717	771	733	710
Service Time	3.032	2.696	2.925	3.087
HCM Lane V/C Ratio	0.162	0.346	0.171	0.214
HCM Control Delay, s/veh	9	10.1	8.9	9.5
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.6	1.5	0.6	0.8

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	14	97	31	42	98
Future Vol, veh/h	30	14	97	31	42	98
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	85	85	82	82	87	87
Heavy Vehicles, %	3	7	1	0	2	4
Mvmt Flow	35	16	118	38	48	113

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	346	137	0	0	156	0
Stage 1	137	-	-	-	-	-
Stage 2	209	-	-	-	-	-
Critical Hdwy	6.43	6.27	-	-	4.12	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.363	-	-	2.218	-
Pot Cap-1 Maneuver	648	898	-	-	1424	-
Stage 1	887	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	625	898	-	-	1424	-
Mov Cap-2 Maneuver	625	-	-	-	-	-
Stage 1	887	-	-	-	-	-
Stage 2	794	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.62	0	2.29
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	692	540	-
HCM Lane V/C Ratio	-	-	0.075	0.034	-
HCM Ctrl Dly (s/v)	-	-	10.6	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Intersection Delay, s/veh	12.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	304	1	9	208	16	3	43	17	49	58	15
Future Vol, veh/h	39	304	1	9	208	16	3	43	17	49	58	15
Peak Hour Factor	0.84	0.84	0.84	0.85	0.85	0.85	1.00	1.00	1.00	0.69	0.69	0.69
Heavy Vehicles, %	3	11	0	0	11	6	33	5	0	0	2	0
Mvmt Flow	46	362	1	11	245	19	3	43	17	71	84	22
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	15	11.6	10.3	11.1
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	11%	4%	40%
Vol Thru, %	68%	88%	89%	48%
Vol Right, %	27%	0%	7%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	63	344	233	122
LT Vol	3	39	9	49
Through Vol	43	304	208	58
RT Vol	17	1	16	15
Lane Flow Rate	63	410	274	177
Geometry Grp	1	1	1	1
Degree of Util (X)	0.113	0.581	0.395	0.284
Departure Headway (Hd)	6.439	5.106	5.187	5.784
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	556	708	694	621
Service Time	4.491	3.138	3.224	3.828
HCM Lane V/C Ratio	0.113	0.579	0.395	0.285
HCM Control Delay, s/veh	10.3	15	11.6	11.1
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	0.4	3.8	1.9	1.2

Intersection	
Intersection Delay, s/veh	18.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	76	287	54	55	158	27	8	51	87	7	24	70
Future Vol, veh/h	76	287	54	55	158	27	8	51	87	7	24	70
Peak Hour Factor	0.86	0.86	0.86	0.68	0.68	0.68	0.72	0.72	0.72	0.87	0.87	0.87
Heavy Vehicles, %	7	4	7	4	2	0	0	4	1	14	0	0
Mvmt Flow	88	334	63	81	232	40	11	71	121	8	28	80
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	24.8	16.5	12.6	11.5
HCM LOS	C	C	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	18%	23%	7%
Vol Thru, %	35%	69%	66%	24%
Vol Right, %	60%	13%	11%	69%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	146	417	240	101
LT Vol	8	76	55	7
Through Vol	51	287	158	24
RT Vol	87	54	27	70
Lane Flow Rate	203	485	353	116
Geometry Grp	1	1	1	1
Degree of Util (X)	0.35	0.765	0.575	0.214
Departure Headway (Hd)	6.21	5.682	5.865	6.64
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	578	640	618	539
Service Time	4.261	3.694	3.881	4.698
HCM Lane V/C Ratio	0.351	0.758	0.571	0.215
HCM Control Delay, s/veh	12.6	24.8	16.5	11.5
HCM Lane LOS	B	C	C	B
HCM 95th-tile Q	1.6	7.1	3.6	0.8

Intersection	
Int Delay, s/veh	15.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	29	138	20	16	68	23	29	63	27	75	73	21
Future Vol, veh/h	29	138	20	16	68	23	29	63	27	75	73	21
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	60	60	60	64	64	64	93	93	93	81	81	81
Heavy Vehicles, %	0	7	0	13	4	17	3	2	7	0	7	0
Mvmt Flow	48	230	33	25	106	36	31	68	29	93	90	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	472	447	103	535	446	82	116	0	0	97	0	0
Stage 1	288	288	-	145	145	-	-	-	-	-	-	-
Stage 2	183	159	-	390	301	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.57	6.2	7.23	6.54	6.37	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.57	-	6.23	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.57	-	6.23	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.063	3.3	3.617	4.036	3.453	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	506	499	957	439	504	937	1466	-	-	1509	-	-
Stage 1	724	664	-	833	773	-	-	-	-	-	-	-
Stage 2	823	757	-	612	661	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	349	455	957	200	460	937	1466	-	-	1509	-	-
Mov Cap-2 Maneuver	349	455	-	200	460	-	-	-	-	-	-	-
Stage 1	676	621	-	814	756	-	-	-	-	-	-	-
Stage 2	665	740	-	348	618	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	27.82	18.88	1.83	3.35
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	414	-	-	459	425	765	-	-
HCM Lane V/C Ratio	0.021	-	-	0.678	0.394	0.061	-	-
HCM Ctrl Dly (s/v)	7.5	0	-	27.8	18.9	7.5	0	-
HCM Lane LOS	A	A	-	D	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	5	1.8	0.2	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	239	5	8	83	17	5	28	13	65	28	12
Future Vol, veh/h	17	239	5	8	83	17	5	28	13	65	28	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	92	92	92	82	82	82	100	100	100	71	71	71
Heavy Vehicles, %	6	5	0	0	10	6	20	4	8	2	4	8
Mvmt Flow	18	260	5	10	101	21	5	28	13	92	39	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	122	0	0	265	0	0	440	441	263	442	433	112
Stage 1	-	-	-	-	-	-	299	299	-	131	131	-
Stage 2	-	-	-	-	-	-	140	141	-	311	302	-
Critical Hdwy	4.16	-	-	4.1	-	-	7.3	6.54	6.28	7.12	6.54	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.54	-	6.12	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.54	-	6.12	5.54	-
Follow-up Hdwy	2.254	-	-	2.2	-	-	3.68	4.036	3.372	3.518	4.036	3.372
Pot Cap-1 Maneuver	1441	-	-	1310	-	-	498	507	762	526	513	925
Stage 1	-	-	-	-	-	-	672	662	-	872	784	-
Stage 2	-	-	-	-	-	-	821	776	-	700	661	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1441	-	-	1310	-	-	441	496	762	477	501	925
Mov Cap-2 Maneuver	-	-	-	-	-	-	441	496	-	477	501	-
Stage 1	-	-	-	-	-	-	662	652	-	865	778	-
Stage 2	-	-	-	-	-	-	759	770	-	648	651	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.49	0.58	12.26	14.86
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	542	117	-	-	129	-	-	512
HCM Lane V/C Ratio	0.085	0.013	-	-	0.007	-	-	0.289
HCM Ctrl Dly (s/v)	12.3	7.5	0	-	7.8	0	-	14.9
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	1.2

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	102	10	20	65	13	7	38	35	20	41	16
Future Vol, veh/h	10	102	10	20	65	13	7	38	35	20	41	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	92	92	92	94	94	94	85	85	85	73	73	73
Heavy Vehicles, %	0	11	0	6	15	23	29	18	34	5	32	6
Mvmt Flow	11	111	11	21	69	14	8	45	41	27	56	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	218	224	67	248	215	65	78	0	0	86	0	0
Stage 1	122	122	-	82	82	-	-	-	-	-	-	-
Stage 2	96	102	-	166	133	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.61	6.2	7.16	6.65	6.43	4.39	-	-	4.15	-	-
Critical Hdwy Stg 1	6.1	5.61	-	6.16	5.65	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.61	-	6.16	5.65	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.099	3.3	3.554	4.135	3.507	2.461	-	-	2.245	-	-
Pot Cap-1 Maneuver	743	659	1002	697	661	943	1366	-	-	1492	-	-
Stage 1	887	778	-	917	802	-	-	-	-	-	-	-
Stage 2	916	793	-	826	762	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	639	642	1002	559	644	943	1366	-	-	1492	-	-
Mov Cap-2 Maneuver	639	642	-	559	644	-	-	-	-	-	-	-
Stage 1	870	763	-	911	797	-	-	-	-	-	-	-
Stage 2	819	788	-	685	747	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	11.8	11.58	0.67	1.94
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	144	-	-	662	651	443	-	-
HCM Lane V/C Ratio	0.006	-	-	0.2	0.16	0.018	-	-
HCM Ctrl Dly (s/v)	7.7	0	-	11.8	11.6	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.6	0.1	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	10	196	0	18	124	18	0	12	40	22	8	9
Future Vol, veh/h	10	196	0	18	124	18	0	12	40	22	8	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	75	75	75	99	99	99	84	84	84	98	98	98
Heavy Vehicles, %	0	12	0	0	20	6	0	0	5	5	13	0
Mvmt Flow	13	261	0	18	125	18	0	14	48	22	8	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	143	0	0	261	0	0	454	468	261	466	459	134
Stage 1	-	-	-	-	-	-	288	288	-	171	171	-
Stage 2	-	-	-	-	-	-	166	180	-	295	288	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.25	7.15	6.63	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.63	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.63	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.345	3.545	4.117	3.3
Pot Cap-1 Maneuver	1452	-	-	1315	-	-	520	496	770	502	483	920
Stage 1	-	-	-	-	-	-	724	677	-	824	737	-
Stage 2	-	-	-	-	-	-	841	754	-	707	654	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1452	-	-	1315	-	-	493	483	770	446	470	920
Mov Cap-2 Maneuver	-	-	-	-	-	-	493	483	-	446	470	-
Stage 1	-	-	-	-	-	-	716	670	-	812	726	-
Stage 2	-	-	-	-	-	-	811	743	-	642	647	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.36	0.87	10.85	12.62
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	677	87	-	-	197	-	-	512
HCM Lane V/C Ratio	0.091	0.009	-	-	0.014	-	-	0.078
HCM Ctrl Dly (s/v)	10.8	7.5	0	-	7.8	0	-	12.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	158	91	33	162	51
Future Vol, veh/h	31	158	91	33	162	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	88	88	74	74
Heavy Vehicles, %	0	1	7	12	1	0
Mvmt Flow	36	186	103	38	219	69

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	141	0	-	0	381	122
Stage 1	-	-	-	-	122	-
Stage 2	-	-	-	-	259	-
Critical Hdwy	4.1	-	-	-	6.41	6.2
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.2	-	-	-	3.509	3.3
Pot Cap-1 Maneuver	1455	-	-	-	623	934
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	787	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1455	-	-	-	606	934
Mov Cap-2 Maneuver	-	-	-	-	606	-
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	787	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	1.24	0	14.57
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	295	-	-	-	662
HCM Lane V/C Ratio	0.025	-	-	-	0.435
HCM Ctrl Dly (s/v)	7.5	0	-	-	14.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	2.2

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	4	15	6	21	28
Future Vol, veh/h	13	4	15	6	21	28
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	47	47	100	100	68	68
Heavy Vehicles, %	0	25	0	0	0	0
Mvmt Flow	28	9	15	6	31	41

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	15	21
Stage 1	-	-	0	0
Stage 2	-	-	15	21
Critical Hdwy	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.4	5.5
Follow-up Hdwy	-	-	3.5	4
Pot Cap-1 Maneuver	-	-	1009	877
Stage 1	-	-	-	-
Stage 2	-	-	1013	882
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	1009	0
Mov Cap-2 Maneuver	-	-	1009	0
Stage 1	-	-	-	0
Stage 2	-	-	1013	0

Approach	NB	SB
HCM Ctrl Dly, s/v	0	
HCM LOS		-

Minor Lane/Major Mvmt	NBT	NBR	SBLn1
Capacity (veh/h)	-	-	-
HCM Lane V/C Ratio	-	-	-
HCM Ctrl Dly (s/v)	-	-	-
HCM Lane LOS	-	-	-
HCM 95th %tile Q(veh)	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	725	37	20	250	8	40
Future Vol, veh/h	725	37	20	250	8	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	100	100	98	98
Heavy Vehicles, %	2	3	0	3	0	3
Mvmt Flow	824	42	20	250	8	41

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	866	0	1135	845
Stage 1	-	-	-	-	845	-
Stage 2	-	-	-	-	290	-
Critical Hdwy	-	-	4.1	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.327
Pot Cap-1 Maneuver	-	-	786	-	226	361
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	764	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	786	-	220	361
Mov Cap-2 Maneuver	-	-	-	-	335	-
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	745	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.72	16.69
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	357	-	-	786	-
HCM Lane V/C Ratio	0.137	-	-	0.025	-
HCM Ctrl Dly (s/v)	16.7	-	-	9.7	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.5

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	67	151	210	86	80	105
Future Vol, veh/h	67	151	210	86	80	105
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	88	88	80	80	100	100
Heavy Vehicles, %	13	1	10	5	3	19
Mvmt Flow	76	172	263	108	80	105

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	581	316	0	0	370	0
Stage 1	316	-	-	-	-	-
Stage 2	265	-	-	-	-	-
Critical Hdwy	6.53	6.21	-	-	4.13	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.309	-	-	2.227	-
Pot Cap-1 Maneuver	458	727	-	-	1183	-
Stage 1	715	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	425	727	-	-	1183	-
Mov Cap-2 Maneuver	425	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	NW	NE	SW
HCM Ctrl Dly, s/v	15.26	0	3.57
HCM LOS	C		

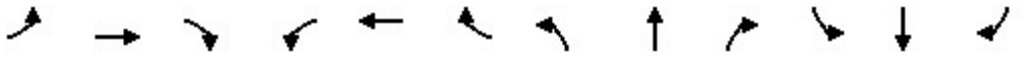
Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	596	778	-
HCM Lane V/C Ratio	-	-	0.415	0.068	-
HCM Ctrl Dly (s/v)	-	-	15.3	8.3	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2	0.2	-

Existing PM Capacity:

Queues
2: 54th Street West & Rimrock Road 10/19/2025

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	2	192	145	384	83	82	163	59	33
v/c Ratio	0.00	0.21	0.19	0.32	0.08	0.49	0.55	0.46	0.15
Control Delay (s/veh)	5.0	11.0	4.9	7.7	1.4	43.3	18.4	44.6	29.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.0	11.0	4.9	7.7	1.4	43.3	18.4	44.6	29.7
Queue Length 50th (ft)	0	46	19	60	0	39	21	29	13
Queue Length 95th (ft)	2	94	45	184	13	81	73	67	39
Internal Link Dist (ft)		4323		924			5202		920
Turn Bay Length (ft)	250		250		250	200		150	
Base Capacity (vph)	676	929	762	1194	1049	453	613	350	607
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	0.00	0.21	0.19	0.32	0.08	0.18	0.27	0.17	0.05

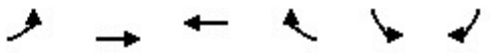
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	173	19	136	361	78	72	40	104	59	29	4
Future Volume (veh/h)	2	173	19	136	361	78	72	40	104	59	29	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1750	1750	1750	1750	1750	1750	1750	1709	1709	1750	1750
Adj Flow Rate, veh/h	2	173	19	145	384	83	82	45	118	59	29	4
Peak Hour Factor	1.00	1.00	1.00	0.94	0.94	0.94	0.88	0.88	0.88	1.00	1.00	1.00
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	3	3	0	0
Cap, veh/h	536	820	90	759	1029	872	305	74	193	178	259	36
Arrive On Green	0.00	0.53	0.53	0.06	0.59	0.59	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1667	1549	170	1667	1750	1483	1398	427	1121	1213	1505	208
Grp Volume(v), veh/h	2	0	192	145	384	83	82	0	163	59	0	33
Grp Sat Flow(s),veh/h/ln	1667	0	1719	1667	1750	1483	1398	0	1548	1213	0	1713
Q Serve(g_s), s	0.0	0.0	4.9	3.2	9.5	2.0	4.3	0.0	8.0	3.9	0.0	1.3
Cycle Q Clear(g_c), s	0.0	0.0	4.9	3.2	9.5	2.0	5.7	0.0	8.0	11.9	0.0	1.3
Prop In Lane	1.00		0.10	1.00		1.00	1.00		0.72	1.00		0.12
Lane Grp Cap(c), veh/h	536	0	910	759	1029	872	305	0	266	178	0	295
V/C Ratio(X)	0.00	0.00	0.21	0.19	0.37	0.10	0.27	0.00	0.61	0.33	0.00	0.11
Avail Cap(c_a), veh/h	704	0	910	828	1029	872	549	0	537	390	0	594
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	9.2	0.0	10.3	7.6	8.9	7.4	31.1	0.0	31.5	37.0	0.0	28.7
Incr Delay (d2), s/veh	0.0	0.0	0.5	0.1	1.0	0.2	0.5	0.0	2.3	1.1	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	0.0	0.0	1.6	0.9	3.2	0.6	1.4	0.0	3.0	1.2	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	9.2	0.0	10.8	7.7	10.0	7.6	31.6	0.0	33.8	38.1	0.0	28.9
LnGrp LOS	A		B	A	A	A	C		C	D		C
Approach Vol, veh/h		194			612			245			92	
Approach Delay, s/veh		10.8			9.1			33.0			34.8	
Approach LOS		B			A			C			C	

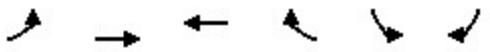
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.6	50.0		20.6	6.7	54.9		20.6				
Change Period (Y+Rc), s	6.5	6.5		6.5	6.5	6.5		6.5				
Max Green Setting (Gmax), s	8.5	43.5		28.5	8.5	43.5		28.5				
Max Q Clear Time (g_c+I1), s	5.2	6.9		13.9	2.0	11.5		10.0				
Green Ext Time (p_c), s	0.1	0.9		0.2	0.0	2.5		1.0				

Intersection Summary		
HCM 7th Control Delay, s/veh		16.6
HCM 7th LOS		B



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	122	210	436	200	124	90
v/c Ratio	0.19	0.17	0.48	0.18	0.55	0.16
Control Delay (s/veh)	4.3	4.6	16.1	1.0	44.3	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	4.3	4.6	16.1	1.0	44.3	4.8
Queue Length 50th (ft)	15	30	137	0	62	0
Queue Length 95th (ft)	35	61	223	12	122	28
Internal Link Dist (ft)		1579	3521		5202	
Turn Bay Length (ft)	400			400		250
Base Capacity (vph)	1015	1750	915	1473	860	1146
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	0.12	0.12	0.48	0.14	0.14	0.08

Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	113	195	353	162	124	90
Future Volume (veh/h)	113	195	353	162	124	90
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1723	1750	1750	1736	1736	1750
Adj Flow Rate, veh/h	122	210	436	200	124	90
Peak Hour Factor	0.93	0.93	0.81	0.81	1.00	1.00
Percent Heavy Veh, %	2	0	0	1	1	0
Cap, veh/h	568	1262	1045	1036	177	251
Arrive On Green	0.06	0.72	0.60	0.60	0.11	0.11
Sat Flow, veh/h	1641	1750	1750	1471	1654	1483
Grp Volume(v), veh/h	122	210	436	200	124	90
Grp Sat Flow(s),veh/h/ln	1641	1750	1750	1471	1654	1483
Q Serve(g_s), s	1.8	2.8	9.8	3.4	5.3	3.9
Cycle Q Clear(g_c), s	1.8	2.8	9.8	3.4	5.3	3.9
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	568	1262	1045	1036	177	251
V/C Ratio(X)	0.21	0.17	0.42	0.19	0.70	0.36
Avail Cap(c_a), veh/h	1485	2240	1045	1036	987	978
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	5.0	3.2	7.9	3.7	31.6	26.9
Incr Delay (d2), s/veh	0.2	0.1	1.2	0.4	5.0	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	0.4	0.5	3.0	1.2	2.2	3.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	5.2	3.3	9.1	4.1	36.6	27.7
LnGrp LOS	A	A	A	A	D	C
Approach Vol, veh/h		332	636		214	
Approach Delay, s/veh		4.0	7.6		32.9	
Approach LOS		A	A		C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		59.1		14.1	9.1	50.0
Change Period (Y+Rc), s		6.3		6.3	4.5	6.3
Max Green Setting (Gmax), s		93.7		43.7	45.5	43.7
Max Q Clear Time (g_c+I1), s		4.8		7.3	3.8	11.8
Green Ext Time (p_c), s		1.2		0.6	0.3	3.3

Intersection Summary	
HCM 7th Control Delay, s/veh	11.1
HCM 7th LOS	B

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	300	61	107	341	0	76	0	174	0	0	0
Future Vol, veh/h	0	300	61	107	341	0	76	0	174	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	200	-	-	200	-	-	200	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	87	87	87	100	100	100	100	100	100
Heavy Vehicles, %	0	1	2	2	0	0	1	0	3	0	0	0
Mvmt Flow	0	341	69	123	392	0	76	0	174	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	392	0	0	410	0	0	1013	1013	376	979	1048	392
Stage 1	-	-	-	-	-	-	376	376	-	638	638	-
Stage 2	-	-	-	-	-	-	638	638	-	341	410	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.11	6.5	6.23	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.509	4	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	1178	-	-	1149	-	-	218	241	669	231	230	661
Stage 1	-	-	-	-	-	-	648	620	-	468	474	-
Stage 2	-	-	-	-	-	-	467	474	-	678	599	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1178	-	-	1149	-	-	195	215	669	153	205	661
Mov Cap-2 Maneuver	-	-	-	-	-	-	195	215	-	153	205	-
Stage 1	-	-	-	-	-	-	648	620	-	418	423	-
Stage 2	-	-	-	-	-	-	417	423	-	502	599	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	2.03	19.13	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	195	669	1178	-	-	1149	-	-	-
HCM Lane V/C Ratio	0.39	0.26	-	-	-	0.107	-	-	-
HCM Ctrl Dly (s/v)	34.8	12.3	0	-	-	8.5	-	-	0
HCM Lane LOS	D	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	1.7	1	0	-	-	0.4	-	-	-

Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	370	863	85	59	4
v/c Ratio	0.30	0.79	0.45	0.22	0.02
Control Delay (s/veh)	5.5	16.6	33.4	9.8	23.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.5	16.6	33.4	9.8	23.5
Queue Length 50th (ft)	51	223	32	0	1
Queue Length 95th (ft)	107	#368	70	28	9
Internal Link Dist (ft)	3521	424	5188		424
Turn Bay Length (ft)				120	
Base Capacity (vph)	1232	1096	867	1006	884
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	0.30	0.79	0.10	0.06	0.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	295	56	112	565	5	85	0	59	3	1	0
Future Volume (veh/h)	0	295	56	112	565	5	85	0	59	3	1	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1750	1750	1750	1750	1736	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	0	311	59	142	715	6	85	0	59	3	1	0
Peak Hour Factor	0.95	0.95	0.95	0.79	0.79	0.79	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	1	0	0	0	0	1	0	0	0	0	0
Cap, veh/h	0	1009	191	219	979	8	251	0	126	141	31	0
Arrive On Green	0.00	0.71	0.71	0.71	0.71	0.71	0.08	0.00	0.08	0.08	0.08	0.00
Sat Flow, veh/h	0	1419	269	212	1376	11	1571	0	1483	456	370	0
Grp Volume(v), veh/h	0	0	370	863	0	0	85	0	59	4	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1688	1599	0	0	1571	0	1483	826	0	0
Q Serve(g_s), s	0.0	0.0	5.0	12.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	5.0	19.7	0.0	0.0	3.0	0.0	2.3	3.0	0.0	0.0
Prop In Lane	0.00		0.16	0.16		0.01	1.00		1.00	0.75		0.00
Lane Grp Cap(c), veh/h	0	0	1200	1206	0	0	251	0	126	173	0	0
V/C Ratio(X)	0.00	0.00	0.31	0.72	0.00	0.00	0.34	0.00	0.47	0.02	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1200	1206	0	0	1159	0	1062	1085	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)	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	3.3	5.2	0.0	0.0	27.0	0.0	26.7	25.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.7	3.7	0.0	0.0	0.8	0.0	2.7	0.1	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	0.0	0.0	1.1	4.3	0.0	0.0	1.2	0.0	0.9	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	3.9	8.9	0.0	0.0	27.8	0.0	29.4	25.8	0.0	0.0
LnGrp LOS			A	A			C		C	C		
Approach Vol, veh/h		370			863			144			4	
Approach Delay, s/veh		3.9			8.9			28.5			25.8	
Approach LOS		A			A			C			C	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	11.3	50.0	11.3	50.0
Change Period (Y+Rc), s	6.1	6.4	6.1	6.4
Max Green Setting (Gmax), s	43.9	43.6	43.9	43.6
Max Q Clear Time (g_c+I1), s	5.0	7.0	5.0	21.7
Green Ext Time (p_c), s	0.6	2.4	0.0	7.0

Intersection Summary	
HCM 7th Control Delay, s/veh	9.7
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	4.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	85	23	98	132	49	111
Future Vol, veh/h	85	23	98	132	49	111
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	84	84	100	100	100	100
Heavy Vehicles, %	0	2	0	0	2	0
Mvmt Flow	101	27	98	132	49	111

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	129	0	443	115
Stage 1	-	-	-	-	115	-
Stage 2	-	-	-	-	328	-
Critical Hdwy	-	-	4.1	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.2	-	3.518	3.3
Pot Cap-1 Maneuver	-	-	1470	-	572	943
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	730	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1470	-	531	943
Mov Cap-2 Maneuver	-	-	-	-	531	-
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	677	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	3.25	10.98
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	762	-	-	767	-
HCM Lane V/C Ratio	0.21	-	-	0.067	-
HCM Ctrl Dly (s/v)	11	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	142	19	28	252	53	46	84	24	36	73	10
Future Vol, veh/h	15	142	19	28	252	53	46	84	24	36	73	10
Peak Hour Factor	0.96	0.96	0.96	0.95	0.95	0.95	0.72	0.72	0.72	0.88	0.88	0.88
Heavy Vehicles, %	0	3	5	0	0	4	0	0	0	0	1	0
Mvmt Flow	16	148	20	29	265	56	64	117	33	41	83	11
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	10.5	13.1	11.3	10.3
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	30%	9%	8%	30%
Vol Thru, %	55%	81%	76%	61%
Vol Right, %	16%	11%	16%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	154	176	333	119
LT Vol	46	15	28	36
Through Vol	84	142	252	73
RT Vol	24	19	53	10
Lane Flow Rate	214	183	351	135
Geometry Grp	1	1	1	1
Degree of Util (X)	0.328	0.274	0.497	0.214
Departure Headway (Hd)	5.518	5.385	5.108	5.705
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	650	666	705	627
Service Time	3.561	3.43	3.146	3.754
HCM Lane V/C Ratio	0.329	0.275	0.498	0.215
HCM Control Delay, s/veh	11.3	10.5	13.1	10.3
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.4	1.1	2.8	0.8

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	35	148	35	11	107
Future Vol, veh/h	55	35	148	35	11	107
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	100	100	79	79	81	81
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	55	35	187	44	14	132

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	369	209	0	0	232	0
Stage 1	209	-	-	-	-	-
Stage 2	159	-	-	-	-	-
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	635	836	-	-	1348	-
Stage 1	830	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	629	836	-	-	1348	-
Mov Cap-2 Maneuver	629	-	-	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	865	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.94	0	0.72
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	696	168	-
HCM Lane V/C Ratio	-	-	0.129	0.01	-
HCM Ctrl Dly (s/v)	-	-	10.9	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0	-

Intersection	
Intersection Delay, s/veh	18.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	291	8	29	375	65	3	59	20	42	60	17
Future Vol, veh/h	30	291	8	29	375	65	3	59	20	42	60	17
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.68	0.68	0.68	0.99	0.99	0.99
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	3	0
Mvmt Flow	34	331	9	33	426	74	4	87	29	42	61	17
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	15.6	23.4	11.2	11.4
HCM LOS	C	C	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	9%	6%	35%
Vol Thru, %	72%	88%	80%	50%
Vol Right, %	24%	2%	14%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	82	329	469	119
LT Vol	3	30	29	42
Through Vol	59	291	375	60
RT Vol	20	8	65	17
Lane Flow Rate	121	374	533	120
Geometry Grp	1	1	1	1
Degree of Util (X)	0.214	0.568	0.768	0.217
Departure Headway (Hd)	6.382	5.468	5.187	6.503
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	558	654	693	548
Service Time	4.473	3.535	3.246	4.594
HCM Lane V/C Ratio	0.217	0.572	0.769	0.219
HCM Control Delay, s/veh	11.2	15.6	23.4	11.4
HCM Lane LOS	B	C	C	B
HCM 95th-tile Q	0.8	3.6	7.3	0.8

Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	77	204	6	27	271	25	2	47	29	14	38	96
Future Vol, veh/h	77	204	6	27	271	25	2	47	29	14	38	96
Peak Hour Factor	0.81	0.81	0.81	0.99	0.99	0.99	0.89	0.89	0.89	0.79	0.79	0.79
Heavy Vehicles, %	0	2	0	0	1	0	0	0	3	0	0	0
Mvmt Flow	95	252	7	27	274	25	2	53	33	18	48	122
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	13.6	12.7	9.8	10.6
HCM LOS	B	B	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	27%	8%	9%
Vol Thru, %	60%	71%	84%	26%
Vol Right, %	37%	2%	8%	65%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	78	287	323	148
LT Vol	2	77	27	14
Through Vol	47	204	271	38
RT Vol	29	6	25	96
Lane Flow Rate	88	354	326	187
Geometry Grp	1	1	1	1
Degree of Util (X)	0.141	0.512	0.469	0.283
Departure Headway (Hd)	5.798	5.202	5.175	5.441
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	616	691	695	659
Service Time	3.857	3.24	3.214	3.49
HCM Lane V/C Ratio	0.143	0.512	0.469	0.284
HCM Control Delay, s/veh	9.8	13.6	12.7	10.6
HCM Lane LOS	A	B	B	B
HCM 95th-tile Q	0.5	2.9	2.5	1.2

Intersection	
Int Delay, s/veh	8.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	67	11	22	121	60	5	107	22	26	49	13
Future Vol, veh/h	15	67	11	22	121	60	5	107	22	26	49	13
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	70	70	70	79	79	79	66	66	66	85	85	85
Heavy Vehicles, %	0	3	9	0	0	0	0	0	0	0	2	0
Mvmt Flow	21	96	16	28	153	76	8	162	33	31	58	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	380	337	65	361	328	179	73	0	0	195	0	0
Stage 1	126	126	-	194	194	-	-	-	-	-	-	-
Stage 2	254	211	-	167	134	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.53	6.29	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.53	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.53	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.027	3.381	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	581	582	979	599	594	869	1540	-	-	1390	-	-
Stage 1	882	789	-	812	744	-	-	-	-	-	-	-
Stage 2	755	726	-	840	789	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	381	566	979	478	577	869	1540	-	-	1390	-	-
Mov Cap-2 Maneuver	381	566	-	478	577	-	-	-	-	-	-	-
Stage 1	862	771	-	808	740	-	-	-	-	-	-	-
Stage 2	543	722	-	707	771	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	13.61	14.72	0.27	2.26
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	65	-	-	550	625	510	-	-
HCM Lane V/C Ratio	0.005	-	-	0.241	0.411	0.022	-	-
HCM Ctrl Dly (s/v)	7.3	0	-	13.6	14.7	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	2	0.1	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	156	1	25	293	42	2	41	19	19	27	9
Future Vol, veh/h	8	156	1	25	293	42	2	41	19	19	27	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	81	81	81	89	89	89	100	100	100	67	67	67
Heavy Vehicles, %	13	2	0	0	1	0	0	0	0	5	0	0
Mvmt Flow	10	193	1	28	329	47	2	41	19	28	40	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	376	0	0	194	0	0	619	646	193	642	623	353
Stage 1	-	-	-	-	-	-	213	213	-	409	409	-
Stage 2	-	-	-	-	-	-	406	433	-	233	214	-
Critical Hdwy	4.23	-	-	4.1	-	-	7.1	6.5	6.2	7.15	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.5	-
Follow-up Hdwy	2.317	-	-	2.2	-	-	3.5	4	3.3	3.545	4	3.3
Pot Cap-1 Maneuver	1124	-	-	1391	-	-	404	393	853	383	405	695
Stage 1	-	-	-	-	-	-	794	730	-	613	600	-
Stage 2	-	-	-	-	-	-	626	585	-	763	730	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1124	-	-	1391	-	-	344	379	853	323	391	695
Mov Cap-2 Maneuver	-	-	-	-	-	-	344	379	-	323	391	-
Stage 1	-	-	-	-	-	-	786	723	-	598	584	-
Stage 2	-	-	-	-	-	-	557	570	-	697	722	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.4	0.53	14.15	16.65
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	455	87	-	-	122	-	-	391
HCM Lane V/C Ratio	0.136	0.009	-	-	0.02	-	-	0.21
HCM Ctrl Dly (s/v)	14.2	8.2	0	-	7.6	0	-	16.6
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.5	0	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	47	2	15	106	27	4	46	16	10	25	20
Future Vol, veh/h	15	47	2	15	106	27	4	46	16	10	25	20
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	100	100	100	74	74	74	100	100	100	60	86	86
Heavy Vehicles, %	0	4	0	0	0	4	0	4	19	0	0	5
Mvmt Flow	15	47	2	20	143	36	4	46	16	17	29	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	200	144	41	148	148	54	52	0	0	62	0	0
Stage 1	74	74	-	62	62	-	-	-	-	-	-	-
Stage 2	126	70	-	86	86	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.54	6.2	7.1	6.5	6.24	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.036	3.3	3.5	4	3.336	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	763	744	1036	825	747	1008	1566	-	-	1554	-	-
Stage 1	940	829	-	954	847	-	-	-	-	-	-	-
Stage 2	883	833	-	927	828	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	586	733	1036	761	737	1008	1566	-	-	1554	-	-
Mov Cap-2 Maneuver	586	733	-	761	737	-	-	-	-	-	-	-
Stage 1	930	820	-	952	845	-	-	-	-	-	-	-
Stage 2	705	831	-	862	819	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	10.67	11.22	0.44	1.77
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	104	-	-	699	778	399	-	-
HCM Lane V/C Ratio	0.003	-	-	0.092	0.257	0.011	-	-
HCM Ctrl Dly (s/v)	7.3	0	-	10.7	11.2	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	1	0	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	112	1	38	185	17	0	17	40	10	16	17
Future Vol, veh/h	4	112	1	38	185	17	0	17	40	10	16	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	100	100	100	80	80	80	100	100	100	72	72	72
Heavy Vehicles, %	0	6	0	3	1	0	0	0	5	0	0	0
Mvmt Flow	4	112	1	48	231	21	0	17	40	14	22	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	253	0	0	113	0	0	458	468	113	465	458	242
Stage 1	-	-	-	-	-	-	121	121	-	337	337	-
Stage 2	-	-	-	-	-	-	337	348	-	129	121	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.5	6.25	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	-	-	2.227	-	-	3.5	4	3.345	3.5	4	3.3
Pot Cap-1 Maneuver	1325	-	-	1470	-	-	517	496	932	511	502	802
Stage 1	-	-	-	-	-	-	889	800	-	682	645	-
Stage 2	-	-	-	-	-	-	681	638	-	880	800	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1325	-	-	1470	-	-	460	476	932	453	482	802
Mov Cap-2 Maneuver	-	-	-	-	-	-	460	476	-	453	482	-
Stage 1	-	-	-	-	-	-	886	797	-	656	621	-
Stage 2	-	-	-	-	-	-	613	614	-	822	797	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.26	1.19	10.39	12.16
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	725	61	-	-	280	-	-	562
HCM Lane V/C Ratio	0.079	0.003	-	-	0.032	-	-	0.106
HCM Ctrl Dly (s/v)	10.4	7.7	0	-	7.5	0	-	12.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.4

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	146	190	117	47	41
Future Vol, veh/h	55	146	190	117	47	41
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	97	97	79	79	69	69
Heavy Vehicles, %	0	1	0	0	0	0
Mvmt Flow	57	151	241	148	68	59

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	389	0	-	0	578	315
Stage 1	-	-	-	-	315	-
Stage 2	-	-	-	-	264	-
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	1181	-	-	-	481	731
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	785	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1181	-	-	-	456	731
Mov Cap-2 Maneuver	-	-	-	-	456	-
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	785	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	2.24	0	13.46
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	493	-	-	-	553
HCM Lane V/C Ratio	0.048	-	-	-	0.231
HCM Ctrl Dly (s/v)	8.2	0	-	-	13.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.9

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	18	38	11	13	9
Future Vol, veh/h	12	18	38	11	13	9
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	50	50	71	71	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	24	36	54	15	16	11

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	54	69
Stage 1	-	-	0	0
Stage 2	-	-	54	69
Critical Hdwy	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.4	5.5
Follow-up Hdwy	-	-	3.5	4
Pot Cap-1 Maneuver	-	-	960	825
Stage 1	-	-	-	-
Stage 2	-	-	974	841
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	960	0
Mov Cap-2 Maneuver	-	-	960	0
Stage 1	-	-	-	0
Stage 2	-	-	974	0

Approach	NB	SB
HCM Ctrl Dly, s/v	0	
HCM LOS		-

Minor Lane/Major Mvmt	NBT	NBR	SBLn1
Capacity (veh/h)	-	-	-
HCM Lane V/C Ratio	-	-	-
HCM Ctrl Dly (s/v)	-	-	-
HCM Lane LOS	-	-	-
HCM 95th %tile Q(veh)	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	325	16	47	608	14	19
Future Vol, veh/h	325	16	47	608	14	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	86	86	100	100
Heavy Vehicles, %	2	0	0	0	0	5
Mvmt Flow	339	17	55	707	14	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	355	0	1163	347
Stage 1	-	-	-	-	347	-
Stage 2	-	-	-	-	816	-
Critical Hdwy	-	-	4.1	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.345
Pot Cap-1 Maneuver	-	-	1215	-	217	689
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	438	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1215	-	207	689
Mov Cap-2 Maneuver	-	-	-	-	326	-
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	418	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.58	13.28
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	468	-	-	1215	-
HCM Lane V/C Ratio	0.071	-	-	0.045	-
HCM Ctrl Dly (s/v)	13.3	-	-	8.1	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	17.3

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	59	371	129	48	146	208
Future Vol, veh/h	59	371	129	48	146	208
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	70	70	83	83	100	100
Heavy Vehicles, %	2	2	5	0	0	1
Mvmt Flow	84	530	155	58	146	208

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	684	184	0	0	213	0
Stage 1	184	-	-	-	-	-
Stage 2	500	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.1	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.2	-
Pot Cap-1 Maneuver	414	858	-	-	1369	-
Stage 1	847	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	364	858	-	-	1369	-
Mov Cap-2 Maneuver	364	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	536	-	-	-	-	-

Approach	NW	NE	SW
HCM Ctrl Dly, s/v	31.3	0	3.28
HCM LOS	D		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	723	742	-
HCM Lane V/C Ratio	-	-	0.849	0.107	-
HCM Ctrl Dly (s/v)	-	-	31.3	7.9	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	9.8	0.4	-

MOVEMENT SUMMARY

Site: [101] King Ave & 56th St AM (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	84	3.0	84	3.0	0.306	6.8	LOS A	1.6	39.7	0.50	0.33	0.50	37.2
4	T1	All MCs	165	0.8	165	0.8	0.306	6.5	LOS A	1.6	39.7	0.50	0.33	0.50	36.5
14	R2	All MCs	63	0.0	63	0.0	0.306	6.5	LOS A	1.6	39.7	0.50	0.33	0.50	37.7
Approach			311	1.2	311	1.2	0.306	6.6	LOS A	1.6	39.7	0.50	0.33	0.50	36.9
West: King Avenue															
5	L2	All MCs	76	6.2	76	6.2	0.455	9.1	LOS A	2.7	69.1	0.58	0.37	0.58	35.5
2	T1	All MCs	360	1.3	360	1.3	0.455	8.5	LOS A	2.7	69.1	0.58	0.37	0.58	38.3
12	R2	All MCs	24	10.0	24	10.0	0.455	9.5	LOS A	2.7	69.1	0.58	0.37	0.58	35.4
Approach			460	2.6	460	2.6	0.455	8.7	LOS A	2.7	69.1	0.58	0.37	0.58	37.6
South: 56th Street West															
3	L2	All MCs	22	0.0	22	0.0	0.195	6.3	LOS A	0.8	20.7	0.58	0.47	0.58	37.8
8	T1	All MCs	96	3.9	96	3.9	0.195	6.9	LOS A	0.8	20.7	0.58	0.47	0.58	36.2
18	R2	All MCs	30	4.2	30	4.2	0.195	6.9	LOS A	0.8	20.7	0.58	0.47	0.58	37.3
Approach			149	3.4	149	3.4	0.195	6.8	LOS A	0.8	20.7	0.58	0.47	0.58	36.7
East: King Avenue															
1	L2	All MCs	22	5.9	22	5.9	0.256	5.9	LOS A	1.3	32.5	0.41	0.24	0.41	37.4
6	T1	All MCs	233	2.7	233	2.7	0.256	5.6	LOS A	1.3	32.5	0.41	0.24	0.41	40.3
16	R2	All MCs	19	20.0	19	20.0	0.256	7.2	LOS A	1.3	32.5	0.41	0.24	0.41	35.8
Approach			274	4.2	274	4.2	0.256	5.7	LOS A	1.3	32.5	0.41	0.24	0.41	39.7
All Vehicles			1195	2.7	1195	2.7	0.455	7.2	LOS A	2.7	69.1	0.52	0.34	0.52	37.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [102] King Ave & 56th St PM (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	43	0.0	43	0.0	0.192	5.4	LOS A	0.9	22.3	0.47	0.32	0.47	38.6
4	T1	All MCs	73	0.0	73	0.0	0.192	5.4	LOS A	0.9	22.3	0.47	0.32	0.47	37.5
14	R2	All MCs	76	0.0	76	0.0	0.192	5.4	LOS A	0.9	22.3	0.47	0.32	0.47	38.8
Approach			192	0.0	192	0.0	0.192	5.4	LOS A	0.9	22.3	0.47	0.32	0.47	38.3
West: King Avenue															
5	L2	All MCs	48	0.0	48	0.0	0.246	5.1	LOS A	1.3	32.0	0.33	0.16	0.33	38.6
2	T1	All MCs	235	1.5	235	1.5	0.246	5.2	LOS A	1.3	32.0	0.33	0.16	0.33	40.6
12	R2	All MCs	8	14.3	8	14.3	0.246	6.2	LOS A	1.3	32.0	0.33	0.16	0.33	36.7
Approach			290	1.6	290	1.6	0.246	5.2	LOS A	1.3	32.0	0.33	0.16	0.33	40.2
South: 56th Street West															
3	L2	All MCs	32	0.0	32	0.0	0.234	5.9	LOS A	1.1	27.9	0.50	0.34	0.50	39.7
8	T1	All MCs	172	0.0	172	0.0	0.234	5.9	LOS A	1.1	27.9	0.50	0.34	0.50	38.5
18	R2	All MCs	25	5.0	25	5.0	0.234	6.4	LOS A	1.1	27.9	0.50	0.34	0.50	39.0
Approach			229	0.6	229	0.6	0.234	5.9	LOS A	1.1	27.9	0.50	0.34	0.50	38.8
East: King Avenue															
1	L2	All MCs	18	0.0	18	0.0	0.329	6.6	LOS A	1.8	44.5	0.48	0.30	0.48	38.0
6	T1	All MCs	263	1.2	263	1.2	0.329	6.7	LOS A	1.8	44.5	0.48	0.30	0.48	40.0
16	R2	All MCs	66	0.0	66	0.0	0.329	6.6	LOS A	1.8	44.5	0.48	0.30	0.48	38.4
Approach			348	0.9	348	0.9	0.329	6.7	LOS A	1.8	44.5	0.48	0.30	0.48	39.6
All Vehicles			1059	0.9	1059	0.9	0.329	5.9	LOS A	1.8	44.5	0.44	0.28	0.44	39.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [103] Central Ave & 56th St AM (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	131	2.2	131	2.2	0.316	6.1	LOS A	1.7	43.8	0.39	0.21	0.39	35.6
4	T1	All MCs	228	1.9	228	1.9	0.316	6.1	LOS A	1.7	43.8	0.39	0.21	0.39	36.3
14	R2	All MCs	1	0.0	1	0.0	0.316	5.9	LOS A	1.7	43.8	0.39	0.21	0.39	36.3
Approach			361	2.0	361	2.0	0.316	6.1	LOS A	1.7	43.8	0.39	0.21	0.39	36.1
West: Central Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.095	5.0	LOS A	0.4	9.9	0.51	0.39	0.51	37.5
2	T1	All MCs	68	0.0	68	0.0	0.095	5.0	LOS A	0.4	9.9	0.51	0.39	0.51	38.3
12	R2	All MCs	14	0.0	14	0.0	0.095	5.0	LOS A	0.4	9.9	0.51	0.39	0.51	37.9
Approach			83	0.0	83	0.0	0.095	5.0	LOS A	0.4	9.9	0.51	0.39	0.51	38.2
South: 56th Street West															
3	L2	All MCs	4	75.0	4	75.0	0.154	12.3	LOS B	0.7	17.7	0.37	0.21	0.37	27.9
8	T1	All MCs	73	6.1	73	6.1	0.154	4.8	LOS A	0.7	17.7	0.37	0.21	0.37	37.6
18	R2	All MCs	87	0.0	87	0.0	0.154	4.4	LOS A	0.7	17.7	0.37	0.21	0.37	38.2
Approach			164	4.7	164	4.7	0.154	4.7	LOS A	0.7	17.7	0.37	0.21	0.37	37.6
East: Central Avenue															
1	L2	All MCs	80	2.1	80	2.1	0.211	4.5	LOS A	1.0	26.8	0.25	0.10	0.25	36.5
6	T1	All MCs	72	4.7	72	4.7	0.211	4.7	LOS A	1.0	26.8	0.25	0.10	0.25	36.9
16	R2	All MCs	100	10.0	100	10.0	0.211	5.1	LOS A	1.0	26.8	0.25	0.10	0.25	35.7
Approach			252	6.0	252	6.0	0.211	4.8	LOS A	1.0	26.8	0.25	0.10	0.25	36.3
All Vehicles			860	3.5	860	3.5	0.316	5.4	LOS A	1.7	43.8	0.36	0.20	0.36	36.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [104] Central Ave & 56th St PM (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	32	0.0	32	0.0	0.174	4.6	LOS A	0.8	20.8	0.35	0.19	0.35	37.3
4	T1	All MCs	156	0.9	156	0.9	0.174	4.6	LOS A	0.8	20.8	0.35	0.19	0.35	37.9
14	R2	All MCs	12	0.0	12	0.0	0.174	4.6	LOS A	0.8	20.8	0.35	0.19	0.35	37.7
Approach			200	0.7	200	0.7	0.174	4.6	LOS A	0.8	20.8	0.35	0.19	0.35	37.8
West: Central Avenue															
5	L2	All MCs	2	0.0	2	0.0	0.091	4.2	LOS A	0.4	9.8	0.39	0.25	0.39	38.0
2	T1	All MCs	85	0.0	85	0.0	0.091	4.2	LOS A	0.4	9.8	0.39	0.25	0.39	38.8
12	R2	All MCs	10	0.0	10	0.0	0.091	4.2	LOS A	0.4	9.8	0.39	0.25	0.39	38.4
Approach			96	0.0	96	0.0	0.091	4.2	LOS A	0.4	9.8	0.39	0.25	0.39	38.7
South: 56th Street West															
3	L2	All MCs	11	0.0	11	0.0	0.203	4.7	LOS A	1.0	25.6	0.29	0.14	0.29	37.7
8	T1	All MCs	186	0.0	186	0.0	0.203	4.7	LOS A	1.0	25.6	0.29	0.14	0.29	38.4
18	R2	All MCs	52	0.0	52	0.0	0.203	4.7	LOS A	1.0	25.6	0.29	0.14	0.29	38.1
Approach			249	0.0	249	0.0	0.203	4.7	LOS A	1.0	25.6	0.29	0.14	0.29	38.3
East: Central Avenue															
1	L2	All MCs	69	0.0	69	0.0	0.211	5.1	LOS A	1.0	25.9	0.39	0.22	0.39	36.8
6	T1	All MCs	94	0.0	94	0.0	0.211	5.1	LOS A	1.0	25.9	0.39	0.22	0.39	37.5
16	R2	All MCs	75	0.0	75	0.0	0.211	5.1	LOS A	1.0	25.9	0.39	0.22	0.39	37.2
Approach			238	0.0	238	0.0	0.211	5.1	LOS A	1.0	25.9	0.39	0.22	0.39	37.2
All Vehicles			783	0.2	783	0.2	0.211	4.7	LOS A	1.0	25.9	0.35	0.19	0.35	37.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [103 (2)] Rimrock Rd & 62nd St AM (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV %]	Arrival Flows [Total veh/h	HV %]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 62nd Street West															
7	L2	All MCs	527	0.0	527	0.0	0.565	9.2	LOS A	4.6	115.9	0.49	0.24	0.49	33.2
4	T1	All MCs	156	1.0	156	1.0	0.565	9.3	LOS A	4.6	115.9	0.49	0.24	0.49	32.0
14	R2	All MCs	3	0.0	3	0.0	0.565	9.2	LOS A	4.6	115.9	0.49	0.24	0.49	33.4
Approach			686	0.2	686	0.2	0.565	9.2	LOS A	4.6	115.9	0.49	0.24	0.49	32.9
West: Rimrock Road															
5	L2	All MCs	2	0.0	2	0.0	0.356	10.0	LOS A	1.7	42.7	0.70	0.65	0.80	34.2
2	T1	All MCs	136	3.0	136	3.0	0.356	10.6	LOS B	1.7	42.7	0.70	0.65	0.80	36.3
12	R2	All MCs	89	1.0	89	1.0	0.356	10.2	LOS B	1.7	42.7	0.70	0.65	0.80	34.4
Approach			227	2.2	227	2.2	0.356	10.5	LOS B	1.7	42.7	0.70	0.65	0.80	35.5
South: 62nd Street West															
3	L2	All MCs	22	12.0	22	12.0	0.143	8.0	LOS A	0.5	13.4	0.61	0.53	0.61	33.5
8	T1	All MCs	31	17.0	31	17.0	0.143	9.0	LOS A	0.5	13.4	0.61	0.53	0.61	31.9
18	R2	All MCs	31	4.0	31	4.0	0.143	6.6	LOS A	0.5	13.4	0.61	0.53	0.61	34.8
Approach			84	10.9	84	10.9	0.143	7.8	LOS A	0.5	13.4	0.61	0.53	0.61	33.3
East: Rimrock Road															
1	L2	All MCs	35	4.0	35	4.0	0.164	4.2	LOS A	0.8	19.9	0.20	0.07	0.20	36.7
6	T1	All MCs	53	17.0	53	17.0	0.164	5.0	LOS A	0.8	19.9	0.20	0.07	0.20	37.8
16	R2	All MCs	113	0.0	113	0.0	0.164	3.9	LOS A	0.8	19.9	0.20	0.07	0.20	37.8
Approach			201	5.2	201	5.2	0.164	4.2	LOS A	0.8	19.9	0.20	0.07	0.20	37.6
All Vehicles			1199	2.2	1199	2.2	0.565	8.5	LOS A	4.6	115.9	0.49	0.31	0.51	34.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 10.0 | Copyright © 2000-2025 Akcelik and Associates Pty Ltd | sidrasolutions.com
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Project: P:\23379_Yellowstone_County_West_Billings_Neighborhood_Plan\TRAFFIC\Capacity Calcs\Existing\Roundabouts\West Billings RABs Existing.sipx

MOVEMENT SUMMARY

Site: [103 (3)] Rimrock Rd & 62nd St PM (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 62nd Street West															
7	L2	All MCs	141	0.0	141	0.0	0.182	4.9	LOS A	0.9	21.6	0.40	0.24	0.40	35.6
4	T1	All MCs	53	0.0	53	0.0	0.182	4.9	LOS A	0.9	21.6	0.40	0.24	0.40	34.4
14	R2	All MCs	6	0.0	6	0.0	0.182	4.9	LOS A	0.9	21.6	0.40	0.24	0.40	35.8
Approach			200	0.0	200	0.0	0.182	4.9	LOS A	0.9	21.6	0.40	0.24	0.40	35.3
West: Rimrock Road															
5	L2	All MCs	2	0.0	2	0.0	0.111	4.2	LOS A	0.5	12.3	0.37	0.22	0.37	37.7
2	T1	All MCs	77	2.0	77	2.0	0.111	4.3	LOS A	0.5	12.3	0.37	0.22	0.37	40.4
12	R2	All MCs	40	0.0	40	0.0	0.111	4.2	LOS A	0.5	12.3	0.37	0.22	0.37	38.2
Approach			120	1.3	120	1.3	0.111	4.3	LOS A	0.5	12.3	0.37	0.22	0.37	39.6
South: 62nd Street West															
3	L2	All MCs	99	0.0	99	0.0	0.186	4.9	LOS A	0.9	22.2	0.40	0.24	0.40	36.1
8	T1	All MCs	88	0.0	88	0.0	0.186	4.9	LOS A	0.9	22.2	0.40	0.24	0.40	34.9
18	R2	All MCs	18	0.0	18	0.0	0.186	4.9	LOS A	0.9	22.2	0.40	0.24	0.40	36.4
Approach			205	0.0	205	0.0	0.186	4.9	LOS A	0.9	22.2	0.40	0.24	0.40	35.6
East: Rimrock Road															
1	L2	All MCs	30	0.0	30	0.0	0.347	6.5	LOS A	2.0	49.6	0.44	0.25	0.44	36.3
6	T1	All MCs	94	0.0	94	0.0	0.347	6.5	LOS A	2.0	49.6	0.44	0.25	0.44	39.1
16	R2	All MCs	271	0.0	271	0.0	0.347	6.5	LOS A	2.0	49.6	0.44	0.25	0.44	36.7
Approach			395	0.0	395	0.0	0.347	6.5	LOS A	2.0	49.6	0.44	0.25	0.44	37.2
All Vehicles			920	0.2	920	0.2	0.347	5.5	LOS A	2.0	49.6	0.41	0.24	0.41	36.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: P:\23379_Yellowstone_County_West_Billings_Neighborhood_Plan\TRAFFIC\Capacity Calcs\Existing\Roundabouts\West Billings RABs Existing.sipx

APPENDIX E

TRAFFIC GENERATION ASSUMPTIONS & WORKFLOW DIAGRAM

Appendix E Contents

FLUM ASSUMPTIONS & WORKFLOW DIAGRAM 366

TRAFFIC GENERATIONASSUMPTIONS & WORKFLOW DIAGRAM

Flowchart:

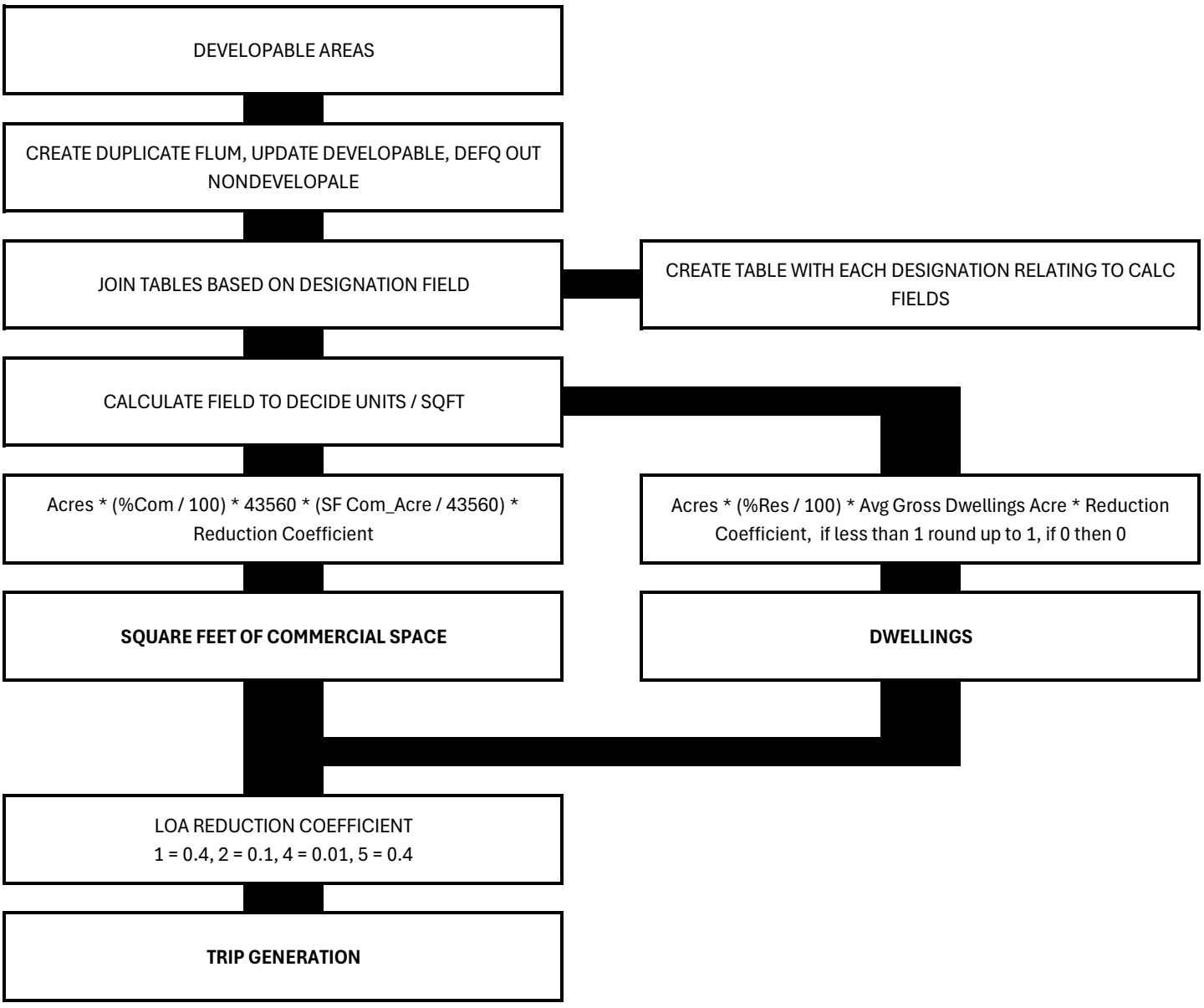

Figure E.1 Data Workflow

Category	% Com	% Res	Avg Gross Dwellings/ Acre	SF Com/ Acre
RRA	0.00	100%	0.25	-
CN	0	100%	0.35	-
URL	0.0	100%	3.40	-
UR	10%	90%	6.00	26,136
URM	20%	80%	7.00	21,780
UN	33%	67%	16.00	17,424
CM	80%	20%	6.00	14,375
DU	n/a	n/a	n/a	n/a
EI	100%	0%	n/a	14,375
OS	n/a	n/a	n/a	n/a
PI	n/a	n/a	n/a	10,890

Figure E.2 Trip Generation Assumptions

TRIP GENERATION SUMMARY

Figure E.3 Trip Generation Summary

(1)	Manufacturing - Land Use 140*	Units = 1000 SF GFA	
	Average Weekday:	Average Rate = 4.75	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 0.68	(76% entering/24% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 0.74	(31% entering/69% exiting)
(2)	Warehousing - Land Use 150*	Units = 1000 SF GFA	
	Average Weekday:	Average Rate = 1.71	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 0.17	(77% entering/23% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 0.18	(28% entering/72% exiting)
(3)	Single-Family Detached Housing - Land Use 210*	Units = Dwelling Units	
	Average Weekday:	Average Rate = 9.43	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 0.70	(25% entering/75% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 0.94	(63% entering/37% exiting)
(4)	Single-Family Attached Housing - Land Use 215*	Units = Dwelling Units	
	Average Weekday:	Average Rate = 7.20	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 0.48	(25% entering/75% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 0.57	(59% entering/41% exiting)
(5)	Multifamily Housing (Low-Rise) - Land Use 220*	Units = Dwelling Units	
	Average Weekday:	Average Rate = 6.74	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 0.40	(24% entering/76% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 0.51	(63% entering/37% exiting)
(6)	Low-Rise Residential with Ground-Floor Commercial - Land Use 230*	Units = Dwelling Units	
	Average Weekday:	Average Rate = 3.44	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 0.44	(23% entering/77% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 0.36	(71% entering/29% exiting)
(7)	High School - Land Use 525*	Units = Students	
	Average Weekday:	Average Rate = 1.94	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 0.52	(68% entering/32% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 0.14	(48% entering/52% exiting)
(8)	Clinic - Land Use 630*	Units = 1000 SF GFA	
	Average Weekday:	Average Rate = 37.6	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 2.75	(81% entering/19% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 3.69	(30% entering/70% exiting)
(9)	General Office Building - Land Use 710*	Units = 1000 SF GFA	
	Average Weekday:	Average Rate = 10.84	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 1.52	(88% entering/12% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 1.44	(17% entering/83% exiting)
(10)	Shopping Center (>150K) - Land Use 820*	Units = 1000 SF GFA	
	Average Weekday:	Average Rate = 37.01	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 0.84	(62% entering/38% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 3.40	(48% entering/52% exiting)
(11)	Strip Retail Plaza (<40K) - Land Use 822*	Units = 1000 SF GFA	
	Average Weekday:	Average Rate = 54.45	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 2.36	(60% entering/40% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 6.59	(50% entering/50% exiting)
(12)	Supermatket - Land Use 850*	Units = 1000 SF GFA	
	Average Weekday:	Average Rate = 93.84	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 2.86	(59% entering/41% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 8.95	(50% entering/50% exiting)
(13)	Drive-in Bank - Land Use 912*	Units = 1000 SF GFA	
	Average Weekday:	Average Rate = 100.35	(50% entering/50% exiting)
	Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM:	Average Rate = 9.95	(58% entering/42% exiting)
	Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM:	Average Rate = 21.01	(50% entering/50% exiting)

**Trip Generation, 11th Edition*, Institute of Transportation Engineers, 2021

***Trip Generation Handbook, 3rd Edition*, Institute of Transportation Engineers, 2017

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APPENDIX F

FUTURE (2044) CAPACITY CALCULATIONS

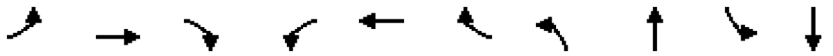
Appendix F Contents

Future (2044) Capacity Calculations 372

Future (2044) Capacity Calculations

Future AM Capacity:

Queues
2: 54th Street West & Rimrock Road 10/07/2025



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	2	959	122	214	221	57	36	334	184	119
v/c Ratio	0.01	1.29	0.17	1.08	0.23	0.07	0.11	0.57	1.11	0.24
Control Delay (s/veh)	9.0	166.0	4.9	112.2	13.0	0.5	27.7	14.2	138.1	28.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	9.0	166.0	4.9	112.2	13.0	0.5	27.7	14.2	138.1	28.3
Queue Length 50th (ft)	1	~781	5	~109	63	0	17	53	~134	57
Queue Length 95th (ft)	4	#1022	37	#263	138	3	42	142	#271	103
Internal Link Dist (ft)		4323			924			5202		920
Turn Bay Length (ft)	250			250		250	200		150	
Base Capacity (vph)	306	746	708	199	942	798	320	588	166	496
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	0.01	1.29	0.17	1.08	0.23	0.07	0.11	0.57	1.11	0.24

Intersection Summary

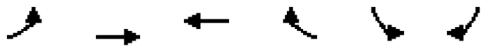
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	882	112	197	203	52	33	29	278	169	103	6
Future Volume (veh/h)	2	882	112	197	203	52	33	29	278	169	103	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	385	1723	1750	1723	1695	1600	1668	1750	1736	1709	1750	1750
Adj Flow Rate, veh/h	2	959	122	214	221	57	36	32	302	184	112	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	2	0	2	4	11	6	0	1	3	0	0
Cap, veh/h	180	749	645	211	877	701	358	41	388	156	464	29
Arrive On Green	0.00	0.44	0.44	0.09	0.52	0.52	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	367	1723	1483	1641	1695	1356	1232	144	1361	1038	1630	102
Grp Volume(v), veh/h	2	959	122	214	221	57	36	0	334	184	0	119
Grp Sat Flow(s),veh/h/ln	367	1723	1483	1641	1695	1356	1232	0	1505	1038	0	1732
Q Serve(g_s), s	0.3	43.5	5.1	8.5	7.2	2.1	2.3	0.0	20.4	8.1	0.0	5.3
Cycle Q Clear(g_c), s	0.3	43.5	5.1	8.5	7.2	2.1	7.6	0.0	20.4	28.5	0.0	5.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.90	1.00		0.06
Lane Grp Cap(c), veh/h	180	749	645	211	877	701	358	0	429	156	0	494
V/C Ratio(X)	0.01	1.28	0.19	1.01	0.25	0.08	0.10	0.00	0.78	1.18	0.00	0.24
Avail Cap(c_a), veh/h	210	749	645	211	877	701	358	0	429	156	0	494
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	15.9	28.3	17.4	28.6	13.4	12.2	30.4	0.0	32.9	47.8	0.0	27.4
Incr Delay (d2), s/veh	0.0	136.0	0.6	65.0	0.7	0.2	0.1	0.0	8.9	128.0	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	0.0	43.8	1.7	6.0	2.7	0.6	0.7	0.0	8.0	9.5	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	15.9	164.3	18.0	93.7	14.1	12.4	30.5	0.0	41.7	175.8	0.0	27.7
LnGrp LOS	B	F	B	F	B	B	C		D	F		C
Approach Vol, veh/h		1083			492			370			303	
Approach Delay, s/veh		147.5			48.5			40.6			117.7	
Approach LOS		F			D			D			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.0	50.0		35.0	6.8	58.2		35.0				
Change Period (Y+Rc), s	6.5	6.5		6.5	6.5	6.5		6.5				
Max Green Setting (Gmax), s	8.5	43.5		28.5	8.5	43.5		28.5				
Max Q Clear Time (g_c+I1), s	10.5	45.5		30.5	2.3	9.2		22.4				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	1.4		1.1				

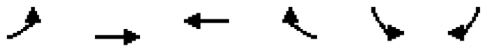
Intersection Summary		
HCM 7th Control Delay, s/veh		104.2
HCM 7th LOS		F



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	204	771	360	140	442	286
v/c Ratio	0.40	0.78	0.54	0.12	0.84	0.34
Control Delay (s/veh)	14.5	27.0	30.5	0.7	52.1	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.5	27.0	30.5	0.7	52.1	5.7
Queue Length 50th (ft)	70	432	203	0	289	25
Queue Length 95th (ft)	120	664	328	12	#533	87
Internal Link Dist (ft)		1579	3521		5202	
Turn Bay Length (ft)	400			400		250
Base Capacity (vph)	784	1437	671	1247	636	1194
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	0.26	0.54	0.54	0.11	0.69	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	188	709	331	129	407	263
Future Volume (veh/h)	188	709	331	129	407	263
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1736	1736	1668	1709	1736	1736
Adj Flow Rate, veh/h	204	771	360	140	442	286
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	6	3	1	1
Cap, veh/h	479	998	735	1070	493	570
Arrive On Green	0.09	0.57	0.44	0.44	0.30	0.30
Sat Flow, veh/h	1654	1736	1668	1448	1654	1471
Grp Volume(v), veh/h	204	771	360	140	442	286
Grp Sat Flow(s),veh/h/ln	1654	1736	1668	1448	1654	1471
Q Serve(g_s), s	6.3	33.7	15.3	2.8	25.4	14.7
Cycle Q Clear(g_c), s	6.3	33.7	15.3	2.8	25.4	14.7
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	479	998	735	1070	493	570
V/C Ratio(X)	0.43	0.77	0.49	0.13	0.90	0.50
Avail Cap(c_a), veh/h	1090	1640	735	1070	728	779
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	13.4	16.1	19.8	3.7	33.3	23.1
Incr Delay (d2), s/veh	0.6	1.3	2.3	0.3	10.0	0.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	11.6	5.9	1.9	10.9	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	14.0	17.4	22.1	4.0	43.3	23.8
LnGrp LOS	B	B	C	A	D	C
Approach Vol, veh/h		975	500		728	
Approach Delay, s/veh		16.7	17.1		35.7	
Approach LOS		B	B		D	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		63.3		35.9	13.3	50.0
Change Period (Y+Rc), s		6.3		6.3	4.5	6.3
Max Green Setting (Gmax), s		93.7		43.7	45.5	43.7
Max Q Clear Time (g_c+I1), s		35.7		27.4	8.3	17.3
Green Ext Time (p_c), s		5.9		2.2	0.6	2.5
Intersection Summary						
HCM 7th Control Delay, s/veh			23.1			
HCM 7th LOS			C			

Lane Group	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	1229	176	549	57	196
v/c Ratio	0.90	0.96	0.40	0.51	0.60
Control Delay (s/veh)	18.9	72.7	4.1	64.5	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	18.9	72.7	4.1	64.5	13.0
Queue Length 50th (ft)	460	83	83	40	0
Queue Length 95th (ft)	#1176	#149	161	84	53
Internal Link Dist (ft)	3542		1579		5173
Turn Bay Length (ft)		200		200	
Base Capacity (vph)	1368	184	1389	178	387
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	0.90	0.96	0.40	0.32	0.51

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	884	247	162	505	0	52	0	180	0	0	0
Future Volume (veh/h)	0	884	247	162	505	0	52	0	180	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1695	1641	1709	1750	1600	1750	1627	1750	1750	1750
Adj Flow Rate, veh/h	0	961	268	176	549	0	57	0	196	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	4	8	3	0	11	0	9	0	0	0
Cap, veh/h	60	1012	282	124	1325	0	276	0	210	0	248	0
Arrive On Green	0.00	0.77	0.77	0.77	0.77	0.00	0.14	0.00	0.14	0.00	0.00	0.00
Sat Flow, veh/h	872	1306	364	432	1709	0	1524	0	1483	0	1750	0
Grp Volume(v), veh/h	0	0	1229	176	549	0	57	0	196	0	0	0
Grp Sat Flow(s),veh/h/ln	872	0	1671	432	1709	0	1524	0	1483	0	1750	0
Q Serve(g_s), s	0.0	0.0	75.1	17.9	12.8	0.0	4.0	0.0	15.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	75.1	93.0	12.8	0.0	4.0	0.0	15.7	0.0	0.0	0.0
Prop In Lane	1.00		0.22	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	60	0	1295	124	1325	0	276	0	210	0	248	0
V/C Ratio(X)	0.00	0.00	0.95	1.42	0.41	0.00	0.21	0.00	0.93	0.00	0.00	0.00
Avail Cap(c_a), veh/h	60	0	1295	124	1325	0	276	0	210	0	248	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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	11.5	55.4	4.5	0.0	45.9	0.0	50.9	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	14.6	227.3	0.2	0.0	0.4	0.0	43.6	0.0	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	0.0	0.0	25.6	11.6	3.6	0.0	1.5	0.0	8.3	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	26.1	282.7	4.7	0.0	46.3	0.0	94.5	0.0	0.0	0.0
LnGrp LOS			C	F	A		D		F			
Approach Vol, veh/h		1229			725			253			0	
Approach Delay, s/veh		26.1			72.2			83.7			0.0	
Approach LOS		C			E			F				

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.0		98.0		22.0		98.0				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		17.0		93.0		17.0		93.0				
Max Q Clear Time (g_c+I1), s		17.7		77.1		0.0		95.0				
Green Ext Time (p_c), s		0.0		9.9		0.0		0.0				

Intersection Summary	
HCM 7th Control Delay, s/veh	47.8
HCM 7th LOS	D

Notes

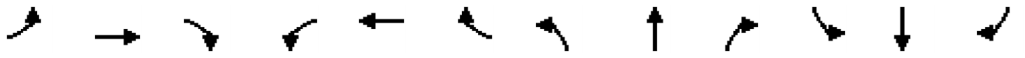
User approved pedestrian interval to be less than phase max green.

Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	1398	683	70	183	28
v/c Ratio	1.33	1.11	0.33	0.63	0.11
Control Delay (s/veh)	171.7	88.4	28.6	30.3	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	171.7	88.4	28.6	30.3	23.9
Queue Length 50th (ft)	~783	~335	26	56	10
Queue Length 95th (ft)	#1137	#589	59	116	30
Internal Link Dist (ft)	3521	424	5188		424
Turn Bay Length (ft)				120	
Base Capacity (vph)	1054	615	774	972	897
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	1.33	1.11	0.09	0.19	0.03

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	1057	190	122	436	70	48	17	168	17	9	0
Future Volume (veh/h)	39	1057	190	122	436	70	48	17	168	17	9	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1736	1723	1695	1750	1545	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	42	1149	207	133	474	76	52	18	183	18	10	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	1	2	4	0	15	0	0	0	0	0
Cap, veh/h	73	890	158	135	419	61	266	78	240	198	90	0
Arrive On Green	0.65	0.65	0.65	0.65	0.65	0.65	0.16	0.16	0.16	0.16	0.16	0.00
Sat Flow, veh/h	27	1367	242	109	643	94	1064	480	1483	676	555	0
Grp Volume(v), veh/h	1398	0	0	683	0	0	70	0	183	28	0	0
Grp Sat Flow(s),veh/h/ln	1636	0	0	846	0	0	1545	0	1483	1231	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	43.6	0.0	0.0	43.6	0.0	0.0	2.4	0.0	7.9	2.4	0.0	0.0
Prop In Lane	0.03		0.15	0.19		0.11	0.74		1.00	0.64		0.00
Lane Grp Cap(c), veh/h	1121	0	0	615	0	0	344	0	240	288	0	0
V/C Ratio(X)	1.25	0.00	0.00	1.11	0.00	0.00	0.20	0.00	0.76	0.10	0.00	0.00
Avail Cap(c_a), veh/h	1121	0	0	615	0	0	1084	0	973	955	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	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	12.4	0.0	0.0	10.7	0.0	0.0	24.5	0.0	26.8	23.9	0.0	0.0
Incr Delay (d2), s/veh	118.7	0.0	0.0	70.5	0.0	0.0	0.3	0.0	5.0	0.1	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	48.6	0.0	0.0	15.3	0.0	0.0	0.9	0.0	2.9	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	131.2	0.0	0.0	81.1	0.0	0.0	24.8	0.0	31.8	24.1	0.0	0.0
LnGrp LOS	F			F			C		C	C		
Approach Vol, veh/h		1398			683			253			28	
Approach Delay, s/veh		131.2			81.1			29.9			24.1	
Approach LOS		F			F			C			C	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	16.9	50.0	16.9	50.0
Change Period (Y+Rc), s	6.1	6.4	6.1	6.4
Max Green Setting (Gmax), s	43.9	43.6	43.9	43.6
Max Q Clear Time (g_c+I1), s	9.9	45.6	4.4	45.6
Green Ext Time (p_c), s	1.0	0.0	0.1	0.0

Intersection Summary	
HCM 7th Control Delay, s/veh	104.6
HCM 7th LOS	F

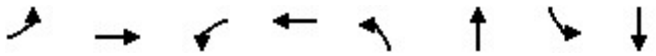
Intersection	
Int Delay, s/veh	6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	236	88	168	81	55	140
Future Vol, veh/h	236	88	168	81	55	140
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	92	92	92	92	92	92
Heavy Vehicles, %	2	0	2	7	10	0
Mvmt Flow	257	96	183	88	60	152

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	352	0	758	304
Stage 1	-	-	-	-	304	-
Stage 2	-	-	-	-	453	-
Critical Hdwy	-	-	4.12	-	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	-	-	2.218	-	3.59	3.3
Pot Cap-1 Maneuver	-	-	1207	-	364	740
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	624	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1207	-	306	740
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	524	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	5.74	16.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	529	-	-	1148	-
HCM Lane V/C Ratio	0.401	-	-	0.151	-
HCM Ctrl Dly (s/v)	16.3	-	-	8.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.9	-	-	0.5	-



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	474	28	210	16	176	140	164
v/c Ratio	0.05	0.67	0.10	0.31	0.05	0.32	0.39	0.30
Control Delay (s/veh)	6.7	13.4	7.4	7.4	8.3	6.1	12.5	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	6.7	13.4	7.4	7.4	8.3	6.1	12.5	8.9
Queue Length 50th (ft)	2	47	2	17	2	9	17	16
Queue Length 95th (ft)	11	#163	14	60	10	38	50	46
Internal Link Dist (ft)		5200		420		5201		5188
Turn Bay Length (ft)	150		150		150		150	
Base Capacity (vph)	601	938	385	911	554	894	619	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	0.04	0.51	0.07	0.23	0.03	0.20	0.23	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	368	68	26	173	20	15	72	90	129	129	22
Future Volume (veh/h)	20	368	68	26	173	20	15	72	90	129	129	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1709	1750	1709	1504	1573	1682	1723	1750	1750	1750
Adj Flow Rate, veh/h	22	400	74	28	188	22	16	78	98	140	140	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	3	0	3	18	13	5	2	0	0	0
Cap, veh/h	633	545	101	415	575	67	538	206	258	544	442	76
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	1190	1425	264	934	1502	176	1115	677	851	1228	1456	250
Grp Volume(v), veh/h	22	0	474	28	0	210	16	0	176	140	0	164
Grp Sat Flow(s),veh/h/ln	1190	0	1689	934	0	1677	1115	0	1529	1228	0	1705
Q Serve(g_s), s	0.3	0.0	6.1	0.7	0.0	2.3	0.3	0.0	2.3	2.6	0.0	1.9
Cycle Q Clear(g_c), s	2.6	0.0	6.1	6.8	0.0	2.3	2.2	0.0	2.3	4.9	0.0	1.9
Prop In Lane	1.00		0.16	1.00		0.10	1.00		0.56	1.00		0.15
Lane Grp Cap(c), veh/h	633	0	646	415	0	642	538	0	464	544	0	518
V/C Ratio(X)	0.03	0.00	0.73	0.07	0.00	0.33	0.03	0.00	0.38	0.26	0.00	0.32
Avail Cap(c_a), veh/h	924	0	1060	644	0	1052	899	0	959	941	0	1070
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	6.5	0.0	6.8	9.7	0.0	5.6	7.7	0.0	7.0	8.9	0.0	6.8
Incr Delay (d2), s/veh	0.0	0.0	1.6	0.1	0.0	0.3	0.0	0.0	0.5	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	0.0	0.0	0.7	0.1	0.0	0.2	0.0	0.0	0.3	0.4	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.5	0.0	8.4	9.7	0.0	5.8	7.7	0.0	7.5	9.2	0.0	7.2
LnGrp LOS	A		A	A		A	A		A	A		A
Approach Vol, veh/h		496			238			192			304	
Approach Delay, s/veh		8.3			6.3			7.5			8.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	11.7	13.8	11.7	13.8
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	4.3	8.1	6.9	8.8
Green Ext Time (p_c), s	0.7	1.7	0.8	0.6

Intersection Summary	
HCM 7th Control Delay, s/veh	7.7
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	26	179	57	77	180
Future Vol, veh/h	55	26	179	57	77	180
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	92	92	92	92	92	92
Heavy Vehicles, %	3	7	1	0	2	4
Mvmt Flow	60	28	195	62	84	196

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	589	226	0	0	257	0
Stage 1	226	-	-	-	-	-
Stage 2	363	-	-	-	-	-
Critical Hdwy	6.43	6.27	-	-	4.12	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.363	-	-	2.218	-
Pot Cap-1 Maneuver	469	802	-	-	1308	-
Stage 1	810	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	436	802	-	-	1308	-
Mov Cap-2 Maneuver	436	-	-	-	-	-
Stage 1	810	-	-	-	-	-
Stage 2	651	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	13.52	0	2.38
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	511	539	-
HCM Lane V/C Ratio	-	-	0.172	0.064	-
HCM Ctrl Dly (s/v)	-	-	13.5	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.2	-

Intersection	
Int Delay, s/veh	12.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	31	440	9	15	153	31	9	52	24	120	52	22
Future Vol, veh/h	31	440	9	15	153	31	9	52	24	120	52	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	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	5	0	0	10	6	20	4	8	2	4	8
Mvmt Flow	34	478	10	16	166	34	10	57	26	130	57	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	200	0	0	488	0	0	778	783	483	790	771	183
Stage 1	-	-	-	-	-	-	551	551	-	216	216	-
Stage 2	-	-	-	-	-	-	227	233	-	574	555	-
Critical Hdwy	4.16	-	-	4.1	-	-	7.3	6.54	6.28	7.12	6.54	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.54	-	6.12	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.54	-	6.12	5.54	-
Follow-up Hdwy	2.254	-	-	2.2	-	-	3.68	4.036	3.372	3.518	4.036	3.372
Pot Cap-1 Maneuver	1349	-	-	1086	-	-	293	323	571	308	328	844
Stage 1	-	-	-	-	-	-	488	512	-	786	720	-
Stage 2	-	-	-	-	-	-	737	708	-	504	510	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1349	-	-	1086	-	-	223	307	571	230	312	844
Mov Cap-2 Maneuver	-	-	-	-	-	-	223	307	-	230	312	-
Stage 1	-	-	-	-	-	-	471	495	-	773	708	-
Stage 2	-	-	-	-	-	-	647	696	-	411	492	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.5	0.63	19.64	52.76
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	337	116	-	-	131	-	-	271
HCM Lane V/C Ratio	0.274	0.025	-	-	0.015	-	-	0.777
HCM Ctrl Dly (s/v)	19.6	7.7	0	-	8.4	0	-	52.8
HCM Lane LOS	C	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	1.1	0.1	-	-	0	-	-	5.9

Intersection	
Int Delay, s/veh	10.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	188	2	37	120	24	13	70	64	37	76	29
Future Vol, veh/h	18	188	2	37	120	24	13	70	64	37	76	29
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	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	11	0	6	15	23	29	18	34	5	32	6
Mvmt Flow	20	204	2	40	130	26	14	76	70	40	83	32

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	348	353	98	404	334	111	114	0	0	146	0	0
Stage 1	179	179	-	139	139	-	-	-	-	-	-	-
Stage 2	170	174	-	265	195	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.61	6.2	7.16	6.65	6.43	4.39	-	-	4.15	-	-
Critical Hdwy Stg 1	6.1	5.61	-	6.16	5.65	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.61	-	6.16	5.65	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.099	3.3	3.554	4.135	3.507	2.461	-	-	2.245	-	-
Pot Cap-1 Maneuver	610	558	963	550	566	888	1323	-	-	1418	-	-
Stage 1	828	735	-	854	757	-	-	-	-	-	-	-
Stage 2	837	738	-	731	716	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	435	535	963	330	542	888	1323	-	-	1418	-	-
Mov Cap-2 Maneuver	435	535	-	330	542	-	-	-	-	-	-	-
Stage 1	803	712	-	844	748	-	-	-	-	-	-	-
Stage 2	663	730	-	505	694	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	16.88	16.71	0.69	1.98
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	145	-	-	527	502	444	-	-
HCM Lane V/C Ratio	0.011	-	-	0.429	0.392	0.028	-	-
HCM Ctrl Dly (s/v)	7.8	0	-	16.9	16.7	7.6	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2.1	1.8	0.1	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	361	0	33	228	33	0	22	74	41	15	17
Future Vol, veh/h	18	361	0	33	228	33	0	22	74	41	15	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	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	12	0	0	20	6	0	0	5	5	13	0
Mvmt Flow	20	392	0	36	248	36	0	24	80	45	16	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	284	0	0	392	0	0	759	787	392	781	769	266
Stage 1	-	-	-	-	-	-	432	432	-	337	337	-
Stage 2	-	-	-	-	-	-	328	355	-	443	432	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.25	7.15	6.63	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.63	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.63	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.345	3.545	4.117	3.3
Pot Cap-1 Maneuver	1290	-	-	1177	-	-	325	326	650	309	319	778
Stage 1	-	-	-	-	-	-	606	586	-	671	622	-
Stage 2	-	-	-	-	-	-	689	633	-	588	564	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1290	-	-	1177	-	-	285	308	650	237	301	778
Mov Cap-2 Maneuver	-	-	-	-	-	-	285	308	-	237	301	-
Stage 1	-	-	-	-	-	-	594	575	-	646	599	-
Stage 2	-	-	-	-	-	-	631	610	-	484	553	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.37	0.92	13.69	21.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	518	85	-	-	197	-	-	298
HCM Lane V/C Ratio	0.201	0.015	-	-	0.03	-	-	0.266
HCM Ctrl Dly (s/v)	13.7	7.8	0	-	8.2	0	-	21.4
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	1

Intersection	
Int Delay, s/veh	22.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	57	291	168	61	298	94
Future Vol, veh/h	57	291	168	61	298	94
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	92	92	92	92	92	92
Heavy Vehicles, %	0	1	7	12	1	0
Mvmt Flow	62	316	183	66	324	102

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	249	0	-	0	656	216
Stage 1	-	-	-	-	216	-
Stage 2	-	-	-	-	440	-
Critical Hdwy	4.1	-	-	-	6.41	6.2
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.2	-	-	-	3.509	3.3
Pot Cap-1 Maneuver	1329	-	-	-	432	829
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	651	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1329	-	-	-	407	829
Mov Cap-2 Maneuver	-	-	-	-	407	-
Stage 1	-	-	-	-	776	-
Stage 2	-	-	-	-	651	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	1.28	0	53.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	295	-	-	-	464
HCM Lane V/C Ratio	0.047	-	-	-	0.918
HCM Ctrl Dly (s/v)	7.8	0	-	-	53.9
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	10.5

Intersection	
Int Delay, s/veh	6.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	7	28	11	39	52
Future Vol, veh/h	24	7	28	11	39	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	25	0	0	0	0
Mvmt Flow	26	8	30	12	42	57

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	30	42
Stage 1	-	-	0	0
Stage 2	-	-	30	42
Critical Hdwy	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.4	5.5
Follow-up Hdwy	-	-	3.5	4
Pot Cap-1 Maneuver	-	-	989	853
Stage 1	-	-	-	-
Stage 2	-	-	997	864
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	989	0
Mov Cap-2 Maneuver	-	-	989	0
Stage 1	-	-	-	0
Stage 2	-	-	997	0

Approach	NB	SB
HCM Ctrl Dly, s/v	0	9.04
HCM LOS		A

Minor Lane/Major Mvmt	NBT	NBR	SBLn1
Capacity (veh/h)	-	-	989
HCM Lane V/C Ratio	-	-	0.1
HCM Ctrl Dly (s/v)	-	-	9
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.3

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1335	68	37	460	15	74
Future Vol, veh/h	1335	68	37	460	15	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	0	3	0	3
Mvmt Flow	1451	74	40	500	16	80

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1525	0	2068	1488
Stage 1	-	-	-	-	1488	-
Stage 2	-	-	-	-	580	-
Critical Hdwy	-	-	4.1	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.327
Pot Cap-1 Maneuver	-	-	443	-	60	152
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	564	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	443	-	55	152
Mov Cap-2 Maneuver	-	-	-	-	155	-
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	512	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.04	62.77
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	152	-	-	443	-
HCM Lane V/C Ratio	0.635	-	-	0.091	-
HCM Ctrl Dly (s/v)	62.8	-	-	13.9	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	3.5	-	-	0.3	-

Intersection	
Int Delay, s/veh	46.8

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	123	278	387	158	147	193
Future Vol, veh/h	123	278	387	158	147	193
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	92	92	92	92	92	92
Heavy Vehicles, %	13	1	10	5	3	19
Mvmt Flow	134	302	421	172	160	210

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1036	507	0	0	592	0
Stage 1	507	-	-	-	-	-
Stage 2	529	-	-	-	-	-
Critical Hdwy	6.53	6.21	-	-	4.13	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.309	-	-	2.227	-
Pot Cap-1 Maneuver	245	568	-	-	979	-
Stage 1	583	-	-	-	-	-
Stage 2	569	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	199	568	-	-	979	-
Mov Cap-2 Maneuver	199	-	-	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	464	-	-	-	-	-

Approach	NW	NE	SW
HCM Ctrl Dly, s/v	146.8	0	4.06
HCM LOS	F		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	362	778	-
HCM Lane V/C Ratio	-	-	1.202	0.163	-
HCM Ctrl Dly (s/v)	-	-	146.8	9.4	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	18.2	0.6	-

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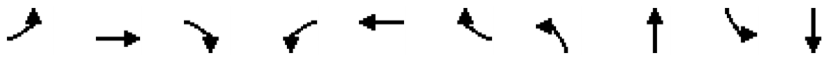
Future PM Capacity:

Queues
2: 54th Street West & Rimrock Road 10/07/2025



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	4	347	38	272	723	157	145	289	118	66
v/c Ratio	0.01	0.41	0.05	0.47	0.66	0.16	0.56	0.68	1.03	0.18
Control Delay (s/veh)	8.5	18.5	0.1	11.5	18.2	2.9	40.1	25.8	126.8	26.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.5	18.5	0.1	11.5	18.2	2.9	40.1	25.8	126.8	26.9
Queue Length 50th (ft)	1	125	0	60	227	1	75	81	68	28
Queue Length 95th (ft)	6	231	0	127	#648	36	134	166	#165	61
Internal Link Dist (ft)		4323			924			5202		920
Turn Bay Length (ft)	250			250		250	200		150	
Base Capacity (vph)	401	845	775	579	1089	983	395	573	176	548
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	0.01	0.41	0.05	0.47	0.66	0.16	0.37	0.50	0.67	0.12

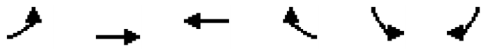
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	319	35	250	665	144	133	74	192	109	53	7
Future Volume (veh/h)	4	319	35	250	665	144	133	74	192	109	53	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1750	1750	1750	1750	1750	1750	1750	1709	1709	1750	1750
Adj Flow Rate, veh/h	4	347	38	272	723	157	145	80	209	118	58	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	3	3	0	0
Cap, veh/h	192	761	645	513	901	763	420	122	319	203	429	59
Arrive On Green	0.01	0.44	0.44	0.09	0.51	0.51	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1667	1750	1483	1667	1750	1483	1357	429	1120	1082	1505	208
Grp Volume(v), veh/h	4	347	38	272	723	157	145	0	289	118	0	66
Grp Sat Flow(s),veh/h/ln	1667	1750	1483	1667	1750	1483	1357	0	1548	1082	0	1713
Q Serve(g_s), s	0.1	14.0	1.5	8.5	34.2	5.7	8.9	0.0	16.4	10.8	0.0	2.9
Cycle Q Clear(g_c), s	0.1	14.0	1.5	8.5	34.2	5.7	11.8	0.0	16.4	27.2	0.0	2.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.72	1.00		0.12
Lane Grp Cap(c), veh/h	192	761	645	513	901	763	420	0	441	203	0	488
V/C Ratio(X)	0.02	0.46	0.06	0.53	0.80	0.21	0.35	0.00	0.65	0.58	0.00	0.14
Avail Cap(c_a), veh/h	325	761	645	513	901	763	420	0	441	203	0	488
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	19.2	19.9	16.4	14.9	20.1	13.2	31.0	0.0	31.4	43.4	0.0	26.6
Incr Delay (d2), s/veh	0.0	2.0	0.2	1.0	7.5	0.6	0.5	0.0	3.5	4.2	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	5.5	0.5	3.1	14.1	1.9	2.8	0.0	6.2	3.1	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	19.2	21.9	16.6	16.0	27.6	13.8	31.4	0.0	34.9	47.5	0.0	26.7
LnGrp LOS	B	C	B	B	C	B	C		C	D		C
Approach Vol, veh/h		389			1152			434			184	
Approach Delay, s/veh		21.3			22.9			33.7			40.1	
Approach LOS		C			C			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.0	50.0		35.0	7.0	58.0		35.0				
Change Period (Y+Rc), s	6.5	6.5		6.5	6.5	6.5		6.5				
Max Green Setting (Gmax), s	8.5	43.5		28.5	8.5	43.5		28.5				
Max Q Clear Time (g_c+I1), s	10.5	16.0		29.2	2.1	36.2		18.4				
Green Ext Time (p_c), s	0.0	1.9		0.0	0.0	3.0		1.5				

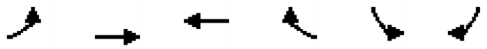
Intersection Summary		
HCM 7th Control Delay, s/veh		26.3
HCM 7th LOS		C



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	226	390	707	324	248	180
v/c Ratio	0.55	0.33	0.92	0.29	0.76	0.26
Control Delay (s/veh)	18.6	8.5	48.6	1.4	54.1	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	18.6	8.5	48.6	1.4	54.1	13.0
Queue Length 50th (ft)	57	92	413	0	150	52
Queue Length 95th (ft)	155	185	#860	29	260	93
Internal Link Dist (ft)		1579	3521		5202	
Turn Bay Length (ft)	400			400		250
Base Capacity (vph)	789	1608	765	1379	720	1080
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	0.24	0.92	0.23	0.34	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	208	359	650	298	228	166
Future Volume (veh/h)	208	359	650	298	228	166
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1723	1750	1750	1736	1736	1750
Adj Flow Rate, veh/h	226	390	707	324	248	180
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	0	1	1	0
Cap, veh/h	342	1165	915	1039	303	404
Arrive On Green	0.09	0.67	0.52	0.52	0.18	0.18
Sat Flow, veh/h	1641	1750	1750	1471	1654	1483
Grp Volume(v), veh/h	226	390	707	324	248	180
Grp Sat Flow(s),veh/h/ln	1641	1750	1750	1471	1654	1483
Q Serve(g_s), s	4.9	8.0	27.0	6.9	12.0	8.4
Cycle Q Clear(g_c), s	4.9	8.0	27.0	6.9	12.0	8.4
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	342	1165	915	1039	303	404
V/C Ratio(X)	0.66	0.33	0.77	0.31	0.82	0.45
Avail Cap(c_a), veh/h	1088	1961	915	1039	864	908
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	14.9	6.0	16.0	4.6	32.8	25.2
Incr Delay (d2), s/veh	2.2	0.2	6.3	0.8	5.4	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	2.2	10.5	3.3	4.9	7.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	17.1	6.2	22.3	5.4	38.2	25.9
LnGrp LOS	B	A	C	A	D	C
Approach Vol, veh/h		616	1031		428	
Approach Delay, s/veh		10.2	17.0		33.0	
Approach LOS		B	B		C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		62.0		21.6	12.0	50.0
Change Period (Y+Rc), s		6.3		6.3	4.5	6.3
Max Green Setting (Gmax), s		93.7		43.7	45.5	43.7
Max Q Clear Time (g_c+I1), s		10.0		14.0	6.9	29.0
Green Ext Time (p_c), s		2.3		1.3	0.6	4.9

Intersection Summary	
HCM 7th Control Delay, s/veh	18.3
HCM 7th LOS	B

Lane Group	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	722	214	683	152	348
v/c Ratio	0.70	0.74	0.64	0.52	0.61
Control Delay (s/veh)	13.2	27.9	11.8	36.5	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	13.2	27.9	11.8	36.5	11.0
Queue Length 50th (ft)	158	50	145	53	11
Queue Length 95th (ft)	383	199	342	161	108
Internal Link Dist (ft)	3542		1579		5173
Turn Bay Length (ft)		200		200	
Base Capacity (vph)	1516	428	1571	772	979
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	0.48	0.50	0.43	0.20	0.36

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	552	112	197	628	0	140	0	320	0	0	0
Future Volume (veh/h)	0	552	112	197	628	0	140	0	320	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1723	1723	1750	1750	1736	1750	1709	1750	1750	1750
Adj Flow Rate, veh/h	0	600	122	214	683	0	152	0	348	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	2	2	0	0	1	0	3	0	0	0
Cap, veh/h	74	883	180	332	1103	0	515	0	395	0	467	0
Arrive On Green	0.00	0.63	0.63	0.63	0.63	0.00	0.27	0.00	0.27	0.00	0.00	0.00
Sat Flow, veh/h	770	1400	285	731	1750	0	1654	0	1483	0	1750	0
Grp Volume(v), veh/h	0	0	722	214	683	0	152	0	348	0	0	0
Grp Sat Flow(s),veh/h/ln	770	0	1685	731	1750	0	1654	0	1483	0	1750	0
Q Serve(g_s), s	0.0	0.0	26.9	26.0	23.0	0.0	7.2	0.0	21.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	26.9	52.9	23.0	0.0	7.2	0.0	21.8	0.0	0.0	0.0
Prop In Lane	1.00		0.17	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	74	0	1062	332	1103	0	515	0	395	0	467	0
V/C Ratio(X)	0.00	0.00	0.68	0.64	0.62	0.00	0.30	0.00	0.88	0.00	0.00	0.00
Avail Cap(c_a), veh/h	183	0	1301	436	1351	0	670	0	534	0	631	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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	11.6	28.7	10.9	0.0	28.8	0.0	34.1	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.1	2.1	0.6	0.0	0.3	0.0	12.3	0.0	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	0.0	0.0	9.0	4.5	7.9	0.0	2.8	0.0	8.9	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	12.7	30.8	11.5	0.0	29.1	0.0	46.5	0.0	0.0	0.0
LnGrp LOS			B	C	B		C		D			
Approach Vol, veh/h		722			897			500			0	
Approach Delay, s/veh		12.7			16.1			41.2			0.0	
Approach LOS		B			B			D				

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	30.9	66.2	30.9	66.2
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	35.0	75.0	35.0	75.0
Max Q Clear Time (g_c+I1), s	23.8	28.9	0.0	54.9
Green Ext Time (p_c), s	2.1	6.0	0.0	6.3

Intersection Summary	
HCM 7th Control Delay, s/veh	20.8
HCM 7th LOS	C

Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	702	1364	171	118	9
v/c Ratio	0.67	2.17	0.65	0.30	0.03
Control Delay (s/veh)	13.5	548.2	37.5	7.0	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	13.5	548.2	37.5	7.0	21.6
Queue Length 50th (ft)	169	~968	68	0	3
Queue Length 95th (ft)	359	#1332	127	37	14
Internal Link Dist (ft)	3521	424	5188		424
Turn Bay Length (ft)				120	
Base Capacity (vph)	1055	629	812	972	855
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	0.67	2.17	0.21	0.12	0.01

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	543	103	206	1040	9	157	0	109	6	2	0
Future Volume (veh/h)	0	543	103	206	1040	9	157	0	109	6	2	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1750	1750	1750	1750	1736	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	0	590	112	224	1130	10	171	0	118	7	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	0	0	0	0	1	0	0	0	0	0
Cap, veh/h	0	922	175	157	561	5	341	0	243	148	30	0
Arrive On Green	0.00	0.65	0.65	0.65	0.65	0.65	0.16	0.00	0.16	0.16	0.16	0.00
Sat Flow, veh/h	0	1419	269	145	864	7	1423	0	1483	322	183	0
Grp Volume(v), veh/h	0	0	702	1364	0	0	171	0	118	9	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1688	1017	0	0	1423	0	1483	504	0	0
Q Serve(g_s), s	0.0	0.0	16.7	26.9	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	16.7	43.6	0.0	0.0	7.7	0.0	4.8	7.7	0.0	0.0
Prop In Lane	0.00		0.16	0.16		0.01	1.00		1.00	0.78		0.00
Lane Grp Cap(c), veh/h	0	0	1096	723	0	0	341	0	243	178	0	0
V/C Ratio(X)	0.00	0.00	0.64	1.89	0.00	0.00	0.50	0.00	0.48	0.05	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1096	723	0	0	1045	0	970	851	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)	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	7.1	17.9	0.0	0.0	26.7	0.0	25.5	23.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	2.9	404.3	0.0	0.0	1.1	0.0	1.5	0.1	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	0.0	0.0	5.0	91.3	0.0	0.0	2.5	0.0	1.7	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	9.9	422.2	0.0	0.0	27.8	0.0	27.0	24.1	0.0	0.0
LnGrp LOS			A	F			C		C	C		
Approach Vol, veh/h		702			1364			289			9	
Approach Delay, s/veh		9.9			422.2			27.5			24.1	
Approach LOS		A			F			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		17.1		50.0		17.1		50.0				
Change Period (Y+Rc), s		6.1		6.4		6.1		6.4				
Max Green Setting (Gmax), s		43.9		43.6		43.9		43.6				
Max Q Clear Time (g_c+I1), s		9.7		18.7		9.7		45.6				
Green Ext Time (p_c), s		1.4		5.2		0.0		0.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			250.0									
HCM 7th LOS			F									

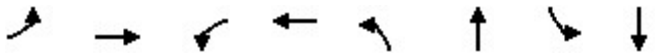
Intersection	
Int Delay, s/veh	8.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	157	42	180	243	90	204
Future Vol, veh/h	157	42	180	243	90	204
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	92	92	92	92	92	92
Heavy Vehicles, %	0	2	0	0	2	0
Mvmt Flow	171	46	196	264	98	222

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	216	0	849	193
Stage 1	-	-	-	-	193	-
Stage 2	-	-	-	-	655	-
Critical Hdwy	-	-	4.1	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.2	-	3.518	3.3
Pot Cap-1 Maneuver	-	-	1365	-	331	853
Stage 1	-	-	-	-	839	-
Stage 2	-	-	-	-	517	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1365	-	276	853
Mov Cap-2 Maneuver	-	-	-	-	276	-
Stage 1	-	-	-	-	839	-
Stage 2	-	-	-	-	430	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	3.44	22.35
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	520	-	-	766	-
HCM Lane V/C Ratio	0.615	-	-	0.143	-
HCM Ctrl Dly (s/v)	22.3	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	4.1	-	-	0.5	-



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	30	322	57	611	92	216	72	166
v/c Ratio	0.12	0.41	0.12	0.76	0.29	0.43	0.24	0.34
Control Delay (s/veh)	7.4	7.8	6.6	16.8	11.8	10.6	11.1	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.4	7.8	6.6	16.8	11.8	10.6	11.1	10.4
Queue Length 50th (ft)	2	28	4	65	13	24	10	20
Queue Length 95th (ft)	14	85	20	#246	34	57	28	48
Internal Link Dist (ft)		5200		420		5201		5188
Turn Bay Length (ft)	150		150		150		150	
Base Capacity (vph)	268	864	507	884	585	889	559	884
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	0.11	0.37	0.11	0.69	0.16	0.24	0.13	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	261	35	52	464	98	85	155	44	66	134	18
Future Volume (veh/h)	28	261	35	52	464	98	85	155	44	66	134	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1709	1682	1750	1750	1695	1750	1750	1750	1750	1736	1750
Adj Flow Rate, veh/h	30	284	38	57	504	107	92	168	48	72	146	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	3	5	0	0	4	0	0	0	0	1	0
Cap, veh/h	376	664	89	603	630	134	484	341	98	440	390	53
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	823	1476	197	1075	1399	297	1239	1309	374	1184	1495	205
Grp Volume(v), veh/h	30	0	322	57	0	611	92	0	216	72	0	166
Grp Sat Flow(s),veh/h/ln	823	0	1674	1075	0	1697	1239	0	1683	1184	0	1699
Q Serve(g_s), s	0.9	0.0	3.6	1.1	0.0	8.6	1.8	0.0	3.0	1.5	0.0	2.2
Cycle Q Clear(g_c), s	9.5	0.0	3.6	4.7	0.0	8.6	4.0	0.0	3.0	4.5	0.0	2.2
Prop In Lane	1.00		0.12	1.00		0.18	1.00		0.22	1.00		0.12
Lane Grp Cap(c), veh/h	376	0	753	603	0	763	484	0	439	440	0	443
V/C Ratio(X)	0.08	0.00	0.43	0.09	0.00	0.80	0.19	0.00	0.49	0.16	0.00	0.37
Avail Cap(c_a), veh/h	482	0	968	741	0	981	878	0	973	816	0	983
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	10.6	0.0	5.2	6.8	0.0	6.5	10.0	0.0	8.7	10.6	0.0	8.4
Incr Delay (d2), s/veh	0.1	0.0	0.4	0.1	0.0	3.7	0.2	0.0	0.9	0.2	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	0.1	0.0	0.3	0.1	0.0	1.4	0.3	0.0	0.6	0.2	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	10.7	0.0	5.6	6.8	0.0	10.3	10.2	0.0	9.5	10.8	0.0	8.9
LnGrp LOS	B		A	A		B	B		A	B		A
Approach Vol, veh/h		352			668			308			238	
Approach Delay, s/veh		6.0			10.0			9.7			9.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	11.2	16.4	11.2	16.4
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	6.0	11.5	6.5	10.6
Green Ext Time (p_c), s	0.9	0.7	0.7	1.9

Intersection Summary	
HCM 7th Control Delay, s/veh	9.0
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	3.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	101	64	273	64	20	197
Future Vol, veh/h	101	64	273	64	20	197
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	110	70	297	70	22	214

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	589	332	0	0	366	0
Stage 1	332	-	-	-	-	-
Stage 2	258	-	-	-	-	-
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	474	715	-	-	1203	-
Stage 1	732	-	-	-	-	-
Stage 2	790	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	464	715	-	-	1203	-
Mov Cap-2 Maneuver	464	-	-	-	-	-
Stage 1	732	-	-	-	-	-
Stage 2	774	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	15.02	0	0.74
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	537	166	-
HCM Lane V/C Ratio	-	-	0.334	0.018	-
HCM Ctrl Dly (s/v)	-	-	15	8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.5	0.1	-

Intersection	
Int Delay, s/veh	9.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	287	2	46	540	77	4	76	35	35	50	17
Future Vol, veh/h	15	287	2	46	540	77	4	76	35	35	50	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	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	13	2	0	0	1	0	0	0	0	5	0	0
Mvmt Flow	16	312	2	50	587	84	4	83	38	38	54	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	671	0	0	314	0	0	1060	1116	313	1115	1076	629
Stage 1	-	-	-	-	-	-	346	346	-	729	729	-
Stage 2	-	-	-	-	-	-	714	771	-	386	347	-
Critical Hdwy	4.23	-	-	4.1	-	-	7.1	6.5	6.2	7.15	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.5	-
Follow-up Hdwy	2.317	-	-	2.2	-	-	3.5	4	3.3	3.545	4	3.3
Pot Cap-1 Maneuver	870	-	-	1258	-	-	204	209	732	183	221	486
Stage 1	-	-	-	-	-	-	674	639	-	410	431	-
Stage 2	-	-	-	-	-	-	425	413	-	631	638	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	870	-	-	1258	-	-	134	191	732	94	202	486
Mov Cap-2 Maneuver	-	-	-	-	-	-	134	191	-	94	202	-
Stage 1	-	-	-	-	-	-	659	625	-	383	403	-
Stage 2	-	-	-	-	-	-	331	386	-	508	624	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.45	0.55	34.7	71.38
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	242	89	-	-	122	-	-	155
HCM Lane V/C Ratio	0.516	0.019	-	-	0.04	-	-	0.713
HCM Ctrl Dly (s/v)	34.7	9.2	0	-	8	0	-	71.4
HCM Lane LOS	D	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	2.7	0.1	-	-	0.1	-	-	4.2

Intersection	
Int Delay, s/veh	9.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	28	87	4	28	195	50	7	85	29	18	46	37
Future Vol, veh/h	28	87	4	28	195	50	7	85	29	18	46	37
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	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	0	4	0	4	19	0	0	5
Mvmt Flow	30	95	4	30	212	54	8	92	32	20	50	40

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	323	248	70	260	253	108	90	0	0	124	0	0
Stage 1	109	109	-	123	123	-	-	-	-	-	-	-
Stage 2	214	139	-	136	129	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.54	6.2	7.1	6.5	6.24	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.036	3.3	3.5	4	3.336	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	634	651	998	697	654	940	1518	-	-	1475	-	-
Stage 1	901	801	-	886	798	-	-	-	-	-	-	-
Stage 2	793	778	-	872	793	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	395	638	998	582	641	940	1518	-	-	1475	-	-
Mov Cap-2 Maneuver	395	638	-	582	641	-	-	-	-	-	-	-
Stage 1	888	790	-	881	793	-	-	-	-	-	-	-
Stage 2	545	773	-	753	782	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	13.29	14.49	0.43	1.33
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	99	-	-	563	674	295	-	-
HCM Lane V/C Ratio	0.005	-	-	0.23	0.441	0.013	-	-
HCM Ctrl Dly (s/v)	7.4	0	-	13.3	14.5	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	2.3	0	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	7	206	2	70	341	31	0	31	74	18	29	31
Future Vol, veh/h	7	206	2	70	341	31	0	31	74	18	29	31
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	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	0	3	1	0	0	0	5	0	0	0
Mvmt Flow	8	224	2	76	371	34	0	34	80	20	32	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	404	0	0	226	0	0	779	797	225	796	781	387
Stage 1	-	-	-	-	-	-	240	240	-	540	540	-
Stage 2	-	-	-	-	-	-	539	557	-	256	241	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.5	6.25	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	-	-	2.227	-	-	3.5	4	3.345	3.5	4	3.3
Pot Cap-1 Maneuver	1165	-	-	1336	-	-	316	322	807	308	329	665
Stage 1	-	-	-	-	-	-	768	710	-	530	525	-
Stage 2	-	-	-	-	-	-	530	516	-	753	710	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1165	-	-	1336	-	-	249	296	807	228	302	665
Mov Cap-2 Maneuver	-	-	-	-	-	-	249	296	-	228	302	-
Stage 1	-	-	-	-	-	-	762	705	-	491	486	-
Stage 2	-	-	-	-	-	-	436	478	-	641	704	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.26	1.24	13.56	18.45
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	534	58	-	-	280	-	-	352
HCM Lane V/C Ratio	0.214	0.007	-	-	0.057	-	-	0.241
HCM Ctrl Dly (s/v)	13.6	8.1	0	-	7.9	0	-	18.4
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.8	0	-	-	0.2	-	-	0.9

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	101	269	350	215	87	76
Future Vol, veh/h	101	269	350	215	87	76
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	92	92	92	92	92	92
Heavy Vehicles, %	0	1	0	0	0	0
Mvmt Flow	110	292	380	234	95	83

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	614	0	-	0	1009	497
Stage 1	-	-	-	-	497	-
Stage 2	-	-	-	-	512	-
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	975	-	-	-	268	577
Stage 1	-	-	-	-	615	-
Stage 2	-	-	-	-	606	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	975	-	-	-	232	577
Mov Cap-2 Maneuver	-	-	-	-	232	-
Stage 1	-	-	-	-	533	-
Stage 2	-	-	-	-	606	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	2.5	0	29.04
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	491	-	-	-	322
HCM Lane V/C Ratio	0.113	-	-	-	0.55
HCM Ctrl Dly (s/v)	9.2	0	-	-	29
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	3.1

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	33	70	20	24	17
Future Vol, veh/h	22	33	70	20	24	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	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	24	36	76	22	26	18

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	76	98
Stage 1	-	-	0	0
Stage 2	-	-	76	98
Critical Hdwy	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.4	5.5
Follow-up Hdwy	-	-	3.5	4
Pot Cap-1 Maneuver	-	-	932	796
Stage 1	-	-	-	-
Stage 2	-	-	952	818
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	932	0
Mov Cap-2 Maneuver	-	-	932	0
Stage 1	-	-	-	0
Stage 2	-	-	952	0

Approach	NB	SB
HCM Ctrl Dly, s/v	0	9.06
HCM LOS		A

Minor Lane/Major Mvmt	NBT	NBR	SBLn1
Capacity (veh/h)	-	-	932
HCM Lane V/C Ratio	-	-	0.048
HCM Ctrl Dly (s/v)	-	-	9.1
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	598	29	87	1120	26	35
Future Vol, veh/h	598	29	87	1120	26	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	0	0	5
Mvmt Flow	650	32	95	1217	28	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	682	0	2072	666
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	1407	-
Critical Hdwy	-	-	4.1	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.345
Pot Cap-1 Maneuver	-	-	921	-	60	454
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	229	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	921	-	54	454
Mov Cap-2 Maneuver	-	-	-	-	153	-
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	205	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.67	24.81
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	247	-	-	921	-
HCM Lane V/C Ratio	0.268	-	-	0.103	-
HCM Ctrl Dly (s/v)	24.8	-	-	9.4	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.1	-	-	0.3	-

Intersection	
Int Delay, s/veh	378.9

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	109	683	238	88	269	383
Future Vol, veh/h	109	683	238	88	269	383
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	70	70	83	83	100	100
Heavy Vehicles, %	2	2	5	0	0	1
Mvmt Flow	156	976	287	106	269	383

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1261	340	0	0	393	0
Stage 1	340	-	-	-	-	-
Stage 2	921	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.1	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.2	-
Pot Cap-1 Maneuver	188	~ 703	-	-	1177	-
Stage 1	721	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 133	~ 703	-	-	1177	-
Mov Cap-2 Maneuver	~ 133	-	-	-	-	-
Stage 1	721	-	-	-	-	-
Stage 2	275	-	-	-	-	-

Approach	NW	NE	SW
HCM Ctrl Dly, s/v	$ 726.64	0	3.7
HCM LOS	F		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	443	743	-
HCM Lane V/C Ratio	-	-	2.556	0.229	-
HCM Ctrl Dly (s/v)	-	-	$ 726.6	9	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	90.8	0.9	-

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

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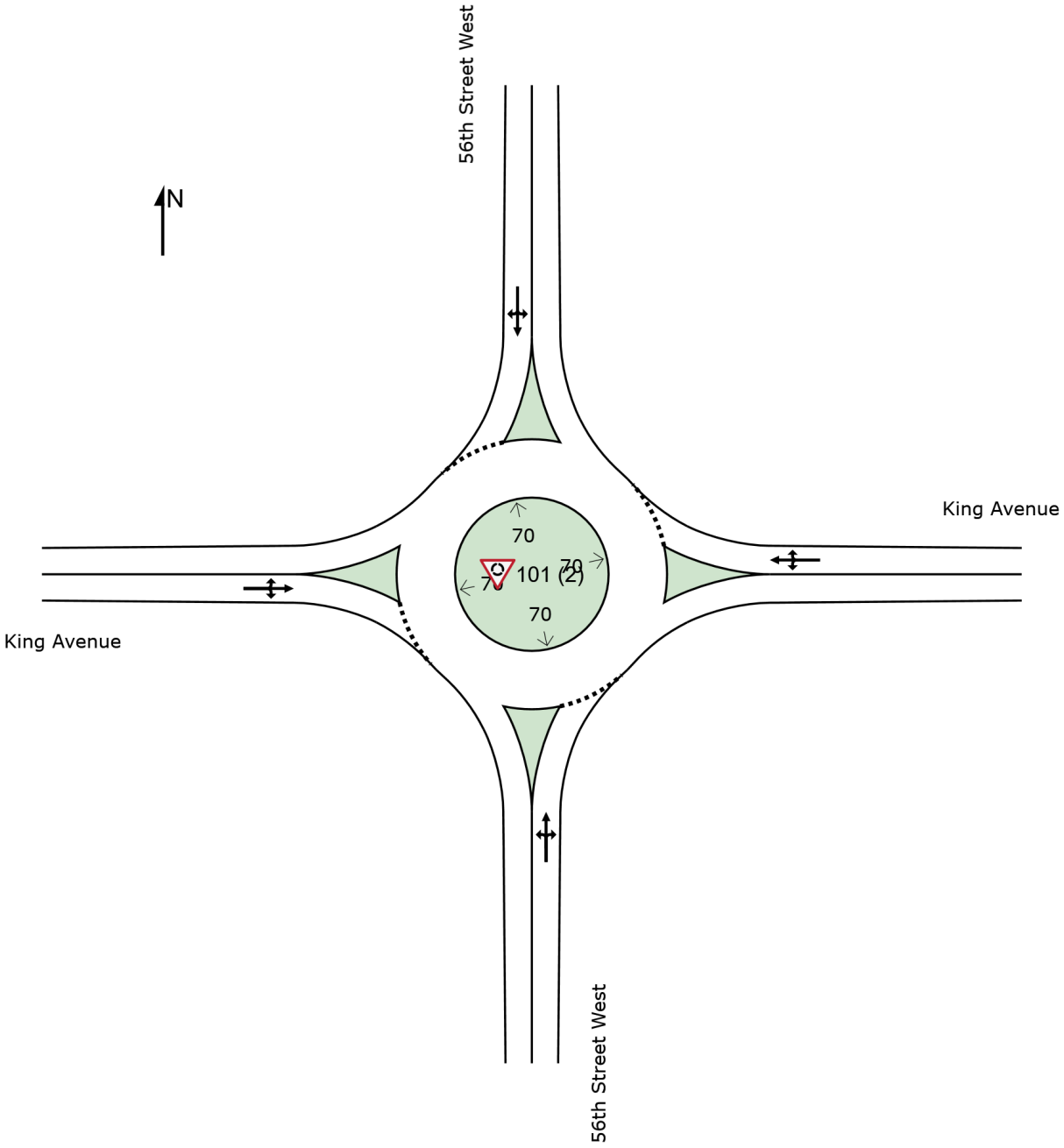
SITE LAYOUT

Site: [101 (2)] King Ave & 56th St AM (Future (2044))

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (2)] King Ave & 56th St AM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	133	3.0	133	3.0	0.572	12.6	LOS B	5.0	125.7	0.75	0.68	1.08	34.0
4	T1	All MCs	260	0.8	260	0.8	0.572	12.2	LOS B	5.0	125.7	0.75	0.68	1.08	33.4
14	R2	All MCs	100	0.0	100	0.0	0.572	12.1	LOS B	5.0	125.7	0.75	0.68	1.08	34.4
Approach			492	1.2	492	1.2	0.572	12.3	LOS B	5.0	125.7	0.75	0.68	1.08	33.8
West: King Avenue															
5	L2	All MCs	126	6.3	126	6.3	0.894	31.9	LOS D	20.9	533.2	1.00	1.28	2.53	26.2
2	T1	All MCs	599	1.3	599	1.3	0.894	31.0	LOS D	20.9	533.2	1.00	1.28	2.53	27.7
12	R2	All MCs	40	10.0	40	10.0	0.894	32.5	LOS D	20.9	533.2	1.00	1.28	2.53	26.2
Approach			765	2.6	765	2.6	0.894	31.2	LOS D	20.9	533.2	1.00	1.28	2.53	27.4
South: 56th Street West															
3	L2	All MCs	36	0.0	36	0.0	0.450	13.5	LOS B	2.2	56.4	0.76	0.79	0.99	33.5
8	T1	All MCs	154	3.9	154	3.9	0.450	14.6	LOS B	2.2	56.4	0.76	0.79	0.99	32.3
18	R2	All MCs	48	4.2	48	4.2	0.450	14.7	LOS B	2.2	56.4	0.76	0.79	0.99	33.1
Approach			238	3.4	238	3.4	0.450	14.4	LOS B	2.2	56.4	0.76	0.79	0.99	32.6
East: King Avenue															
1	L2	All MCs	34	5.9	34	5.9	0.458	9.4	LOS A	2.7	70.5	0.61	0.44	0.65	35.4
6	T1	All MCs	364	2.7	364	2.7	0.458	9.1	LOS A	2.7	70.5	0.61	0.44	0.65	38.0
16	R2	All MCs	30	20.0	30	20.0	0.458	11.3	LOS B	2.7	70.5	0.61	0.44	0.65	33.9
Approach			428	4.2	428	4.2	0.458	9.2	LOS A	2.7	70.5	0.61	0.44	0.65	37.4
All Vehicles			1924	2.7	1924	2.7	0.894	19.4	LOS C	20.9	533.2	0.82	0.88	1.55	31.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [102 (2)] King Ave & 56th St PM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	76	0.0	76	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.5
4	T1	All MCs	128	0.0	128	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	34.6
14	R2	All MCs	134	0.0	134	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.7
Approach			338	0.0	338	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.2
West: King Avenue															
5	L2	All MCs	80	0.0	80	0.0	0.460	8.3	LOS A	2.9	72.5	0.55	0.34	0.55	36.6
2	T1	All MCs	395	1.5	395	1.5	0.460	8.4	LOS A	2.9	72.5	0.55	0.34	0.55	38.4
12	R2	All MCs	14	14.3	14	14.3	0.460	9.8	LOS A	2.9	72.5	0.55	0.34	0.55	34.9
Approach			489	1.6	489	1.6	0.460	8.4	LOS A	2.9	72.5	0.55	0.34	0.55	38.0
South: 56th Street West															
3	L2	All MCs	50	0.0	50	0.0	0.467	10.8	LOS B	3.0	74.7	0.71	0.65	0.92	36.5
8	T1	All MCs	272	0.0	272	0.0	0.467	10.8	LOS B	3.0	74.7	0.71	0.65	0.92	35.5
18	R2	All MCs	40	5.0	40	5.0	0.467	11.7	LOS B	3.0	74.7	0.71	0.65	0.92	35.9
Approach			362	0.6	362	0.6	0.467	10.9	LOS B	3.0	74.7	0.71	0.65	0.92	35.7
East: King Avenue															
1	L2	All MCs	34	0.0	34	0.0	0.708	16.1	LOS C	9.5	239.3	0.86	0.81	1.46	32.7
6	T1	All MCs	485	1.2	485	1.2	0.708	16.2	LOS C	9.5	239.3	0.86	0.81	1.46	34.2
16	R2	All MCs	122	0.0	122	0.0	0.708	16.1	LOS C	9.5	239.3	0.86	0.81	1.46	33.1
Approach			640	0.9	640	0.9	0.708	16.2	LOS C	9.5	239.3	0.86	0.81	1.46	33.9
All Vehicles			1829	0.9	1829	0.9	0.708	12.0	LOS B	9.5	239.3	0.72	0.62	1.00	35.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [102 (2)] King Ave & 56th St PM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	76	0.0	76	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.5
4	T1	All MCs	128	0.0	128	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	34.6
14	R2	All MCs	134	0.0	134	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.7
Approach			338	0.0	338	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.2
West: King Avenue															
5	L2	All MCs	80	0.0	80	0.0	0.460	8.3	LOS A	2.9	72.5	0.55	0.34	0.55	36.6
2	T1	All MCs	395	1.5	395	1.5	0.460	8.4	LOS A	2.9	72.5	0.55	0.34	0.55	38.4
12	R2	All MCs	14	14.3	14	14.3	0.460	9.8	LOS A	2.9	72.5	0.55	0.34	0.55	34.9
Approach			489	1.6	489	1.6	0.460	8.4	LOS A	2.9	72.5	0.55	0.34	0.55	38.0
South: 56th Street West															
3	L2	All MCs	50	0.0	50	0.0	0.467	10.8	LOS B	3.0	74.7	0.71	0.65	0.92	36.5
8	T1	All MCs	272	0.0	272	0.0	0.467	10.8	LOS B	3.0	74.7	0.71	0.65	0.92	35.5
18	R2	All MCs	40	5.0	40	5.0	0.467	11.7	LOS B	3.0	74.7	0.71	0.65	0.92	35.9
Approach			362	0.6	362	0.6	0.467	10.9	LOS B	3.0	74.7	0.71	0.65	0.92	35.7
East: King Avenue															
1	L2	All MCs	34	0.0	34	0.0	0.708	16.1	LOS C	9.5	239.3	0.86	0.81	1.46	32.7
6	T1	All MCs	485	1.2	485	1.2	0.708	16.2	LOS C	9.5	239.3	0.86	0.81	1.46	34.2
16	R2	All MCs	122	0.0	122	0.0	0.708	16.1	LOS C	9.5	239.3	0.86	0.81	1.46	33.1
Approach			640	0.9	640	0.9	0.708	16.2	LOS C	9.5	239.3	0.86	0.81	1.46	33.9
All Vehicles			1829	0.9	1829	0.9	0.708	12.0	LOS B	9.5	239.3	0.72	0.62	1.00	35.5

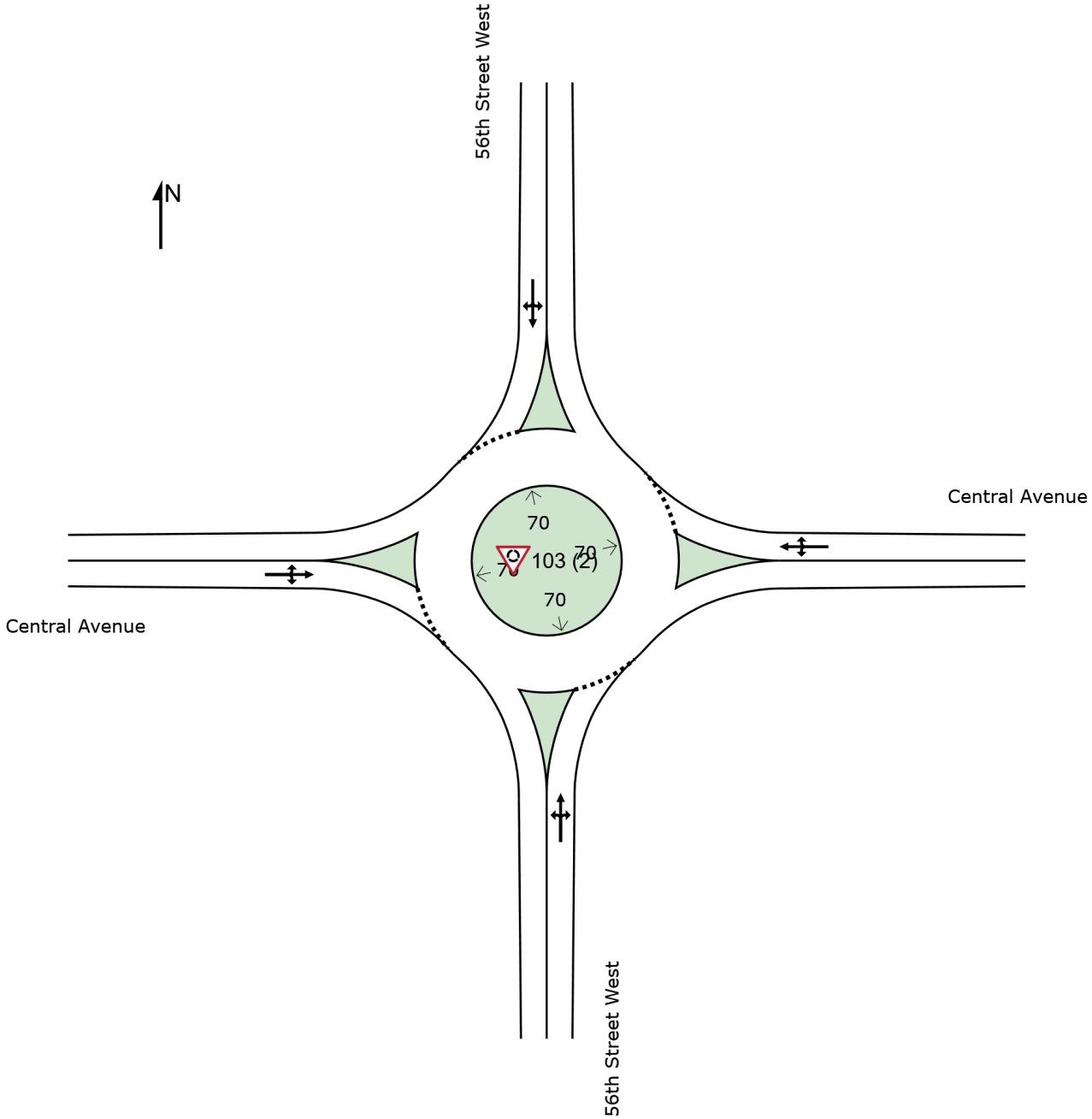
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: [103 (2)] Central Ave & 56th St AM (Future (2044))

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [103 (2)] Central Ave & 56th St AM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV %]	Arrival Flows [Total veh/h	HV %]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	186	2.2	186	2.2	0.465	8.3	LOS A	3.0	75.6	0.52	0.30	0.52	34.4
4	T1	All MCs	324	1.9	324	1.9	0.465	8.3	LOS A	3.0	75.6	0.52	0.30	0.52	35.1
14	R2	All MCs	1	0.0	1	0.0	0.465	8.1	LOS A	3.0	75.6	0.52	0.30	0.52	35.1
Approach			511	2.0	511	2.0	0.465	8.3	LOS A	3.0	75.6	0.52	0.30	0.52	34.9
West: Central Avenue															
5	L2	All MCs	2	0.0	2	0.0	0.226	7.4	LOS A	1.0	24.5	0.62	0.53	0.62	36.1
2	T1	All MCs	136	0.0	136	0.0	0.226	7.4	LOS A	1.0	24.5	0.62	0.53	0.62	36.8
12	R2	All MCs	28	0.0	28	0.0	0.226	7.4	LOS A	1.0	24.5	0.62	0.53	0.62	36.5
Approach			166	0.0	166	0.0	0.226	7.4	LOS A	1.0	24.5	0.62	0.53	0.62	36.7
South: 56th Street West															
3	L2	All MCs	8	75.0	8	75.0	0.318	17.7	LOS C	1.6	40.3	0.53	0.37	0.53	27.1
8	T1	All MCs	133	6.1	133	6.1	0.318	7.3	LOS A	1.6	40.3	0.53	0.37	0.53	36.1
18	R2	All MCs	157	0.0	157	0.0	0.318	6.7	LOS A	1.6	40.3	0.53	0.37	0.53	36.7
Approach			297	4.6	297	4.6	0.318	7.2	LOS A	1.6	40.3	0.53	0.37	0.53	36.1
East: Central Avenue															
1	L2	All MCs	96	2.1	96	2.1	0.272	5.5	LOS A	1.4	35.8	0.37	0.19	0.37	35.9
6	T1	All MCs	86	4.7	86	4.7	0.272	5.7	LOS A	1.4	35.8	0.37	0.19	0.37	36.3
16	R2	All MCs	120	10.0	120	10.0	0.272	6.1	LOS A	1.4	35.8	0.37	0.19	0.37	35.2
Approach			301	6.0	301	6.0	0.272	5.8	LOS A	1.4	35.8	0.37	0.19	0.37	35.7
All Vehicles			1275	3.3	1275	3.3	0.465	7.3	LOS A	3.0	75.6	0.50	0.32	0.50	35.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [104 (2)] Central Ave & 56th St PM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV %]	Arrival Flows [Total veh/h	HV %]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	46	0.0	46	0.0	0.281	6.1	LOS A	1.4	35.9	0.48	0.31	0.48	36.4
4	T1	All MCs	228	0.9	228	0.9	0.281	6.2	LOS A	1.4	35.9	0.48	0.31	0.48	37.0
14	R2	All MCs	18	0.0	18	0.0	0.281	6.1	LOS A	1.4	35.9	0.48	0.31	0.48	36.8
Approach			292	0.7	292	0.7	0.281	6.2	LOS A	1.4	35.9	0.48	0.31	0.48	36.9
West: Central Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.106	4.8	LOS A	0.5	11.3	0.48	0.35	0.48	37.6
2	T1	All MCs	88	0.0	88	0.0	0.106	4.8	LOS A	0.5	11.3	0.48	0.35	0.48	38.4
12	R2	All MCs	10	0.0	10	0.0	0.106	4.8	LOS A	0.5	11.3	0.48	0.35	0.48	38.0
Approach			99	0.0	99	0.0	0.106	4.8	LOS A	0.5	11.3	0.48	0.35	0.48	38.3
South: 56th Street West															
3	L2	All MCs	18	0.0	18	0.0	0.348	6.2	LOS A	2.1	51.4	0.37	0.18	0.37	36.7
8	T1	All MCs	312	0.0	312	0.0	0.348	6.2	LOS A	2.1	51.4	0.37	0.18	0.37	37.4
18	R2	All MCs	88	0.0	88	0.0	0.348	6.2	LOS A	2.1	51.4	0.37	0.18	0.37	37.1
Approach			418	0.0	418	0.0	0.348	6.2	LOS A	2.1	51.4	0.37	0.18	0.37	37.3
East: Central Avenue															
1	L2	All MCs	107	0.0	107	0.0	0.373	7.6	LOS A	2.0	50.7	0.56	0.39	0.56	35.3
6	T1	All MCs	145	0.0	145	0.0	0.373	7.6	LOS A	2.0	50.7	0.56	0.39	0.56	36.0
16	R2	All MCs	116	0.0	116	0.0	0.373	7.6	LOS A	2.0	50.7	0.56	0.39	0.56	35.7
Approach			367	0.0	367	0.0	0.373	7.6	LOS A	2.0	50.7	0.56	0.39	0.56	35.7
All Vehicles			1177	0.2	1177	0.2	0.373	6.5	LOS A	2.1	51.4	0.47	0.29	0.47	36.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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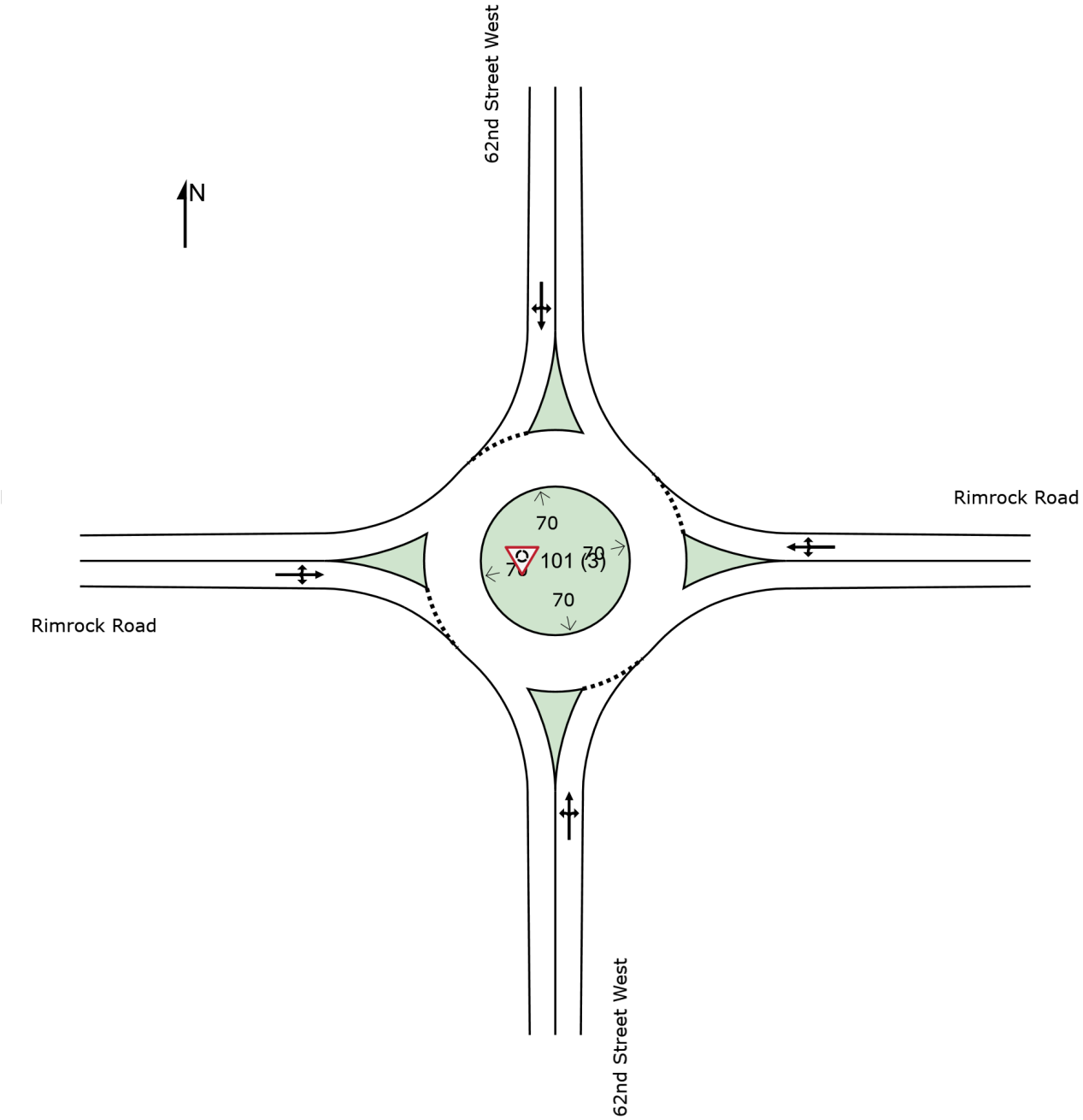
SITE LAYOUT

Site: [101 (3)] Rimrock Rd & 62nd St AM (Future (2044))

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (3)] Rimrock Rd & 62nd St AM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV %]	Arrival Flows [Total veh/h	HV %]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist ft]	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 62nd Street West															
7	L2	All MCs	664	0.0	664	0.0	0.748	14.7	LOS B	13.3	332.1	0.79	0.53	1.03	30.7
4	T1	All MCs	196	1.0	196	1.0	0.748	14.8	LOS B	13.3	332.1	0.79	0.53	1.03	29.7
14	R2	All MCs	4	0.0	4	0.0	0.748	14.7	LOS B	13.3	332.1	0.79	0.53	1.03	30.9
Approach			864	0.2	864	0.2	0.748	14.7	LOS B	13.3	332.1	0.79	0.53	1.03	30.5
West: Rimrock Road															
5	L2	All MCs	4	0.0	4	0.0	0.872	40.2	LOS E	9.1	231.8	0.95	1.24	2.28	23.3
2	T1	All MCs	272	3.0	272	3.0	0.872	41.2	LOS E	9.1	231.8	0.95	1.24	2.28	24.3
12	R2	All MCs	178	1.0	178	1.0	0.872	40.5	LOS E	9.1	231.8	0.95	1.24	2.28	23.4
Approach			454	2.2	454	2.2	0.872	41.0	LOS E	9.1	231.8	0.95	1.24	2.28	23.9
South: 62nd Street West															
3	L2	All MCs	34	12.0	34	12.0	0.303	13.9	LOS B	1.1	29.0	0.71	0.73	0.82	30.9
8	T1	All MCs	48	17.0	48	17.0	0.303	15.5	LOS C	1.1	29.0	0.71	0.73	0.82	29.5
18	R2	All MCs	48	4.0	48	4.0	0.303	11.5	LOS B	1.1	29.0	0.71	0.73	0.82	32.0
Approach			129	10.9	129	10.9	0.303	13.5	LOS B	1.1	29.0	0.71	0.73	0.82	30.7
East: Rimrock Road															
1	L2	All MCs	48	4.0	48	4.0	0.231	4.9	LOS A	1.1	29.9	0.27	0.12	0.27	36.2
6	T1	All MCs	72	17.0	72	17.0	0.231	5.9	LOS A	1.1	29.9	0.27	0.12	0.27	37.3
16	R2	All MCs	154	0.0	154	0.0	0.231	4.7	LOS A	1.1	29.9	0.27	0.12	0.27	37.3
Approach			274	5.2	274	5.2	0.231	5.0	LOS A	1.1	29.9	0.27	0.12	0.27	37.1
All Vehicles			1722	2.3	1722	2.3	0.872	20.0	LOS C	13.3	332.1	0.75	0.67	1.22	29.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (4)] Rimrock Rd & 62nd St PM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV %]	Arrival Flows [Total veh/h	HV %]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 62nd Street West															
7	L2	All MCs	283	0.0	283	0.0	0.441	9.2	LOS A	2.7	67.3	0.65	0.51	0.71	33.4
4	T1	All MCs	107	0.0	107	0.0	0.441	9.2	LOS A	2.7	67.3	0.65	0.51	0.71	32.3
14	R2	All MCs	12	0.0	12	0.0	0.441	9.2	LOS A	2.7	67.3	0.65	0.51	0.71	33.6
Approach			401	0.0	401	0.0	0.441	9.2	LOS A	2.7	67.3	0.65	0.51	0.71	33.1
West: Rimrock Road															
5	L2	All MCs	4	0.0	4	0.0	0.237	6.5	LOS A	1.1	27.1	0.56	0.43	0.56	36.2
2	T1	All MCs	130	2.0	130	2.0	0.237	6.7	LOS A	1.1	27.1	0.56	0.43	0.56	38.8
12	R2	All MCs	68	0.0	68	0.0	0.237	6.5	LOS A	1.1	27.1	0.56	0.43	0.56	36.7
Approach			203	1.3	203	1.3	0.237	6.7	LOS A	1.1	27.1	0.56	0.43	0.56	38.0
South: 62nd Street West															
3	L2	All MCs	162	0.0	162	0.0	0.375	8.2	LOS A	2.0	48.8	0.61	0.46	0.61	34.4
8	T1	All MCs	145	0.0	145	0.0	0.375	8.2	LOS A	2.0	48.8	0.61	0.46	0.61	33.2
18	R2	All MCs	30	0.0	30	0.0	0.375	8.2	LOS A	2.0	48.8	0.61	0.46	0.61	34.6
Approach			337	0.0	337	0.0	0.375	8.2	LOS A	2.0	48.8	0.61	0.46	0.61	33.9
East: Rimrock Road															
1	L2	All MCs	60	0.0	60	0.0	0.786	18.6	LOS C	15.9	397.2	0.94	0.90	1.70	30.3
6	T1	All MCs	188	0.0	188	0.0	0.786	18.6	LOS C	15.9	397.2	0.94	0.90	1.70	32.3
16	R2	All MCs	542	0.0	542	0.0	0.786	18.6	LOS C	15.9	397.2	0.94	0.90	1.70	30.6
Approach			790	0.0	790	0.0	0.786	18.6	LOS C	15.9	397.2	0.94	0.90	1.70	31.0
All Vehicles			1732	0.2	1732	0.2	0.786	13.0	LOS B	15.9	397.2	0.76	0.67	1.13	32.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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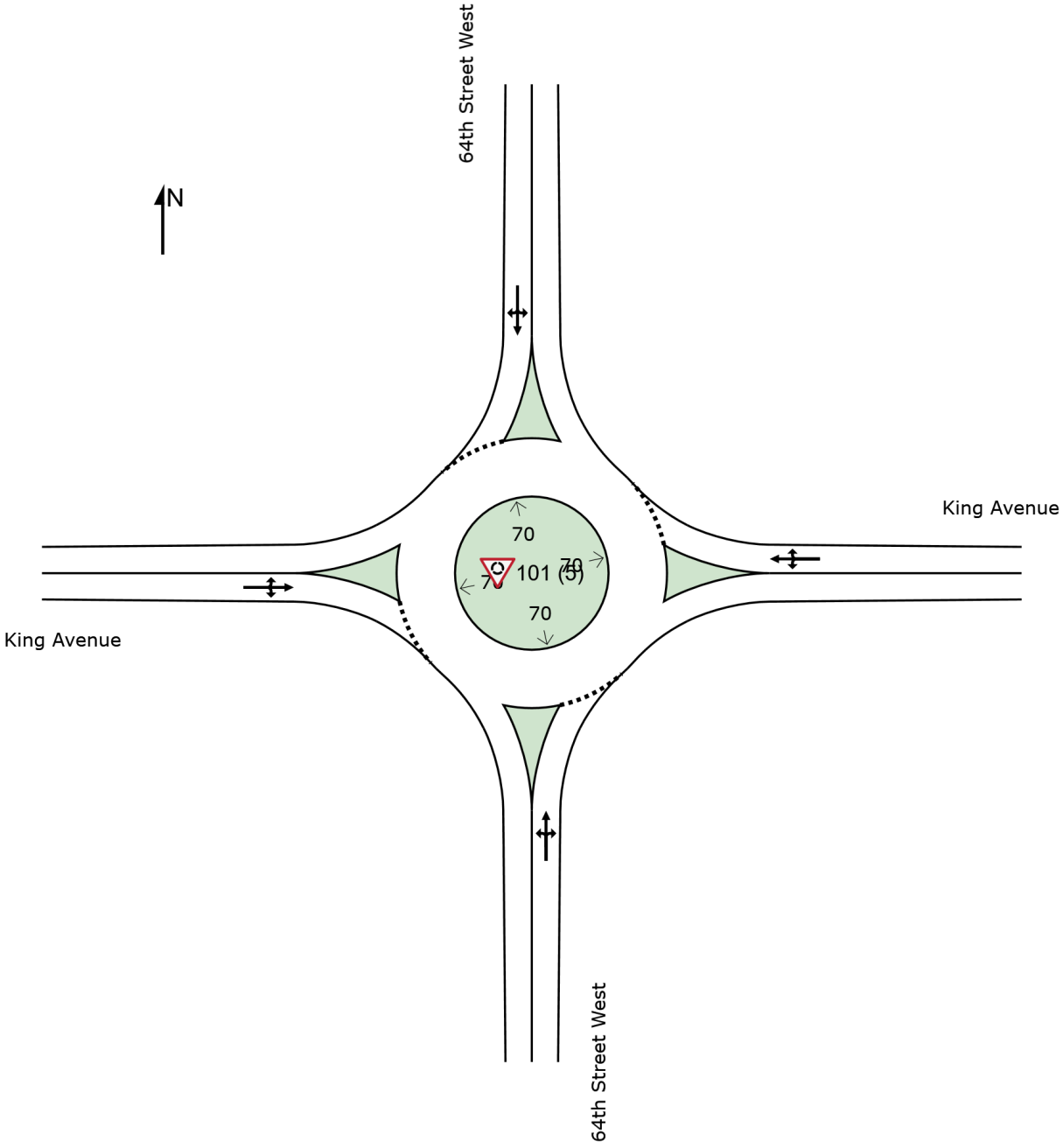
SITE LAYOUT

Site: [101 (5)] King Ave & 64th St AM (Future (2044))

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (5)] King Ave & 64th St AM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 64th Street West															
7	L2	All MCs	14	14.3	14	14.3	0.236	8.5	LOS A	1.1	26.9	0.56	0.43	0.56	36.1
4	T1	All MCs	48	0.0	48	0.0	0.236	6.5	LOS A	1.1	26.9	0.56	0.43	0.56	37.2
14	R2	All MCs	140	0.0	140	0.0	0.236	6.5	LOS A	1.1	26.9	0.56	0.43	0.56	38.4
Approach			202	1.0	202	1.0	0.236	6.6	LOS A	1.1	26.9	0.56	0.43	0.56	37.9
West: King Avenue															
5	L2	All MCs	152	6.6	152	6.6	0.761	16.1	LOS C	15.0	387.5	0.83	0.60	1.17	31.8
2	T1	All MCs	575	3.5	575	3.5	0.761	15.8	LOS C	15.0	387.5	0.83	0.60	1.17	33.9
12	R2	All MCs	108	7.4	108	7.4	0.761	16.2	LOS C	15.0	387.5	0.83	0.60	1.17	32.1
Approach			835	4.6	835	4.6	0.761	15.9	LOS C	15.0	387.5	0.83	0.60	1.17	33.2
South: 64th Street West															
3	L2	All MCs	16	0.0	16	0.0	0.484	13.2	LOS B	2.7	68.6	0.76	0.77	1.03	34.1
8	T1	All MCs	102	3.9	102	3.9	0.484	14.2	LOS B	2.7	68.6	0.76	0.77	1.03	32.8
18	R2	All MCs	174	1.1	174	1.1	0.484	13.5	LOS B	2.7	68.6	0.76	0.77	1.03	34.1
Approach			292	2.0	292	2.0	0.484	13.7	LOS B	2.7	68.6	0.76	0.77	1.03	33.6
East: King Avenue															
1	L2	All MCs	110	3.6	110	3.6	0.477	9.2	LOS A	2.9	73.9	0.60	0.39	0.60	35.5
6	T1	All MCs	316	1.9	316	1.9	0.477	9.0	LOS A	2.9	73.9	0.60	0.39	0.60	37.8
16	R2	All MCs	54	0.0	54	0.0	0.477	8.8	LOS A	2.9	73.9	0.60	0.39	0.60	36.5
Approach			480	2.1	480	2.1	0.477	9.1	LOS A	2.9	73.9	0.60	0.39	0.60	37.1
All Vehicles			1810	3.1	1810	3.1	0.761	12.7	LOS B	15.0	387.5	0.72	0.55	0.93	34.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (6)] King Ave & 64th St PM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 64th Street West															
7	L2	All MCs	28	0.0	28	0.0	0.399	10.0	LOS A	2.2	54.0	0.69	0.62	0.80	36.2
4	T1	All MCs	76	0.0	76	0.0	0.399	10.0	LOS A	2.2	54.0	0.69	0.62	0.80	35.2
14	R2	All MCs	192	0.0	192	0.0	0.399	10.0	LOS A	2.2	54.0	0.69	0.62	0.80	36.4
Approach			297	0.0	297	0.0	0.399	10.0	LOS A	2.2	54.0	0.69	0.62	0.80	36.0
West: King Avenue															
5	L2	All MCs	154	0.0	154	0.0	0.497	8.3	LOS A	3.5	88.0	0.49	0.26	0.49	36.3
2	T1	All MCs	409	2.0	409	2.0	0.497	8.5	LOS A	3.5	88.0	0.49	0.26	0.49	38.0
12	R2	All MCs	12	0.0	12	0.0	0.497	8.3	LOS A	3.5	88.0	0.49	0.26	0.49	36.7
Approach			575	1.4	575	1.4	0.497	8.5	LOS A	3.5	88.0	0.49	0.26	0.49	37.5
South: 64th Street West															
3	L2	All MCs	4	0.0	4	0.0	0.213	7.1	LOS A	0.9	22.8	0.61	0.52	0.61	37.9
8	T1	All MCs	95	0.0	95	0.0	0.213	7.1	LOS A	0.9	22.8	0.61	0.52	0.61	36.8
18	R2	All MCs	58	3.4	58	3.4	0.213	7.6	LOS A	0.9	22.8	0.61	0.52	0.61	37.5
Approach			157	1.3	157	1.3	0.213	7.3	LOS A	0.9	22.8	0.61	0.52	0.61	37.1
East: King Avenue															
1	L2	All MCs	54	0.0	54	0.0	0.613	11.4	LOS B	6.6	165.2	0.69	0.50	0.87	35.0
6	T1	All MCs	542	1.1	542	1.1	0.613	11.5	LOS B	6.6	165.2	0.69	0.50	0.87	36.8
16	R2	All MCs	50	0.0	50	0.0	0.613	11.4	LOS B	6.6	165.2	0.69	0.50	0.87	35.4
Approach			647	0.9	647	0.9	0.613	11.5	LOS B	6.6	165.2	0.69	0.50	0.87	36.5
All Vehicles			1675	1.0	1675	1.0	0.613	9.8	LOS A	6.6	165.2	0.61	0.44	0.70	36.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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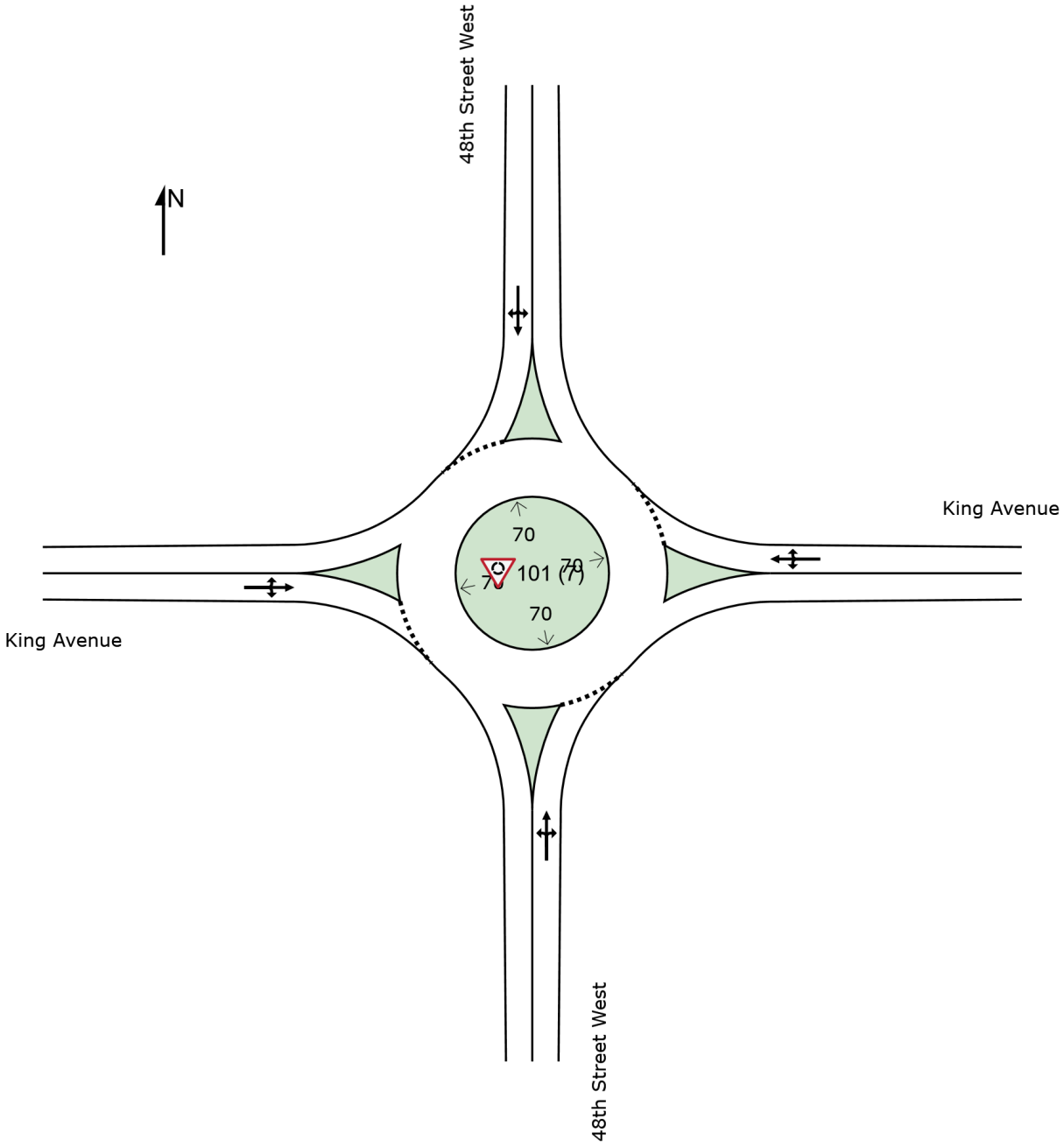
SITE LAYOUT

Site: [101 (7)] King Ave & 48th St AM (Future (2044))

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (7)] King Ave & 48th St AM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	98	0.0	98	0.0	0.295	7.5	LOS A	1.4	34.8	0.60	0.48	0.60	36.7
4	T1	All MCs	116	1.7	116	1.7	0.295	7.7	LOS A	1.4	34.8	0.60	0.48	0.60	35.4
14	R2	All MCs	30	0.0	30	0.0	0.295	7.5	LOS A	1.4	34.8	0.60	0.48	0.60	36.7
Approach			245	0.8	245	0.8	0.295	7.6	LOS A	1.4	34.8	0.60	0.48	0.60	36.1
West: King Avenue															
5	L2	All MCs	78	2.6	78	2.6	0.705	14.2	LOS B	10.7	287.8	0.78	0.63	1.19	32.8
2	T1	All MCs	609	10.5	609	10.5	0.705	15.1	LOS C	10.7	287.8	0.78	0.63	1.19	33.7
12	R2	All MCs	2	0.0	2	0.0	0.705	14.0	LOS B	10.7	287.8	0.78	0.63	1.19	33.5
Approach			689	9.6	689	9.6	0.705	15.0	LOS C	10.7	287.8	0.78	0.63	1.19	33.6
South: 48th Street West															
3	L2	All MCs	7	33.0	7	33.0	0.238	19.2	LOS C	0.9	23.1	0.68	0.64	0.68	31.9
8	T1	All MCs	86	4.7	86	4.7	0.238	10.0	LOS B	0.9	23.1	0.68	0.64	0.68	34.6
18	R2	All MCs	34	0.0	34	0.0	0.238	8.8	LOS A	0.9	23.1	0.68	0.64	0.68	36.2
Approach			126	4.9	126	4.9	0.238	10.1	LOS B	0.9	23.1	0.68	0.64	0.68	34.9
East: King Avenue															
1	L2	All MCs	18	0.0	18	0.0	0.450	7.5	LOS A	2.6	71.5	0.48	0.27	0.48	36.9
6	T1	All MCs	416	10.6	416	10.6	0.450	8.4	LOS A	2.6	71.5	0.48	0.27	0.48	37.6
16	R2	All MCs	32	6.3	32	6.3	0.450	8.1	LOS A	2.6	71.5	0.48	0.27	0.48	36.4
Approach			466	9.9	466	9.9	0.450	8.4	LOS A	2.6	71.5	0.48	0.27	0.48	37.5
All Vehicles			1526	7.9	1526	7.9	0.705	11.4	LOS B	10.7	287.8	0.65	0.50	0.84	35.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (8)] King Ave & 48th St PM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	84	0.0	84	0.0	0.408	11.9	LOS B	2.0	50.4	0.73	0.73	0.90	34.1
4	T1	All MCs	120	3.3	120	3.3	0.408	12.8	LOS B	2.0	50.4	0.73	0.73	0.90	32.9
14	R2	All MCs	34	0.0	34	0.0	0.408	11.9	LOS B	2.0	50.4	0.73	0.73	0.90	34.2
Approach			237	1.7	237	1.7	0.408	12.4	LOS B	2.0	50.4	0.73	0.73	0.90	33.5
West: King Avenue															
5	L2	All MCs	60	0.0	60	0.0	0.632	12.0	LOS B	7.3	185.0	0.72	0.54	0.96	34.7
2	T1	All MCs	583	1.0	583	1.0	0.632	12.1	LOS B	7.3	185.0	0.72	0.54	0.96	36.4
12	R2	All MCs	16	0.0	16	0.0	0.632	12.0	LOS B	7.3	185.0	0.72	0.54	0.96	35.1
Approach			659	0.9	659	0.9	0.632	12.1	LOS B	7.3	185.0	0.72	0.54	0.96	36.2
South: 48th Street West															
3	L2	All MCs	7	0.0	7	0.0	0.253	8.6	LOS A	1.1	26.8	0.66	0.60	0.66	37.1
8	T1	All MCs	118	0.0	118	0.0	0.253	8.6	LOS A	1.1	26.8	0.66	0.60	0.66	36.0
18	R2	All MCs	40	0.0	40	0.0	0.253	8.6	LOS A	1.1	26.8	0.66	0.60	0.66	37.3
Approach			165	0.0	165	0.0	0.253	8.6	LOS A	1.1	26.8	0.66	0.60	0.66	36.4
East: King Avenue															
1	L2	All MCs	58	0.0	58	0.0	0.824	18.8	LOS C	22.5	564.8	0.97	0.76	1.53	31.5
6	T1	All MCs	751	0.3	751	0.3	0.824	18.8	LOS C	22.5	564.8	0.97	0.76	1.53	33.0
16	R2	All MCs	130	0.0	130	0.0	0.824	18.8	LOS C	22.5	564.8	0.97	0.76	1.53	31.8
Approach			939	0.2	939	0.2	0.824	18.8	LOS C	22.5	564.8	0.97	0.76	1.53	32.7
All Vehicles			2000	0.6	2000	0.6	0.824	15.0	LOS B	22.5	564.8	0.83	0.67	1.19	34.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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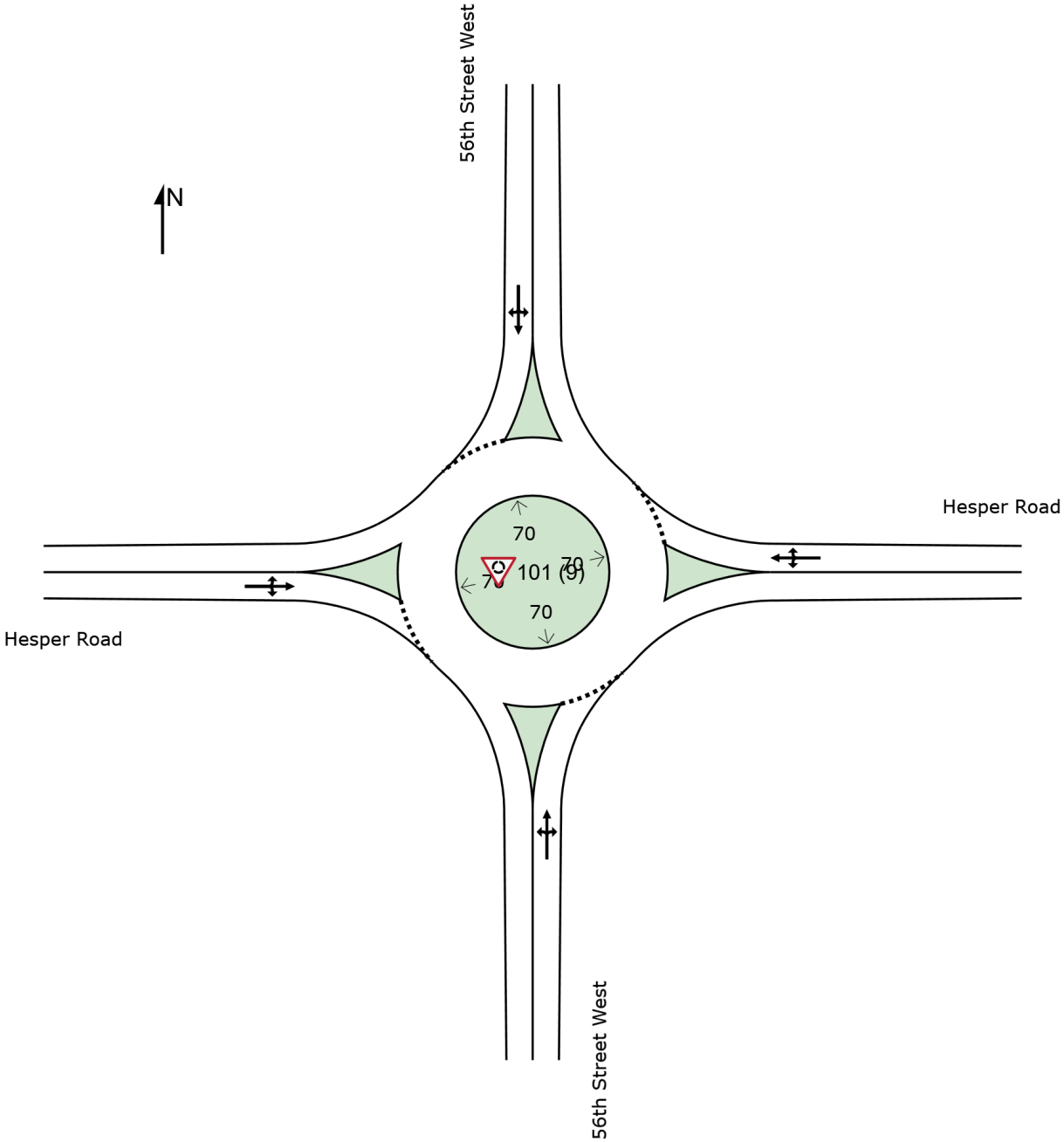
SITE LAYOUT

Site: [101 (9)] Hesper Rd & 56th St AM (Future (2044))

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (9)] Hesper Rd & 56th St AM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	150	0.0	150	0.0	0.323	6.3	LOS A	1.7	43.3	0.47	0.29	0.47	35.4
4	T1	All MCs	146	6.8	146	6.8	0.323	7.0	LOS A	1.7	43.3	0.47	0.29	0.47	35.2
14	R2	All MCs	42	0.0	42	0.0	0.323	6.3	LOS A	1.7	43.3	0.47	0.29	0.47	35.8
Approach			338	2.9	338	2.9	0.323	6.6	LOS A	1.7	43.3	0.47	0.29	0.47	35.4
West: Hesper Road															
5	L2	All MCs	58	0.0	58	0.0	0.407	8.0	LOS A	2.1	55.7	0.59	0.41	0.59	35.1
2	T1	All MCs	276	6.5	276	6.5	0.407	8.7	LOS A	2.1	55.7	0.59	0.41	0.59	34.9
12	R2	All MCs	40	0.0	40	0.0	0.407	8.0	LOS A	2.1	55.7	0.59	0.41	0.59	35.4
Approach			374	4.8	374	4.8	0.407	8.5	LOS A	2.1	55.7	0.59	0.41	0.59	35.0
South: 56th Street West															
3	L2	All MCs	58	3.4	58	3.4	0.302	8.0	LOS A	1.4	35.0	0.61	0.49	0.61	34.7
8	T1	All MCs	126	1.6	126	1.6	0.302	7.7	LOS A	1.4	35.0	0.61	0.49	0.61	35.6
18	R2	All MCs	54	7.4	54	7.4	0.302	8.6	LOS A	1.4	35.0	0.61	0.49	0.61	34.5
Approach			238	3.4	238	3.4	0.302	8.0	LOS A	1.4	35.0	0.61	0.49	0.61	35.1
East: Hesper Road															
1	L2	All MCs	32	12.5	32	12.5	0.218	6.1	LOS A	1.0	25.8	0.43	0.27	0.43	34.8
6	T1	All MCs	136	4.4	136	4.4	0.218	5.4	LOS A	1.0	25.8	0.43	0.27	0.43	36.8
16	R2	All MCs	46	17.4	46	17.4	0.218	6.6	LOS A	1.0	25.8	0.43	0.27	0.43	34.6
Approach			213	8.4	213	8.4	0.218	5.8	LOS A	1.0	25.8	0.43	0.27	0.43	36.0
All Vehicles			1163	4.6	1163	4.6	0.407	7.4	LOS A	2.1	55.7	0.53	0.37	0.53	35.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (10)] Hesper Rd & 56th St PM (Future (2044))
Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	52	0.0	52	0.0	0.175	5.1	LOS A	0.8	20.1	0.45	0.30	0.45	36.6
4	T1	All MCs	98	2.0	98	2.0	0.175	5.3	LOS A	0.8	20.1	0.45	0.30	0.45	37.1
14	R2	All MCs	26	0.0	26	0.0	0.175	5.1	LOS A	0.8	20.1	0.45	0.30	0.45	37.0
Approach			176	1.1	176	1.1	0.175	5.2	LOS A	0.8	20.1	0.45	0.30	0.45	36.9
West: Hesper Road															
5	L2	All MCs	30	0.0	30	0.0	0.171	4.5	LOS A	0.8	20.0	0.37	0.21	0.37	37.2
2	T1	All MCs	134	3.0	134	3.0	0.171	4.8	LOS A	0.8	20.0	0.37	0.21	0.37	37.5
12	R2	All MCs	22	9.1	22	9.1	0.171	5.3	LOS A	0.8	20.0	0.37	0.21	0.37	36.2
Approach			186	3.2	186	3.2	0.171	4.8	LOS A	0.8	20.0	0.37	0.21	0.37	37.3
South: 56th Street West															
3	L2	All MCs	10	0.0	10	0.0	0.244	5.5	LOS A	1.2	30.7	0.42	0.25	0.42	37.1
8	T1	All MCs	214	0.0	214	0.0	0.244	5.5	LOS A	1.2	30.7	0.42	0.25	0.42	37.9
18	R2	All MCs	45	0.0	45	0.0	0.244	5.5	LOS A	1.2	30.7	0.42	0.25	0.42	37.6
Approach			268	0.0	268	0.0	0.244	5.5	LOS A	1.2	30.7	0.42	0.25	0.42	37.8
East: Hesper Road															
1	L2	All MCs	45	0.0	45	0.0	0.382	7.3	LOS A	2.2	54.6	0.51	0.32	0.51	35.9
6	T1	All MCs	242	0.0	242	0.0	0.382	7.3	LOS A	2.2	54.6	0.51	0.32	0.51	36.6
16	R2	All MCs	120	0.0	120	0.0	0.382	7.3	LOS A	2.2	54.6	0.51	0.32	0.51	36.3
Approach			407	0.0	407	0.0	0.382	7.3	LOS A	2.2	54.6	0.51	0.32	0.51	36.4
All Vehicles			1037	0.8	1037	0.8	0.382	6.0	LOS A	2.2	54.6	0.45	0.28	0.45	37.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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APPENDIX G

FUTURE (2044) ALTERNATIVE CAPACITY CALCULATIONS

Appendix G Contents

Future (2044) Alternative Capacity Calculations 438

Future (2044) Alternative Capacity Calculations

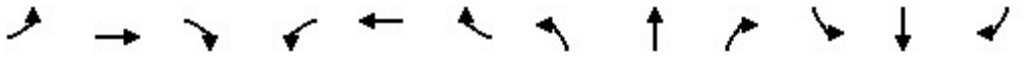
Future AM Capacity:

Queues
2: 54th Street West & Rimrock Road 10/14/2025

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	2	1081	214	221	57	36	334	184	119
v/c Ratio	0.01	0.79	0.84	0.22	0.07	0.11	0.50	1.04	0.22
Control Delay (s/veh)	13.5	39.5	80.3	15.1	4.2	31.7	7.8	121.5	32.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	13.5	39.5	80.3	15.1	4.2	31.7	7.8	121.5	32.8
Queue Length 50th (ft)	1	453	184	91	0	23	19	162	74
Queue Length 95th (ft)	9	586	#323	170	25	51	94	#318	123
Internal Link Dist (ft)		4323		924			5202		920
Turn Bay Length (ft)	250		250		250	200		150	
Base Capacity (vph)	267	1362	295	998	818	427	770	226	680
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	0.79	0.73	0.22	0.07	0.08	0.43	0.81	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	882	112	197	203	52	33	29	278	169	103	6
Future Volume (veh/h)	2	882	112	197	203	52	33	29	278	169	103	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	385	1723	1750	1723	1695	1600	1668	1750	1736	1709	1750	1750
Adj Flow Rate, veh/h	2	959	122	214	221	57	36	32	302	184	112	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	2	0	2	4	11	6	0	1	3	0	0
Cap, veh/h	148	1132	144	237	900	720	443	52	495	242	592	37
Arrive On Green	0.00	0.39	0.39	0.14	0.53	0.53	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	367	2921	371	1641	1695	1356	1232	144	1361	1038	1630	102
Grp Volume(v), veh/h	2	537	544	214	221	57	36	0	334	184	0	119
Grp Sat Flow(s),veh/h/ln	367	1637	1656	1641	1695	1356	1232	0	1505	1038	0	1732
Q Serve(g_s), s	0.2	40.9	40.9	17.5	9.6	2.8	2.8	0.0	24.8	24.1	0.0	6.4
Cycle Q Clear(g_c), s	0.2	40.9	40.9	17.5	9.6	2.8	9.2	0.0	24.8	48.9	0.0	6.4
Prop In Lane	1.00		0.22	1.00		1.00	1.00		0.90	1.00		0.06
Lane Grp Cap(c), veh/h	148	634	642	237	900	720	443	0	547	242	0	629
V/C Ratio(X)	0.01	0.85	0.85	0.90	0.25	0.08	0.08	0.00	0.61	0.76	0.00	0.19
Avail Cap(c_a), veh/h	159	634	642	276	900	720	443	0	547	242	0	629
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	25.7	38.2	38.2	57.6	17.3	15.7	32.9	0.0	35.6	55.6	0.0	29.7
Incr Delay (d2), s/veh	0.0	13.2	13.1	28.1	0.6	0.2	0.1	0.0	2.0	13.3	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	17.7	17.9	9.0	3.8	0.9	0.8	0.0	9.1	7.2	0.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	25.7	51.3	51.2	85.7	18.0	15.9	33.0	0.0	37.6	68.9	0.0	29.9
LnGrp LOS	C	D	D	F	B	B	C		D	E		C
Approach Vol, veh/h		1083			492			370			303	
Approach Delay, s/veh		51.2			47.2			37.1			53.6	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.7	59.0		55.0	3.2	78.6		55.0				
Change Period (Y+Rc), s	3.0	6.0		5.3	3.0	6.0		5.3				
Max Green Setting (Gmax), s	23.0	53.0		49.7	4.0	72.0		49.7				
Max Q Clear Time (g_c+I1), s	19.5	42.9		50.9	2.2	11.6		26.8				
Green Ext Time (p_c), s	0.2	4.3		0.0	0.0	1.4		2.1				

Intersection Summary		
HCM 7th Control Delay, s/veh	48.3	
HCM 7th LOS	D	

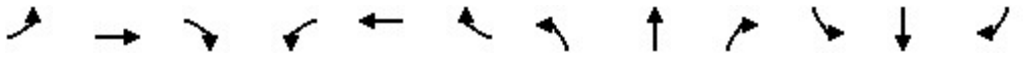
Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBT	WBL	WBT	NBT	NBR
Lane Group Flow (vph)	1229	176	549	57	196
v/c Ratio	0.83	0.74	0.26	0.31	0.52
Control Delay (s/veh)	19.3	44.6	4.1	23.9	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.3	44.6	4.1	23.9	9.2
Queue Length 50th (ft)	151	56	27	16	0
Queue Length 95th (ft)	#309	#157	56	42	47
Internal Link Dist (ft)	3542		1579	5173	
Turn Bay Length (ft)		200			200
Base Capacity (vph)	1493	238	2172	368	557
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	0.82	0.74	0.25	0.15	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	884	247	162	505	0	52	0	180	0	0	0
Future Volume (veh/h)	0	884	247	162	505	0	52	0	180	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1695	1641	1709	1750	1600	1750	1627	1750	1750	1750
Adj Flow Rate, veh/h	0	961	268	176	549	0	57	0	196	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	4	8	3	0	11	0	9	0	0	0
Cap, veh/h	142	1117	311	214	2059	0	408	0	255	0	323	0
Arrive On Green	0.00	0.44	0.44	0.14	0.63	0.00	0.18	0.00	0.18	0.00	0.00	0.00
Sat Flow, veh/h	872	2550	709	1563	3333	0	1440	0	1379	0	1750	0
Grp Volume(v), veh/h	0	621	608	176	549	0	57	0	196	0	0	0
Grp Sat Flow(s),veh/h/ln	872	1650	1609	1563	1624	0	1440	0	1379	0	1750	0
Q Serve(g_s), s	0.0	17.2	17.4	5.6	3.8	0.0	1.7	0.0	6.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	17.2	17.4	5.6	3.8	0.0	1.7	0.0	6.9	0.0	0.0	0.0
Prop In Lane	1.00		0.44	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	142	723	705	214	2059	0	408	0	255	0	323	0
V/C Ratio(X)	0.00	0.86	0.86	0.82	0.27	0.00	0.14	0.00	0.77	0.00	0.00	0.00
Avail Cap(c_a), veh/h	168	773	754	246	2224	0	595	0	434	0	551	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)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	12.9	12.9	21.3	4.1	0.0	17.6	0.0	19.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	9.1	9.7	17.7	0.1	0.0	0.2	0.0	4.9	0.0	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	0.0	6.6	6.6	2.9	0.7	0.0	0.5	0.0	2.3	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	22.0	22.6	39.0	4.2	0.0	17.7	0.0	24.5	0.0	0.0	0.0
LnGrp LOS		C	C	D	A		B		C			
Approach Vol, veh/h		1229			725			253			0	
Approach Delay, s/veh		22.3			12.6			23.0			0.0	
Approach LOS		C			B			C				

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	10.0	26.9		14.0		36.8		14.0				
Change Period (Y+Rc), s	3.0	4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s	8.0	23.8		16.0		34.8		16.0				
Max Q Clear Time (g_c+I1), s	7.6	19.4		8.9		5.8		0.0				
Green Ext Time (p_c), s	0.0	2.9		0.5		3.8		0.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			19.2									
HCM 7th LOS			B									

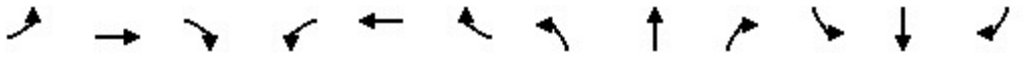
Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	42	1356	133	550	70	183	28
v/c Ratio	0.07	0.69	0.64	0.25	0.38	0.48	0.13
Control Delay (s/veh)	3.3	13.5	42.1	5.5	28.0	8.8	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	3.3	13.5	42.1	5.5	28.0	8.8	22.3
Queue Length 50th (ft)	3	180	45	26	22	0	9
Queue Length 95th (ft)	11	#313	#124	80	54	45	27
Internal Link Dist (ft)		3521		424	5188		424
Turn Bay Length (ft)						120	
Base Capacity (vph)	615	1969	213	2188	255	461	286
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	0.07	0.69	0.62	0.25	0.27	0.40	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	1057	190	122	436	70	48	17	168	17	9	0
Future Volume (veh/h)	39	1057	190	122	436	70	48	17	168	17	9	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1736	1723	1695	1750	1545	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	42	1149	207	133	474	76	52	18	183	18	10	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	1	2	4	0	15	0	0	0	0	0
Cap, veh/h	627	1466	263	165	1645	262	276	78	233	211	93	0
Arrive On Green	0.03	0.52	0.52	0.10	0.59	0.59	0.16	0.16	0.16	0.16	0.16	0.00
Sat Flow, veh/h	1667	2795	501	1641	2782	444	1047	500	1483	669	591	0
Grp Volume(v), veh/h	42	676	680	133	273	277	70	0	183	28	0	0
Grp Sat Flow(s),veh/h/ln	1667	1650	1646	1641	1611	1616	1547	0	1483	1260	0	0
Q Serve(g_s), s	0.6	18.5	18.7	4.4	4.7	4.7	0.0	0.0	6.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.6	18.5	18.7	4.4	4.7	4.7	2.0	0.0	6.7	2.0	0.0	0.0
Prop In Lane	1.00		0.30	1.00		0.27	0.74		1.00	0.64		0.00
Lane Grp Cap(c), veh/h	627	865	864	165	952	955	355	0	233	303	0	0
V/C Ratio(X)	0.07	0.78	0.79	0.80	0.29	0.29	0.20	0.00	0.79	0.09	0.00	0.00
Avail Cap(c_a), veh/h	719	865	864	205	952	955	424	0	302	366	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	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.6	10.7	10.8	24.7	5.6	5.7	20.8	0.0	22.7	20.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	6.9	7.2	16.9	0.8	0.8	0.3	0.0	9.9	0.1	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	0.2	6.6	6.7	2.3	1.3	1.3	0.8	0.0	2.7	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.6	17.7	18.0	41.5	6.4	6.4	21.0	0.0	32.6	20.4	0.0	0.0
LnGrp LOS	A	B	B	D	A	A	C		C	C		
Approach Vol, veh/h		1398			683			253			28	
Approach Delay, s/veh		17.4			13.3			29.4			20.4	
Approach LOS		B			B			C			C	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		13.4	8.6	34.0		13.4	4.9	37.7				
Change Period (Y+Rc), s		4.6	3.0	4.6		4.6	3.0	4.6				
Max Green Setting (Gmax), s		11.4	7.0	29.4		11.4	5.0	31.4				
Max Q Clear Time (g_c+I1), s		8.7	6.4	20.7		4.0	2.6	6.7				
Green Ext Time (p_c), s		0.3	0.0	5.4		0.0	0.0	3.3				

Intersection Summary	
HCM 7th Control Delay, s/veh	17.6
HCM 7th LOS	B

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	522	216	93	211
v/c Ratio	0.74	0.33	0.21	0.58
Control Delay (s/veh)	18.1	9.1	11.8	21.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay (s/veh)	18.1	9.1	11.8	21.1
Queue Length 50th (ft)	97	29	12	41
Queue Length 95th (ft)	238	82	47	119
Internal Link Dist (ft)	5212	417	5184	5199
Turn Bay Length (ft)				
Base Capacity (vph)	1152	1076	728	607
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	0.45	0.20	0.13	0.35

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	440	9	15	153	31	9	52	24	120	52	22
Future Volume (veh/h)	31	440	9	15	153	31	9	52	24	120	52	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1668	1682	1750	1750	1614	1668	1477	1695	1641	1723	1695	1641
Adj Flow Rate, veh/h	34	478	10	16	166	34	10	57	26	130	57	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	6	5	0	0	10	6	20	4	8	2	4	8
Cap, veh/h	144	656	13	140	524	101	144	234	98	358	109	36
Arrive On Green	0.42	0.42	0.42	0.42	0.42	0.42	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	51	1570	32	41	1252	242	78	1073	447	791	498	165
Grp Volume(v), veh/h	522	0	0	216	0	0	93	0	0	211	0	0
Grp Sat Flow(s),veh/h/ln	1653	0	0	1534	0	0	1598	0	0	1455	0	0
Q Serve(g_s), s	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0
Cycle Q Clear(g_c), s	8.3	0.0	0.0	2.9	0.0	0.0	1.5	0.0	0.0	4.0	0.0	0.0
Prop In Lane	0.07		0.02	0.07		0.16	0.11		0.28	0.62		0.11
Lane Grp Cap(c), veh/h	813	0	0	765	0	0	476	0	0	503	0	0
V/C Ratio(X)	0.64	0.00	0.00	0.28	0.00	0.00	0.20	0.00	0.00	0.42	0.00	0.00
Avail Cap(c_a), veh/h	1653	0	0	1525	0	0	1097	0	0	1059	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	7.7	0.0	0.0	6.2	0.0	0.0	10.2	0.0	0.0	11.1	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.6	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	1.2	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	8.6	0.0	0.0	6.4	0.0	0.0	10.4	0.0	0.0	11.6	0.0	0.0
LnGrp LOS	A			A			B			B		
Approach Vol, veh/h		522			216			93			211	
Approach Delay, s/veh		8.6			6.4			10.4			11.6	
Approach LOS		A			A			B			B	

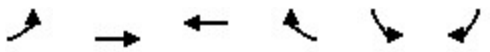
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.5		18.8		12.5		18.8				
Change Period (Y+Rc), s		5.7		5.7		5.7		5.7				
Max Green Setting (Gmax), s		19.3		29.3		19.3		29.3				
Max Q Clear Time (g_c+I1), s		3.5		10.3		6.0		4.9				
Green Ext Time (p_c), s		0.3		2.8		0.8		1.1				

Intersection Summary		
HCM 7th Control Delay, s/veh	8.9	
HCM 7th LOS	A	

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	62	316	183	66	426
v/c Ratio	0.17	0.55	0.34	0.14	0.69
Control Delay (s/veh)	10.3	14.5	11.6	3.9	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	10.3	14.5	11.6	3.9	17.3
Queue Length 50th (ft)	9	52	29	0	61
Queue Length 95th (ft)	27	110	68	18	#200
Internal Link Dist (ft)		1482	3542		5231
Turn Bay Length (ft)					
Base Capacity (vph)	721	1111	1049	875	782
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	0.09	0.28	0.17	0.08	0.54

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



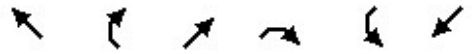
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	291	168	61	298	94
Future Volume (veh/h)	57	291	168	61	298	94
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1750	1736	1654	1586	1736	1750
Adj Flow Rate, veh/h	62	316	183	66	324	102
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	7	12	1	0
Cap, veh/h	480	497	473	385	415	131
Arrive On Green	0.29	0.29	0.29	0.29	0.34	0.34
Sat Flow, veh/h	1149	1736	1654	1344	1219	384
Grp Volume(v), veh/h	62	316	183	66	427	0
Grp Sat Flow(s),veh/h/ln	1149	1736	1654	1344	1606	0
Q Serve(g_s), s	1.3	4.5	2.5	1.0	6.8	0.0
Cycle Q Clear(g_c), s	3.8	4.5	2.5	1.0	6.8	0.0
Prop In Lane	1.00			1.00	0.76	0.24
Lane Grp Cap(c), veh/h	480	497	473	385	547	0
V/C Ratio(X)	0.13	0.64	0.39	0.17	0.78	0.00
Avail Cap(c_a), veh/h	1070	1388	1323	1075	945	0
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	0.00
Uniform Delay (d), s/veh	9.7	8.8	8.1	7.6	8.4	0.0
Incr Delay (d2), s/veh	0.1	1.4	0.5	0.2	2.5	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.0	0.5	0.2	1.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	9.8	10.2	8.7	7.8	10.9	0.0
LnGrp LOS	A	B	A	A	B	
Approach Vol, veh/h		378	249		427	
Approach Delay, s/veh		10.1	8.4		10.9	
Approach LOS		B	A		B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		13.4		15.0		13.4
Change Period (Y+Rc), s		5.3		5.3		5.3
Max Green Setting (Gmax), s		22.7		16.7		22.7
Max Q Clear Time (g_c+I1), s		6.5		8.8		4.5
Green Ext Time (p_c), s		1.7		0.9		1.0

Intersection Summary	
HCM 7th Control Delay, s/veh	10.0
HCM 7th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.



Lane Group	NWT	NWR	NET	NER	SWL	SWT
Lane Group Flow (vph)	134	302	421	172	160	210
v/c Ratio	0.53	0.44	0.79	0.29	0.79	0.28
Control Delay (s/veh)	31.9	3.3	32.8	4.7	58.4	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	31.9	3.3	32.8	4.7	58.4	10.9
Queue Length 50th (ft)	49	0	155	0	63	49
Queue Length 95th (ft)	97	30	#337	40	#172	108
Internal Link Dist (ft)	347		798			232
Turn Bay Length (ft)		250		200	200	
Base Capacity (vph)	377	694	553	605	203	766
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	0.44	0.76	0.28	0.79	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	123	0	278	0	387	158	147	193	0
Future Volume (veh/h)	0	0	0	123	0	278	0	387	158	147	193	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1573	1723	1736	1723	1614	1682	1709	1491	1723
Adj Flow Rate, veh/h	0	0	0	134	0	0	0	421	172	160	210	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	13	2	1	2	10	5	3	19	2
Cap, veh/h	0	5	0	236	0		0	566	500	200	832	0
Arrive On Green	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.35	0.35	0.12	0.56	0.00
Sat Flow, veh/h	0	1723	0	1641	0	1471	0	1614	1425	1628	1491	0
Grp Volume(v), veh/h	0	0	0	134	0	0	0	421	172	160	210	0
Grp Sat Flow(s),veh/h/ln	0	1723	0	1641	0	1471	0	1614	1425	1628	1491	0
Q Serve(g_s), s	0.0	0.0	0.0	2.7	0.0	0.0	0.0	8.2	3.2	3.4	2.6	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.7	0.0	0.0	0.0	8.2	3.2	3.4	2.6	0.0
Prop In Lane	0.00		0.00	1.00		1.00	0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	0	5	0	236	0		0	566	500	200	832	0
V/C Ratio(X)	0.00	0.00	0.00	0.57	0.00		0.00	0.74	0.34	0.80	0.25	0.00
Avail Cap(c_a), veh/h	0	775	0	752	0		0	1002	885	366	1387	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)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	14.2	0.0	0.0	0.0	10.1	8.5	15.2	4.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.1	0.0	0.0	0.0	2.0	0.4	7.3	0.2	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	0.0	0.0	0.0	0.9	0.0	0.0	0.0	1.9	0.6	1.3	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	0.0	16.3	0.0	0.0	0.0	12.1	8.9	22.4	4.2	0.0
LnGrp LOS				B				B	A	C	A	
Approach Vol, veh/h		0			134			593			370	
Approach Delay, s/veh		0.0			16.3			11.2			12.1	
Approach LOS					B			B			B	

Timer - Assigned Phs	2	3	4		6		8					
Phs Duration (G+Y+Rc), s	10.4	7.4	17.8		0.0		25.2					
Change Period (Y+Rc), s	5.3	3.0	5.3		4.0		5.3					
Max Green Setting (Gmax), s	16.3	8.0	22.1		16.0		33.1					
Max Q Clear Time (g_c+I1), s	4.7	5.4	10.2		0.0		4.6					
Green Ext Time (p_c), s	0.4	0.1	2.3		0.0		1.1					

Intersection Summary	
HCM 7th Control Delay, s/veh	12.1
HCM 7th LOS	B

Notes

Unsignalized Delay for [NWR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1335	68	37	460	15	74
Future Vol, veh/h	1335	68	37	460	15	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	2	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	0	3	0	3
Mvmt Flow	1451	74	40	500	16	80

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1525	0	2068	1488
Stage 1	-	-	-	-	1488	-
Stage 2	-	-	-	-	580	-
Critical Hdwy	-	-	4.1	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.327
Pot Cap-1 Maneuver	-	-	443	-	60	152
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	564	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	443	-	55	152
Mov Cap-2 Maneuver	-	-	-	-	187	-
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	512	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.04	48.32
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	187	152	-	-	443	-
HCM Lane V/C Ratio	0.087	0.53	-	-	0.091	-
HCM Ctrl Dly (s/v)	26.1	52.8	-	-	13.9	-
HCM Lane LOS	D	F	-	-	B	-
HCM 95th %tile Q(veh)	0.3	2.6	-	-	0.3	-

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Future PM Capacity:

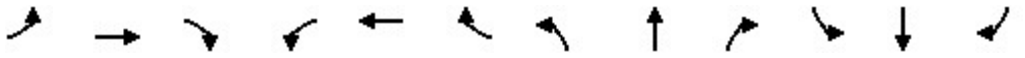
Queues

2: 54th Street West & Rimrock Road 10/14/2025

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	4	385	272	723	157	145	289	118	66
v/c Ratio	0.01	0.34	0.72	0.70	0.17	0.52	0.62	0.83	0.17
Control Delay (s/veh)	7.3	19.7	37.3	16.9	2.3	32.0	18.2	71.4	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.3	19.7	37.3	16.9	2.3	32.0	18.2	71.4	21.6
Queue Length 50th (ft)	1	67	115	206	0	56	49	51	20
Queue Length 95th (ft)	4	115	196	#510	28	117	133	#145	54
Internal Link Dist (ft)		4323		924			5202		920
Turn Bay Length (ft)	250		250		250	200		150	
Base Capacity (vph)	405	1140	518	1039	947	356	547	180	495
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	0.34	0.53	0.70	0.17	0.41	0.53	0.66	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	319	35	250	665	144	133	74	192	109	53	7
Future Volume (veh/h)	4	319	35	250	665	144	133	74	192	109	53	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1750	1750	1750	1750	1750	1750	1750	1709	1709	1750	1750
Adj Flow Rate, veh/h	4	347	38	272	723	157	145	80	209	118	58	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	3	3	0	0
Cap, veh/h	236	1050	114	318	931	789	424	116	303	208	407	56
Arrive On Green	0.01	0.35	0.35	0.19	0.53	0.53	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	1667	3024	329	1667	1750	1483	1357	429	1120	1082	1505	208
Grp Volume(v), veh/h	4	190	195	272	723	157	145	0	289	118	0	66
Grp Sat Flow(s),veh/h/ln	1667	1663	1691	1667	1750	1483	1357	0	1548	1082	0	1713
Q Serve(g_s), s	0.1	6.3	6.3	11.7	24.5	4.1	6.8	0.0	12.5	7.6	0.0	2.2
Cycle Q Clear(g_c), s	0.1	6.3	6.3	11.7	24.5	4.1	8.9	0.0	12.5	20.1	0.0	2.2
Prop In Lane	1.00		0.19	1.00		1.00	1.00		0.72	1.00		0.12
Lane Grp Cap(c), veh/h	236	577	587	318	931	789	424	0	418	208	0	463
V/C Ratio(X)	0.02	0.33	0.33	0.86	0.78	0.20	0.34	0.00	0.69	0.57	0.00	0.14
Avail Cap(c_a), veh/h	361	577	587	493	931	789	424	0	418	208	0	463
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	16.4	17.9	17.9	29.1	13.9	9.1	24.0	0.0	24.4	33.6	0.0	20.6
Incr Delay (d2), s/veh	0.0	1.5	1.5	8.8	6.3	0.6	0.5	0.0	4.8	3.6	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	2.3	2.3	5.1	9.1	1.2	2.0	0.0	4.7	2.3	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	16.4	19.4	19.5	38.0	20.2	9.7	24.5	0.0	29.1	37.2	0.0	20.7
LnGrp LOS	B	B	B	D	C	A	C		C	D		C
Approach Vol, veh/h		389			1152			434			184	
Approach Delay, s/veh		19.4			22.9			27.6			31.3	
Approach LOS		B			C			C			C	

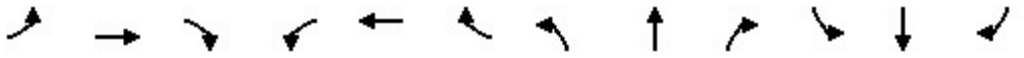
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	17.2	31.8		25.4	3.4	45.6		25.4				
Change Period (Y+Rc), s	3.0	6.0		5.3	3.0	6.0		5.3				
Max Green Setting (Gmax), s	22.0	23.6		20.1	6.0	39.6		20.1				
Max Q Clear Time (g_c+I1), s	13.7	8.3		22.1	2.1	26.5		14.5				
Green Ext Time (p_c), s	0.5	1.6		0.0	0.0	4.2		1.0				

Intersection Summary		
HCM 7th Control Delay, s/veh		24.0
HCM 7th LOS		C

Lane Group	EBT	WBL	WBT	NBT	NBR
Lane Group Flow (vph)	722	214	683	152	348
v/c Ratio	0.68	0.55	0.37	0.49	0.57
Control Delay (s/veh)	19.3	25.1	6.6	24.3	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.3	25.1	6.6	24.3	6.8
Queue Length 50th (ft)	94	61	45	43	0
Queue Length 95th (ft)	#175	130	90	92	55
Internal Link Dist (ft)	3542		1579	5173	
Turn Bay Length (ft)		200			
Base Capacity (vph)	1295	520	2376	490	757
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	0.56	0.41	0.29	0.31	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	552	112	197	628	0	140	0	320	0	0	0
Future Volume (veh/h)	0	552	112	197	628	0	140	0	320	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1723	1723	1750	1750	1736	1750	1709	1750	1750	1750
Adj Flow Rate, veh/h	0	600	122	214	683	0	152	0	348	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	2	2	0	0	1	0	3	0	0	0
Cap, veh/h	154	794	161	269	1723	0	565	0	413	0	500	0
Arrive On Green	0.00	0.29	0.29	0.16	0.52	0.00	0.29	0.00	0.29	0.00	0.00	0.00
Sat Flow, veh/h	770	2732	554	1641	3413	0	1440	0	1448	0	1750	0
Grp Volume(v), veh/h	0	362	360	214	683	0	152	0	348	0	0	0
Grp Sat Flow(s),veh/h/ln	770	1650	1637	1641	1663	0	1440	0	1448	0	1750	0
Q Serve(g_s), s	0.0	9.3	9.4	5.9	5.8	0.0	4.0	0.0	10.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	9.3	9.4	5.9	5.8	0.0	4.0	0.0	10.6	0.0	0.0	0.0
Prop In Lane	1.00		0.34	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	154	479	475	269	1723	0	565	0	413	0	500	0
V/C Ratio(X)	0.00	0.75	0.76	0.80	0.40	0.00	0.27	0.00	0.84	0.00	0.00	0.00
Avail Cap(c_a), veh/h	216	612	608	490	2441	0	658	0	507	0	612	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)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	15.1	15.1	18.8	6.8	0.0	13.4	0.0	15.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	4.0	4.1	5.4	0.1	0.0	0.3	0.0	10.3	0.0	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	0.0	3.4	3.4	2.3	1.4	0.0	1.1	0.0	4.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	19.1	19.3	24.2	7.0	0.0	13.6	0.0	26.0	0.0	0.0	0.0
LnGrp LOS		B	B	C	A		B		C			
Approach Vol, veh/h		722			897			500			0	
Approach Delay, s/veh		19.2			11.1			22.3			0.0	
Approach LOS		B			B			C				

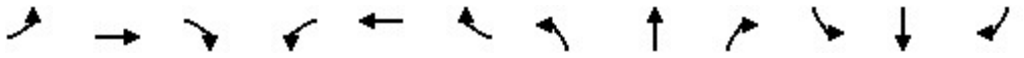
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	10.7	18.2		18.0		28.9		18.0				
Change Period (Y+Rc), s	3.0	4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s	14.0	17.4		16.4		34.4		16.4				
Max Q Clear Time (g_c+I1), s	7.9	11.4		12.6		7.8		0.0				
Green Ext Time (p_c), s	0.3	2.2		0.8		4.9		0.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			16.5									
HCM 7th LOS			B									

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	702	224	1140	171	118	9
v/c Ratio	0.46	0.51	0.50	0.49	0.24	0.03
Control Delay (s/veh)	15.0	24.7	7.0	25.1	4.7	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	15.0	24.7	7.0	25.1	4.7	17.8
Queue Length 50th (ft)	96	66	98	51	0	2
Queue Length 95th (ft)	155	#151	157	109	27	12
Internal Link Dist (ft)	3521		424	5188		424
Turn Bay Length (ft)					120	
Base Capacity (vph)	1625	612	2304	531	689	544
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	0.43	0.37	0.49	0.32	0.17	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	543	103	206	1040	9	157	0	109	6	2	0
Future Volume (veh/h)	0	543	103	206	1040	9	157	0	109	6	2	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1736	1750	1750	1750	1750	1736	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	0	590	112	224	1130	10	171	0	118	7	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	0	0	0	0	1	0	0	0	0	0
Cap, veh/h	367	909	172	287	1969	17	456	0	244	249	48	0
Arrive On Green	0.00	0.33	0.33	0.17	0.58	0.58	0.16	0.00	0.16	0.16	0.16	0.00
Sat Flow, veh/h	1667	2768	524	1667	3377	30	1571	0	1483	449	293	0
Grp Volume(v), veh/h	0	351	351	224	556	584	171	0	118	9	0	0
Grp Sat Flow(s),veh/h/ln	1667	1650	1642	1667	1663	1745	1571	0	1483	742	0	0
Q Serve(g_s), s	0.0	6.6	6.7	4.7	7.6	7.6	0.0	0.0	2.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.6	6.7	4.7	7.6	7.6	3.5	0.0	2.6	3.5	0.0	0.0
Prop In Lane	1.00		0.32	1.00		0.02	1.00		1.00	0.78		0.00
Lane Grp Cap(c), veh/h	367	542	539	287	969	1017	456	0	244	298	0	0
V/C Ratio(X)	0.00	0.65	0.65	0.78	0.57	0.57	0.37	0.00	0.48	0.03	0.00	0.00
Avail Cap(c_a), veh/h	545	922	918	594	1340	1406	787	0	585	614	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)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	10.4	10.5	14.4	4.8	4.8	14.2	0.0	13.8	12.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.3	1.3	4.6	0.5	0.5	0.5	0.0	1.5	0.0	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	0.0	1.8	1.8	1.7	1.1	1.1	1.1	0.0	0.8	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	11.8	11.8	19.0	5.3	5.3	14.7	0.0	15.3	12.9	0.0	0.0
LnGrp LOS		B	B	B	A	A	B		B	B		
Approach Vol, veh/h		702			1364			289			9	
Approach Delay, s/veh		11.8			7.5			14.9			12.9	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.3	16.6		10.6	0.0	25.9		10.6				
Change Period (Y+Rc), s	3.0	4.6		4.6	3.0	4.6		4.6				
Max Green Setting (Gmax), s	13.0	20.4		14.4	4.0	29.4		14.4				
Max Q Clear Time (g_c+I1), s	6.7	8.7		5.5	0.0	9.6		5.5				
Green Ext Time (p_c), s	0.3	3.3		0.8	0.0	7.4		0.0				

Intersection Summary	
HCM 7th Control Delay, s/veh	9.7
HCM 7th LOS	A

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	330	721	125	110
v/c Ratio	0.37	0.81	0.36	0.39
Control Delay (s/veh)	7.3	17.3	16.4	20.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.3	17.3	16.4	20.0
Queue Length 50th (ft)	41	123	20	22
Queue Length 95th (ft)	95	#360	61	62
Internal Link Dist (ft)	5212	417	5184	5199
Turn Bay Length (ft)				
Base Capacity (vph)	1191	1195	689	575
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	0.28	0.60	0.18	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	287	2	46	540	77	4	76	35	35	50	17
Future Volume (veh/h)	15	287	2	46	540	77	4	76	35	35	50	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1573	1723	1750	1750	1736	1750	1750	1750	1750	1682	1750	1750
Adj Flow Rate, veh/h	16	312	2	50	587	84	4	83	38	38	54	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	13	2	0	0	1	0	0	0	0	5	0	0
Cap, veh/h	123	881	5	142	753	104	110	156	70	199	128	37
Arrive On Green	0.53	0.53	0.53	0.53	0.53	0.53	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	27	1650	10	60	1411	194	27	1122	502	430	922	264
Grp Volume(v), veh/h	330	0	0	721	0	0	125	0	0	110	0	0
Grp Sat Flow(s),veh/h/ln	1687	0	0	1665	0	0	1652	0	0	1616	0	0
Q Serve(g_s), s	0.0	0.0	0.0	3.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.9	0.0	0.0	12.2	0.0	0.0	2.4	0.0	0.0	2.1	0.0	0.0
Prop In Lane	0.05		0.01	0.07		0.12	0.03		0.30	0.35		0.16
Lane Grp Cap(c), veh/h	1009	0	0	999	0	0	336	0	0	363	0	0
V/C Ratio(X)	0.33	0.00	0.00	0.72	0.00	0.00	0.37	0.00	0.00	0.30	0.00	0.00
Avail Cap(c_a), veh/h	1601	0	0	1594	0	0	924	0	0	907	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	4.7	0.0	0.0	6.6	0.0	0.0	14.0	0.0	0.0	13.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	1.0	0.0	0.0	0.7	0.0	0.0	0.5	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	0.3	0.0	0.0	1.5	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	4.9	0.0	0.0	7.6	0.0	0.0	14.7	0.0	0.0	14.3	0.0	0.0
LnGrp LOS	A			A			B			B		
Approach Vol, veh/h		330			721			125			110	
Approach Delay, s/veh		4.9			7.6			14.7			14.3	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	10.5	24.3	10.5	24.3
Change Period (Y+Rc), s	5.7	5.7	5.7	5.7
Max Green Setting (Gmax), s	17.3	31.3	17.3	31.3
Max Q Clear Time (g_c+I1), s	4.4	5.9	4.1	14.2
Green Ext Time (p_c), s	0.4	1.8	0.3	4.4

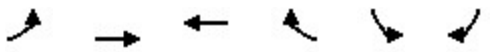
Intersection Summary	
HCM 7th Control Delay, s/veh	8.1
HCM 7th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	110	292	380	234	178
v/c Ratio	0.29	0.42	0.54	0.32	0.39
Control Delay (s/veh)	8.8	8.9	10.5	2.5	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.8	8.9	10.5	2.5	9.6
Queue Length 50th (ft)	10	29	40	0	12
Queue Length 95th (ft)	37	80	106	24	55
Internal Link Dist (ft)		1482	3542		5231
Turn Bay Length (ft)					
Base Capacity (vph)	672	1242	1254	1132	968
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	0.16	0.24	0.30	0.21	0.18

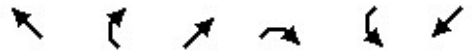
Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	101	269	350	215	87	76
Future Volume (veh/h)	101	269	350	215	87	76
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1750	1736	1750	1750	1750	1750
Adj Flow Rate, veh/h	110	292	380	234	95	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	0	0	0	0
Cap, veh/h	475	722	727	616	160	140
Arrive On Green	0.42	0.42	0.42	0.42	0.19	0.19
Sat Flow, veh/h	821	1736	1750	1483	837	731
Grp Volume(v), veh/h	110	292	380	234	179	0
Grp Sat Flow(s),veh/h/ln	821	1736	1750	1483	1577	0
Q Serve(g_s), s	3.1	3.2	4.4	3.0	2.8	0.0
Cycle Q Clear(g_c), s	7.5	3.2	4.4	3.0	2.8	0.0
Prop In Lane	1.00			1.00	0.53	0.46
Lane Grp Cap(c), veh/h	475	722	727	616	302	0
V/C Ratio(X)	0.23	0.40	0.52	0.38	0.59	0.00
Avail Cap(c_a), veh/h	793	1396	1407	1192	1034	0
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	0.00
Uniform Delay (d), s/veh	8.7	5.5	5.9	5.5	9.9	0.0
Incr Delay (d2), s/veh	0.2	0.4	0.6	0.4	1.8	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.4	0.5	0.3	0.7	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	8.9	5.9	6.5	5.9	11.8	0.0
LnGrp LOS	A	A	A	A	B	
Approach Vol, veh/h		402	614		179	
Approach Delay, s/veh		6.7	6.2		11.8	
Approach LOS		A	A		B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		16.5		10.5		16.5
Change Period (Y+Rc), s		5.3		5.3		5.3
Max Green Setting (Gmax), s		21.7		17.7		21.7
Max Q Clear Time (g_c+I1), s		9.5		4.8		6.4
Green Ext Time (p_c), s		1.7		0.4		2.5

Intersection Summary	
HCM 7th Control Delay, s/veh	7.2
HCM 7th LOS	A



Lane Group	NWT	NWR	NET	NER	SWL	SWT
Lane Group Flow (vph)	156	976	287	106	269	383
v/c Ratio	0.59	0.94	0.79	0.26	0.52	0.39
Control Delay (s/veh)	38.2	23.8	46.4	7.1	26.6	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	38.2	23.8	46.4	7.1	26.6	11.1
Queue Length 50th (ft)	69	72	131	0	103	91
Queue Length 95th (ft)	127	54	#241	29	189	170
Internal Link Dist (ft)	347		798			232
Turn Bay Length (ft)		250		200	200	
Base Capacity (vph)	369	1035	369	417	513	988
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	0.42	0.94	0.78	0.25	0.52	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	109	0	683	0	238	88	269	383	0
Future Volume (veh/h)	0	0	0	109	0	683	0	238	88	269	383	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1682	1750	1750	1736	1723
Adj Flow Rate, veh/h	0	0	0	156	0	0	0	287	106	269	383	0
Peak Hour Factor	0.92	0.92	0.92	0.70	0.92	0.70	0.92	0.83	0.83	1.00	1.00	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	5	0	0	1	2
Cap, veh/h	0	5	0	261	0		0	414	365	351	940	0
Arrive On Green	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.25	0.25	0.21	0.54	0.00
Sat Flow, veh/h	0	1723	0	1641	0	1460	0	1682	1483	1667	1736	0
Grp Volume(v), veh/h	0	0	0	156	0	0	0	287	106	269	383	0
Grp Sat Flow(s),veh/h/ln	0	1723	0	1641	0	1460	0	1682	1483	1667	1736	0
Q Serve(g_s), s	0.0	0.0	0.0	3.1	0.0	0.0	0.0	5.5	2.1	5.4	4.6	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	3.1	0.0	0.0	0.0	5.5	2.1	5.4	4.6	0.0
Prop In Lane	0.00		0.00	1.00		1.00	0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	0	5	0	261	0		0	414	365	351	940	0
V/C Ratio(X)	0.00	0.00	0.00	0.60	0.00		0.00	0.69	0.29	0.77	0.41	0.00
Avail Cap(c_a), veh/h	0	778	0	782	0		0	783	691	1082	2082	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)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	13.8	0.0	0.0	0.0	12.1	10.8	13.2	4.8	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.2	0.0	0.0	0.0	2.1	0.4	3.5	0.3	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	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.6	0.5	1.7	0.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	0.0	16.0	0.0	0.0	0.0	14.2	11.3	16.7	5.1	0.0
LnGrp LOS				B				B	B	B	A	
Approach Vol, veh/h		0			156			393			652	
Approach Delay, s/veh		0.0			16.0			13.4			9.9	
Approach LOS					B			B			A	

Timer - Assigned Phs	2	3	4		6		8					
Phs Duration (G+Y+Rc), s	10.9	10.5	14.0		0.0		24.5					
Change Period (Y+Rc), s	5.3	3.0	5.3		4.0		5.3					
Max Green Setting (Gmax), s	16.9	23.0	16.5		16.0		42.5					
Max Q Clear Time (g_c+I1), s	5.1	7.4	7.5		0.0		6.6					
Green Ext Time (p_c), s	0.5	0.6	1.2		0.0		2.2					

Intersection Summary	
HCM 7th Control Delay, s/veh	11.8
HCM 7th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NWR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	598	29	87	1120	26	35
Future Vol, veh/h	598	29	87	1120	26	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	0	0	5
Mvmt Flow	650	32	95	1217	28	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	682	0	2072	666
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	1407	-
Critical Hdwy	-	-	4.1	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.345
Pot Cap-1 Maneuver	-	-	921	-	60	454
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	229	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	921	-	54	454
Mov Cap-2 Maneuver	-	-	-	-	153	-
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	205	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.67	22.21
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	153	454	-	-	921	-
HCM Lane V/C Ratio	0.184	0.084	-	-	0.103	-
HCM Ctrl Dly (s/v)	33.7	13.6	-	-	9.4	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	0.3	-	-	0.3	-

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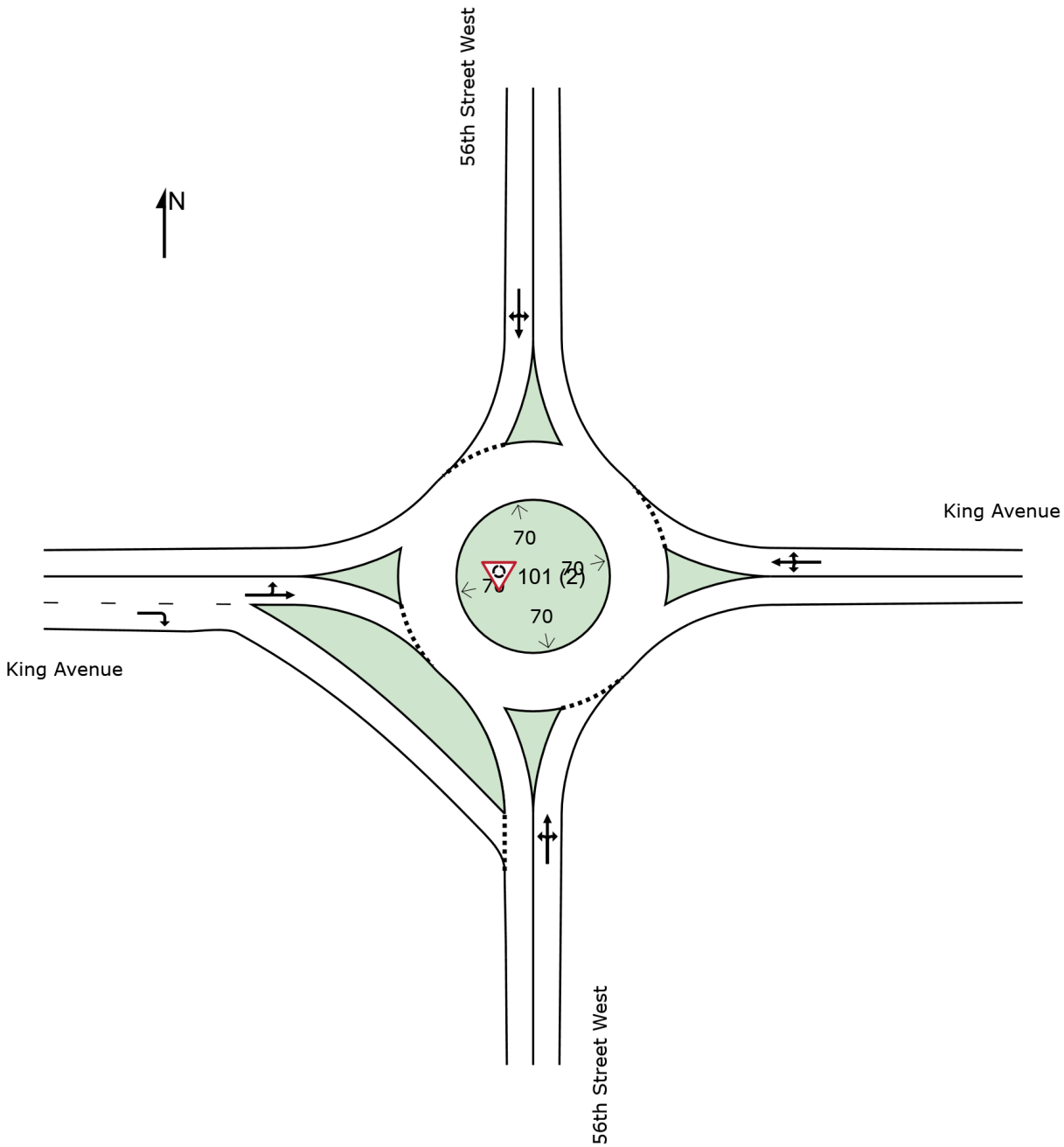
SITE LAYOUT

Site: [101 (2)] King Ave & 56th St AM Improved (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (2)] King Ave & 56th St AM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	133	3.0	133	3.0	0.572	12.6	LOS B	5.0	125.7	0.75	0.68	1.08	34.0
4	T1	All MCs	260	0.8	260	0.8	0.572	12.2	LOS B	5.0	125.7	0.75	0.68	1.08	33.4
14	R2	All MCs	100	0.0	100	0.0	0.572	12.1	LOS B	5.0	125.7	0.75	0.68	1.08	34.4
Approach			492	1.2	492	1.2	0.572	12.3	LOS B	5.0	125.7	0.75	0.68	1.08	33.8
West: King Avenue															
5	L2	All MCs	126	6.3	126	6.3	0.784	20.6	LOS C	12.6	320.4	0.92	0.95	1.81	30.2
2	T1	All MCs	599	1.3	599	1.3	0.784	19.7	LOS C	12.6	320.4	0.92	0.95	1.81	32.2
12	R2	All MCs	40	10.0	40	10.0	0.044	4.4	LOS A	0.2	4.4	0.41	0.27	0.41	38.8
Approach			765	2.6	765	2.6	0.784	19.0	LOS C	12.6	320.4	0.89	0.91	1.73	32.1
South: 56th Street West															
3	L2	All MCs	36	0.0	36	0.0	0.450	13.5	LOS B	2.2	56.7	0.76	0.79	1.00	33.5
8	T1	All MCs	154	3.9	154	3.9	0.450	14.6	LOS B	2.2	56.7	0.76	0.79	1.00	32.3
18	R2	All MCs	48	4.2	48	4.2	0.450	14.7	LOS B	2.2	56.7	0.76	0.79	1.00	33.1
Approach			238	3.4	238	3.4	0.450	14.4	LOS B	2.2	56.7	0.76	0.79	1.00	32.6
East: King Avenue															
1	L2	All MCs	34	5.9	34	5.9	0.458	9.4	LOS A	2.7	70.5	0.61	0.44	0.65	35.4
6	T1	All MCs	364	2.7	364	2.7	0.458	9.1	LOS A	2.7	70.5	0.61	0.44	0.65	38.0
16	R2	All MCs	30	20.0	30	20.0	0.458	11.3	LOS B	2.7	70.5	0.61	0.44	0.65	33.9
Approach			428	4.2	428	4.2	0.458	9.2	LOS A	2.7	70.5	0.61	0.44	0.65	37.4
All Vehicles			1924	2.7	1924	2.7	0.784	14.6	LOS B	12.6	320.4	0.78	0.73	1.23	33.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [102 (2)] King Ave & 56th St PM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	76	0.0	76	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.5
4	T1	All MCs	128	0.0	128	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	34.6
14	R2	All MCs	134	0.0	134	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.7
Approach			338	0.0	338	0.0	0.440	10.4	LOS B	2.6	65.4	0.70	0.63	0.86	35.2
West: King Avenue															
5	L2	All MCs	80	0.0	80	0.0	0.422	7.4	LOS A	2.4	59.7	0.49	0.30	0.49	37.1
2	T1	All MCs	395	1.5	395	1.5	0.422	7.6	LOS A	2.4	59.7	0.49	0.30	0.49	39.0
12	R2	All MCs	14	14.3	14	14.3	0.014	3.7	LOS A	0.1	1.4	0.29	0.13	0.29	38.5
Approach			489	1.6	489	1.6	0.422	7.4	LOS A	2.4	59.7	0.48	0.29	0.48	38.6
South: 56th Street West															
3	L2	All MCs	50	0.0	50	0.0	0.467	10.8	LOS B	3.0	74.8	0.71	0.65	0.92	36.5
8	T1	All MCs	272	0.0	272	0.0	0.467	10.8	LOS B	3.0	74.8	0.71	0.65	0.92	35.5
18	R2	All MCs	40	5.0	40	5.0	0.467	11.7	LOS B	3.0	74.8	0.71	0.65	0.92	35.9
Approach			362	0.6	362	0.6	0.467	10.9	LOS B	3.0	74.8	0.71	0.65	0.92	35.7
East: King Avenue															
1	L2	All MCs	34	0.0	34	0.0	0.708	16.1	LOS C	9.5	239.3	0.86	0.81	1.46	32.7
6	T1	All MCs	485	1.2	485	1.2	0.708	16.2	LOS C	9.5	239.3	0.86	0.81	1.46	34.2
16	R2	All MCs	122	0.0	122	0.0	0.708	16.1	LOS C	9.5	239.3	0.86	0.81	1.46	33.1
Approach			640	0.9	640	0.9	0.708	16.2	LOS C	9.5	239.3	0.86	0.81	1.46	33.9
All Vehicles			1829	0.9	1829	0.9	0.708	11.7	LOS B	9.5	239.3	0.70	0.61	0.98	35.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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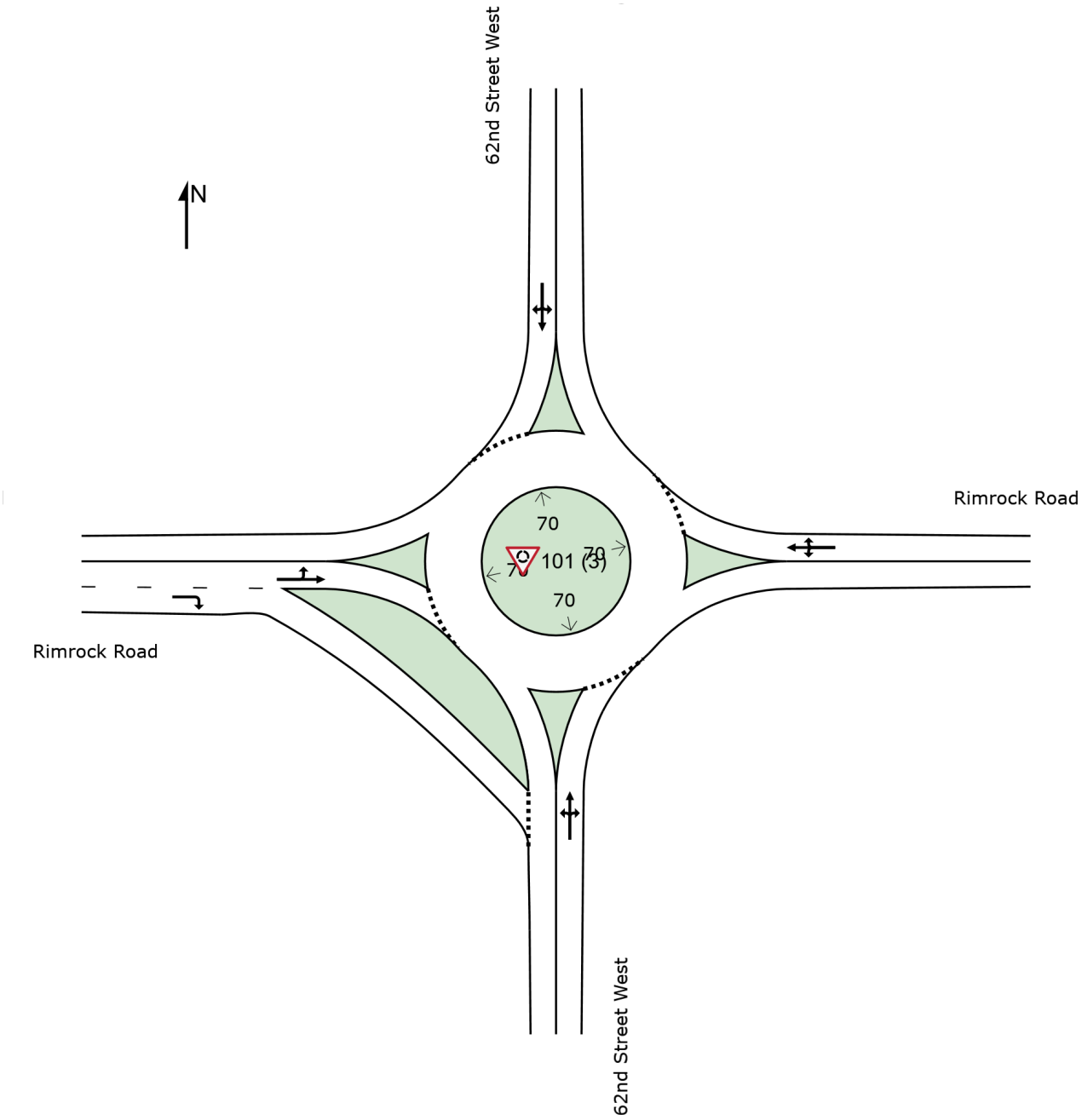
SITE LAYOUT

Site: [101 (3)] Rimrock Rd & 62nd St AM Improved (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (3)] Rimrock Rd & 62nd St AM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 62nd Street West															
7	L2	All MCs	664	0.0	664	0.0	0.748	14.7	LOS B	13.3	332.1	0.79	0.53	1.03	30.7
4	T1	All MCs	196	1.0	196	1.0	0.748	14.8	LOS B	13.3	332.1	0.79	0.53	1.03	29.7
14	R2	All MCs	4	0.0	4	0.0	0.748	14.7	LOS B	13.3	332.1	0.79	0.53	1.03	30.9
Approach			864	0.2	864	0.2	0.748	14.7	LOS B	13.3	332.1	0.79	0.53	1.03	30.5
West: Rimrock Road															
5	L2	All MCs	4	0.0	4	0.0	0.478	13.1	LOS B	2.3	60.0	0.74	0.78	1.02	32.3
2	T1	All MCs	272	3.0	272	3.0	0.478	14.1	LOS B	2.3	60.0	0.74	0.78	1.02	34.2
12	R2	All MCs	178	1.0	178	1.0	0.168	4.9	LOS A	0.8	19.5	0.41	0.26	0.41	37.9
Approach			454	2.2	454	2.2	0.478	10.5	LOS B	2.3	60.0	0.61	0.57	0.78	35.5
South: 62nd Street West															
3	L2	All MCs	34	12.0	34	12.0	0.303	13.9	LOS B	1.1	29.0	0.71	0.73	0.82	30.9
8	T1	All MCs	48	17.0	48	17.0	0.303	15.5	LOS C	1.1	29.0	0.71	0.73	0.82	29.5
18	R2	All MCs	48	4.0	48	4.0	0.303	11.5	LOS B	1.1	29.0	0.71	0.73	0.82	32.0
Approach			129	10.9	129	10.9	0.303	13.5	LOS B	1.1	29.0	0.71	0.73	0.82	30.7
East: Rimrock Road															
1	L2	All MCs	48	4.0	48	4.0	0.231	4.9	LOS A	1.1	29.9	0.27	0.12	0.27	36.2
6	T1	All MCs	72	17.0	72	17.0	0.231	5.9	LOS A	1.1	29.9	0.27	0.12	0.27	37.3
16	R2	All MCs	154	0.0	154	0.0	0.231	4.7	LOS A	1.1	29.9	0.27	0.12	0.27	37.3
Approach			274	5.2	274	5.2	0.231	5.0	LOS A	1.1	29.9	0.27	0.12	0.27	37.1
All Vehicles			1722	2.3	1722	2.3	0.748	12.0	LOS B	13.3	332.1	0.66	0.49	0.83	32.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (4)] Rimrock Rd & 62nd St PM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 62nd Street West															
7	L2	All MCs	283	0.0	283	0.0	0.441	9.2	LOS A	2.7	67.3	0.65	0.51	0.71	33.4
4	T1	All MCs	107	0.0	107	0.0	0.441	9.2	LOS A	2.7	67.3	0.65	0.51	0.71	32.3
14	R2	All MCs	12	0.0	12	0.0	0.441	9.2	LOS A	2.7	67.3	0.65	0.51	0.71	33.6
Approach			401	0.0	401	0.0	0.441	9.2	LOS A	2.7	67.3	0.65	0.51	0.71	33.1
West: Rimrock Road															
5	L2	All MCs	4	0.0	4	0.0	0.147	5.1	LOS A	0.6	14.7	0.49	0.37	0.49	36.9
2	T1	All MCs	130	2.0	130	2.0	0.147	5.3	LOS A	0.6	14.7	0.49	0.37	0.49	39.5
12	R2	All MCs	68	0.0	68	0.0	0.059	3.6	LOS A	0.3	6.3	0.31	0.16	0.31	38.9
Approach			203	1.3	203	1.3	0.147	4.7	LOS A	0.6	14.7	0.43	0.30	0.43	39.3
South: 62nd Street West															
3	L2	All MCs	162	0.0	162	0.0	0.375	8.2	LOS A	2.0	48.8	0.61	0.46	0.61	34.4
8	T1	All MCs	145	0.0	145	0.0	0.375	8.2	LOS A	2.0	48.8	0.61	0.46	0.61	33.2
18	R2	All MCs	30	0.0	30	0.0	0.375	8.2	LOS A	2.0	48.8	0.61	0.46	0.61	34.6
Approach			337	0.0	337	0.0	0.375	8.2	LOS A	2.0	48.8	0.61	0.46	0.61	33.9
East: Rimrock Road															
1	L2	All MCs	60	0.0	60	0.0	0.786	18.6	LOS C	15.9	397.2	0.94	0.90	1.70	30.3
6	T1	All MCs	188	0.0	188	0.0	0.786	18.6	LOS C	15.9	397.2	0.94	0.90	1.70	32.3
16	R2	All MCs	542	0.0	542	0.0	0.786	18.6	LOS C	15.9	397.2	0.94	0.90	1.70	30.6
Approach			790	0.0	790	0.0	0.786	18.6	LOS C	15.9	397.2	0.94	0.90	1.70	31.0
All Vehicles			1732	0.2	1732	0.2	0.786	12.8	LOS B	15.9	397.2	0.75	0.65	1.11	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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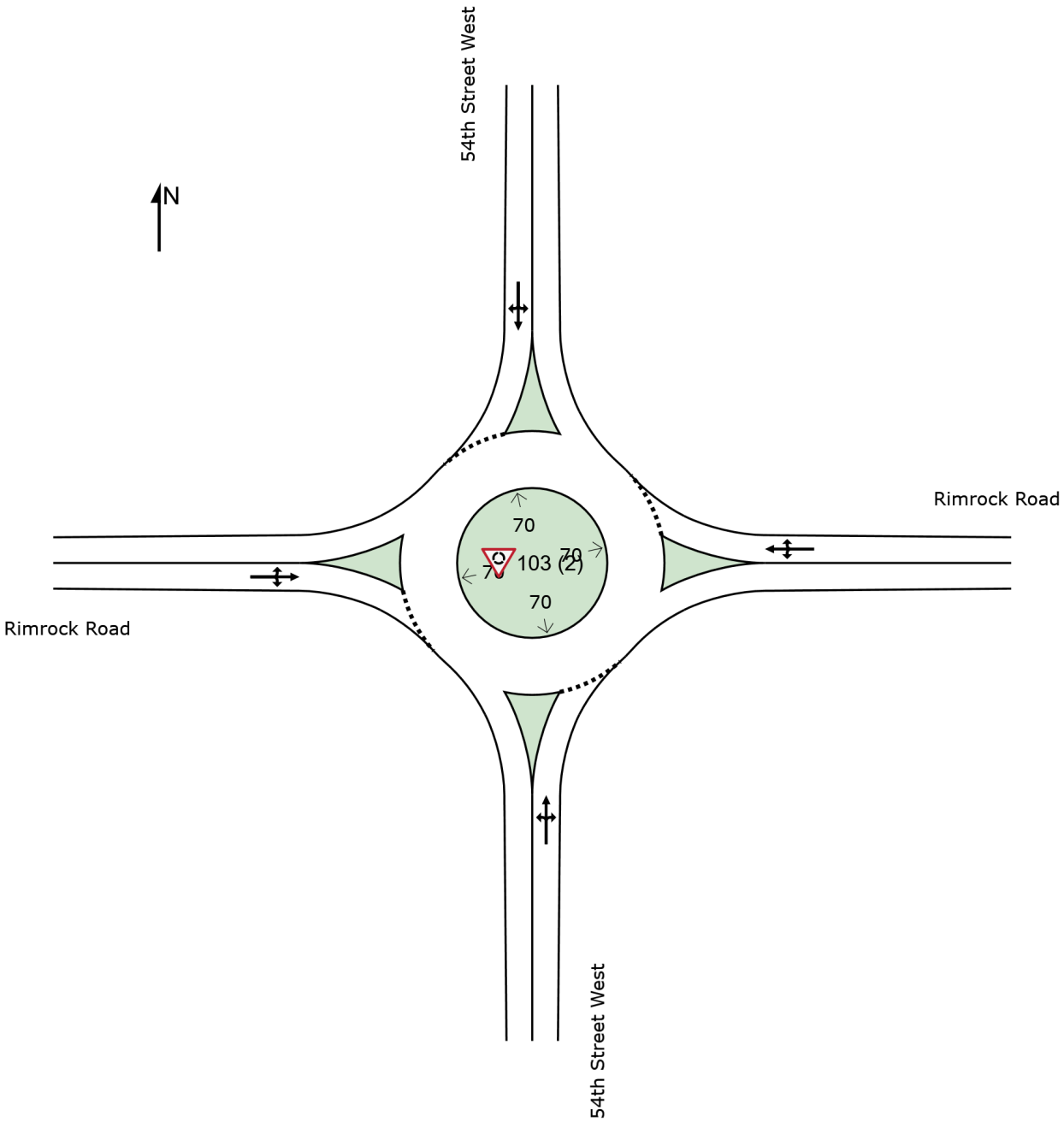
SITE LAYOUT

Site: [103 (2)] Rimrock Rd & 54th St AM Improved (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [103 (2)] Rimrock Rd & 54th St AM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 54th Street West															
7	L2	All MCs	164	3.3	164	3.3	0.311	7.7	LOS A	1.5	37.8	0.59	0.44	0.59	26.1
4	T1	All MCs	100	0.0	100	0.0	0.311	7.3	LOS A	1.5	37.8	0.59	0.44	0.59	26.8
14	R2	All MCs	5	0.0	5	0.0	0.311	7.3	LOS A	1.5	37.8	0.59	0.44	0.59	26.6
Approach			270	2.0	270	2.0	0.311	7.5	LOS A	1.5	37.8	0.59	0.44	0.59	26.4
West: Rimrock Road															
5	L2	All MCs	2	100.0	2	100.0	1.154	125.4	LOS F	63.0	1602.0	1.00	2.86	6.30	12.9
2	T1	All MCs	853	2.1	853	2.1	1.154	99.0	LOS F	63.0	1602.0	1.00	2.86	6.30	14.4
12	R2	All MCs	109	0.0	109	0.0	1.154	98.6	LOS F	63.0	1602.0	1.00	2.86	6.30	14.4
Approach			964	2.1	964	2.1	1.154	99.0	LOS F	63.0	1602.0	1.00	2.86	6.30	14.3
South: 54th Street West															
3	L2	All MCs	32	5.6	32	5.6	0.627	22.2	LOS C	3.9	98.3	0.83	0.94	1.29	27.6
8	T1	All MCs	28	0.0	28	0.0	0.627	20.3	LOS C	3.9	98.3	0.83	0.94	1.29	23.4
18	R2	All MCs	268	0.7	268	0.7	0.627	20.5	LOS C	3.9	98.3	0.83	0.94	1.29	28.4
Approach			328	1.1	328	1.1	0.627	20.6	LOS C	3.9	98.3	0.83	0.94	1.29	27.8
East: Rimrock Road															
1	L2	All MCs	190	1.9	190	1.9	0.350	5.8	LOS A	2.1	53.7	0.26	0.10	0.26	33.5
6	T1	All MCs	196	3.6	196	3.6	0.350	6.0	LOS A	2.1	53.7	0.26	0.10	0.26	33.9
16	R2	All MCs	50	10.7	50	10.7	0.350	6.5	LOS A	2.1	53.7	0.26	0.10	0.26	27.1
Approach			436	3.7	436	3.7	0.350	6.0	LOS A	2.1	53.7	0.26	0.10	0.26	32.8
All Vehicles			1998	2.3	1998	2.3	1.154	53.5	LOS F	63.0	1602.0	0.75	1.62	3.39	19.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [103 (3)] Rimrock Rd & 54th St PM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 54th Street West															
7	L2	All MCs	105	3.4	105	3.4	0.366	14.8	LOS B	1.5	38.9	0.75	0.81	0.89	24.2
4	T1	All MCs	52	0.0	52	0.0	0.366	13.5	LOS B	1.5	38.9	0.75	0.81	0.89	24.8
14	R2	All MCs	8	0.0	8	0.0	0.366	13.5	LOS B	1.5	38.9	0.75	0.81	0.89	24.6
Approach			165	2.2	165	2.2	0.366	14.3	LOS B	1.5	38.9	0.75	0.81	0.89	24.4
West: Rimrock Road															
5	L2	All MCs	3	0.0	3	0.0	0.379	8.2	LOS A	2.0	49.7	0.61	0.45	0.61	26.9
2	T1	All MCs	308	0.0	308	0.0	0.379	8.2	LOS A	2.0	49.7	0.61	0.45	0.61	34.3
12	R2	All MCs	34	0.0	34	0.0	0.379	8.2	LOS A	2.0	49.7	0.61	0.45	0.61	34.0
Approach			345	0.0	345	0.0	0.379	8.2	LOS A	2.0	49.7	0.61	0.45	0.61	34.2
South: 54th Street West															
3	L2	All MCs	128	0.0	128	0.0	0.436	9.1	LOS A	2.6	65.8	0.65	0.51	0.72	32.4
8	T1	All MCs	72	0.0	72	0.0	0.436	9.1	LOS A	2.6	65.8	0.65	0.51	0.72	26.3
18	R2	All MCs	185	2.9	185	2.9	0.436	9.5	LOS A	2.6	65.8	0.65	0.51	0.72	32.4
Approach			385	1.4	385	1.4	0.436	9.3	LOS A	2.6	65.8	0.65	0.51	0.72	31.1
East: Rimrock Road															
1	L2	All MCs	242	2.1	242	2.1	0.963	35.5	LOS E	47.4	1230.5	1.00	1.59	2.50	23.4
6	T1	All MCs	643	4.7	643	4.7	0.963	35.8	LOS E	47.4	1230.5	1.00	1.59	2.50	23.6
16	R2	All MCs	139	10.0	139	10.0	0.963	36.5	LOS E	47.4	1230.5	1.00	1.59	2.50	20.1
Approach			1025	4.8	1025	4.8	0.963	35.8	LOS E	47.4	1230.5	1.00	1.59	2.50	23.0
All Vehicles			1920	3.0	1920	3.0	0.963	23.7	LOS C	47.4	1230.5	0.84	1.10	1.67	26.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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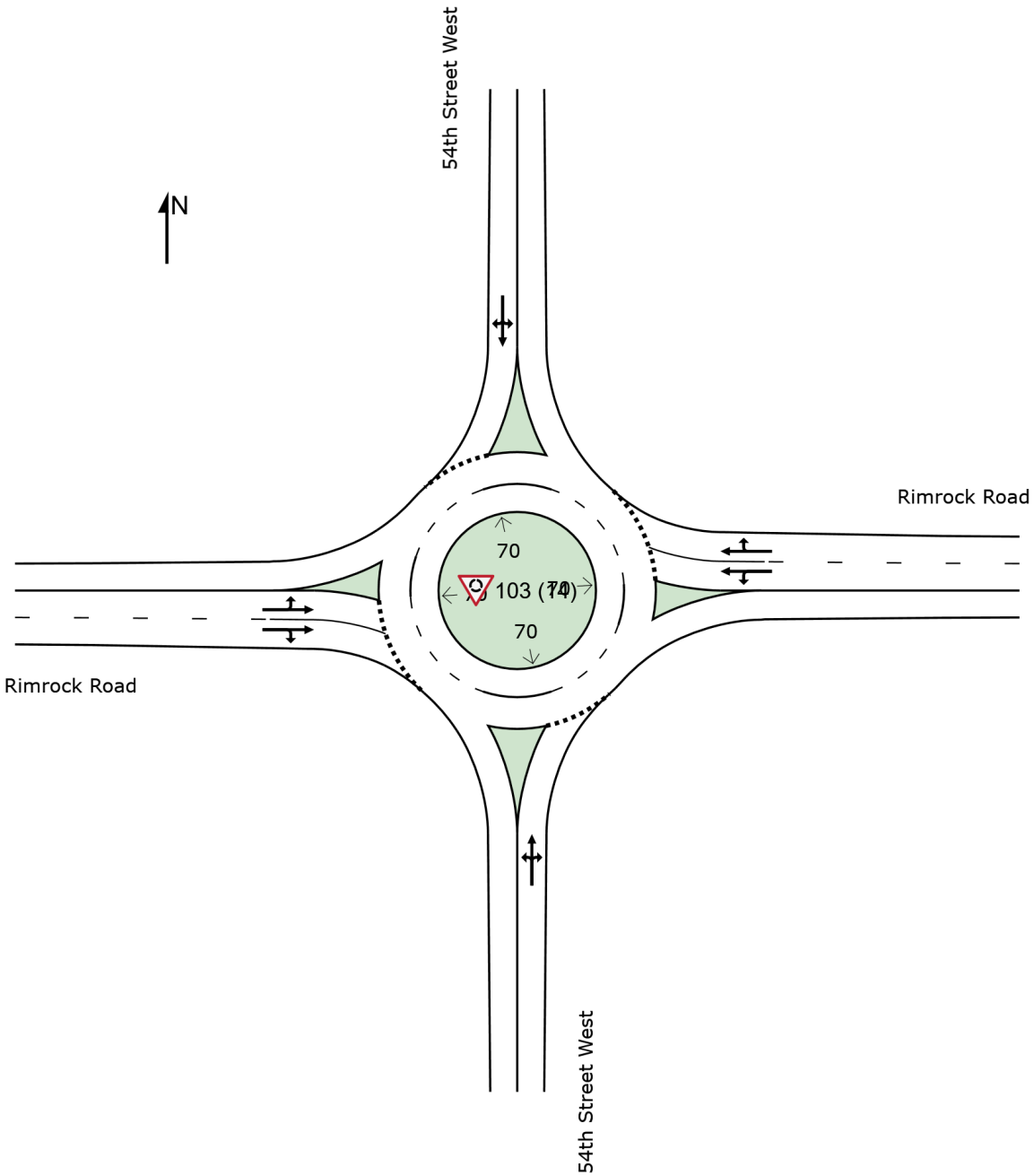
SITE LAYOUT

Site: [103 (14)] Rimrock Rd & 54th St AM Improved 2LN (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [103 (14)] Rimrock Rd & 54th St AM Improved 2LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 54th Street West															
7	L2	All MCs	164	3.3	164	3.3	0.283	6.8	LOS A	1.2	30.0	0.51	0.38	0.51	26.4
4	T1	All MCs	100	0.0	100	0.0	0.283	6.3	LOS A	1.2	30.0	0.51	0.38	0.51	27.1
14	R2	All MCs	5	0.0	5	0.0	0.283	6.3	LOS A	1.2	30.0	0.51	0.38	0.51	26.9
Approach			270	2.0	270	2.0	0.283	6.6	LOS A	1.2	30.0	0.51	0.38	0.51	26.6
West: Rimrock Road															
5	L2	All MCs	2	100.0	2	100.0	0.874	56.8	LOS F	18.9	482.7	1.00	1.32	2.48	21.7
2	T1	All MCs	853	2.1	853	2.1	0.874	26.1	LOS D	18.9	482.7	0.97	1.26	2.36	26.8
12	R2	All MCs	109	0.0	109	0.0	0.182	5.8	LOS A	0.7	18.2	0.50	0.39	0.50	35.1
Approach			964	2.1	964	2.1	0.874	23.9	LOS C	18.9	482.7	0.92	1.17	2.15	27.5
South: 54th Street West															
3	L2	All MCs	32	5.6	32	5.6	0.581	19.7	LOS C	3.1	79.3	0.77	0.89	1.20	28.7
8	T1	All MCs	28	0.0	28	0.0	0.581	17.1	LOS C	3.1	79.3	0.77	0.89	1.20	24.2
18	R2	All MCs	268	0.7	268	0.7	0.581	17.4	LOS C	3.1	79.3	0.77	0.89	1.20	29.6
Approach			328	1.1	328	1.1	0.581	17.6	LOS C	3.1	79.3	0.77	0.89	1.20	28.9
East: Rimrock Road															
1	L2	All MCs	190	1.9	190	1.9	0.281	5.0	LOS A	1.3	34.1	0.20	0.07	0.20	33.8
6	T1	All MCs	196	3.6	196	3.6	0.281	5.0	LOS A	1.3	34.1	0.20	0.07	0.20	34.4
16	R2	All MCs	50	10.7	50	10.7	0.059	3.6	LOS A	0.2	5.6	0.16	0.06	0.16	28.5
Approach			436	3.7	436	3.7	0.281	4.8	LOS A	1.3	34.1	0.19	0.07	0.19	33.3
All Vehicles			1998	2.3	1998	2.3	0.874	16.4	LOS C	18.9	482.7	0.68	0.78	1.35	28.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [103 (15)] Rimrock Rd & 54th St PM Improved 2LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 54th Street West															
7	L2	All MCs	105	3.4	105	3.4	0.302	11.4	LOS B	1.1	28.2	0.67	0.71	0.75	25.1
4	T1	All MCs	52	0.0	52	0.0	0.302	10.0	LOS B	1.1	28.2	0.67	0.71	0.75	25.7
14	R2	All MCs	8	0.0	8	0.0	0.302	10.0	LOS B	1.1	28.2	0.67	0.71	0.75	25.6
Approach			165	2.2	165	2.2	0.302	10.9	LOS B	1.1	28.2	0.67	0.71	0.75	25.3
West: Rimrock Road															
5	L2	All MCs	3	0.0	3	0.0	0.288	6.4	LOS A	1.3	31.4	0.50	0.37	0.50	27.4
2	T1	All MCs	308	0.0	308	0.0	0.288	6.3	LOS A	1.3	31.4	0.49	0.37	0.49	35.3
12	R2	All MCs	34	0.0	34	0.0	0.060	4.4	LOS A	0.2	5.6	0.44	0.33	0.44	36.0
Approach			345	0.0	345	0.0	0.288	6.1	LOS A	1.3	31.4	0.49	0.36	0.49	35.3
South: 54th Street West															
3	L2	All MCs	128	0.0	128	0.0	0.396	7.8	LOS A	1.9	47.0	0.56	0.42	0.56	33.0
8	T1	All MCs	72	0.0	72	0.0	0.396	7.8	LOS A	1.9	47.0	0.56	0.42	0.56	26.7
18	R2	All MCs	185	2.9	185	2.9	0.396	8.3	LOS A	1.9	47.0	0.56	0.42	0.56	33.0
Approach			385	1.4	385	1.4	0.396	8.0	LOS A	1.9	47.0	0.56	0.42	0.56	31.6
East: Rimrock Road															
1	L2	All MCs	242	2.1	242	2.1	0.760	15.3	LOS C	14.5	374.8	0.77	0.65	1.19	29.6
6	T1	All MCs	643	4.7	643	4.7	0.760	15.3	LOS C	14.5	374.8	0.75	0.63	1.16	30.0
16	R2	All MCs	139	10.0	139	10.0	0.158	5.0	LOS A	0.6	16.1	0.34	0.20	0.34	28.0
Approach			1025	4.8	1025	4.8	0.760	13.9	LOS B	14.5	374.8	0.70	0.58	1.06	29.6
All Vehicles			1920	3.0	1920	3.0	0.760	11.1	LOS B	14.5	374.8	0.63	0.52	0.83	30.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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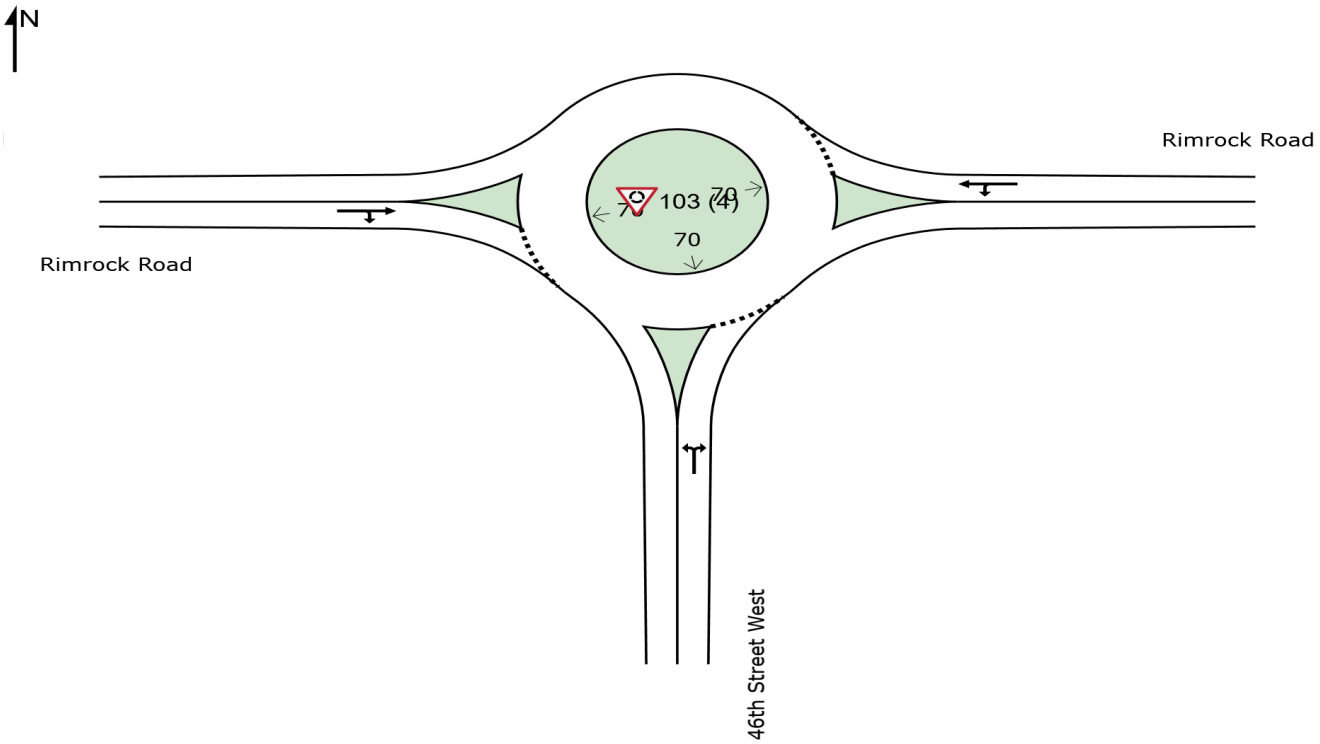
SITE LAYOUT

Site: [103 (4)] Rimrock Rd & 46th St AM Improved (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: P:\23379_Yellowstone_County_West_Billings_Neighborhood_Plan\TRAFFIC\Capacity Calcs\Future 2044\Roundabouts\West Billings RABs Future (2044) Improved.sipx

MOVEMENT SUMMARY

Site: [103 (4)] Rimrock Rd & 46th St AM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
West: Rimrock Road															
2	T1	All MCs	1291	1.7	1291	1.7	1.037	27.3	LOS F	146.5	3714.5	1.00	1.16	1.30	26.4
12	R2	All MCs	66	2.7	66	2.7	1.037	27.4	LOS F	146.5	3714.5	1.00	1.16	1.30	22.0
Approach			1358	1.7	1358	1.7	1.037	27.3	LOS D	146.5	3714.5	1.00	1.16	1.30	26.2
South: 46th Street West															
3	L2	All MCs	14	0.0	14	0.0	0.239	13.2	LOS B	0.8	21.3	0.78	0.78	0.79	24.9
18	R2	All MCs	72	2.5	72	2.5	0.239	14.5	LOS B	0.8	21.3	0.78	0.78	0.79	24.9
Approach			86	2.1	86	2.1	0.239	14.3	LOS B	0.8	21.3	0.78	0.78	0.79	24.9
East: Rimrock Road															
1	L2	All MCs	36	0.0	36	0.0	0.364	5.1	LOS A	2.3	59.2	0.11	0.02	0.11	27.7
6	T1	All MCs	446	3.2	446	3.2	0.364	5.3	LOS A	2.3	59.2	0.11	0.02	0.11	35.2
Approach			482	3.0	482	3.0	0.364	5.3	LOS A	2.3	59.2	0.11	0.02	0.11	34.5
All Vehicles			1925	2.1	1925	2.1	1.037	21.2	LOS C	146.5	3714.5	0.77	0.86	0.98	27.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: P:\23379_Yellowstone_County_West_Billings_Neighborhood_Plan\TRAFFIC\Capacity Calcs\Future 2044\Roundabouts\West Billings RABs Future (2044) Improved.sipx

MOVEMENT SUMMARY

Site: [103 (5)] Rimrock Rd & 46th St PM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
West: Rimrock Road															
2	T1	All MCs	579	1.2	579	1.2	0.485	7.7	LOS A	3.6	90.4	0.36	0.15	0.36	34.4
12	R2	All MCs	28	0.0	28	0.0	0.485	7.6	LOS A	3.6	90.4	0.36	0.15	0.36	27.2
Approach			608	1.1	608	1.1	0.485	7.7	LOS A	3.6	90.4	0.36	0.15	0.36	34.0
South: 46th Street West															
3	L2	All MCs	25	0.0	25	0.0	0.081	5.3	LOS A	0.3	7.9	0.56	0.47	0.56	27.1
18	R2	All MCs	34	5.3	34	5.3	0.081	6.2	LOS A	0.3	7.9	0.56	0.47	0.56	26.9
Approach			59	3.0	59	3.0	0.081	5.8	LOS A	0.3	7.9	0.56	0.47	0.56	27.0
East: Rimrock Road															
1	L2	All MCs	84	0.0	84	0.0	0.868	13.1	LOS B	23.6	591.9	0.64	0.16	0.64	25.3
6	T1	All MCs	1083	0.2	1083	0.2	0.868	13.1	LOS B	23.6	591.9	0.64	0.16	0.64	31.7
Approach			1166	0.2	1166	0.2	0.868	13.1	LOS B	23.6	591.9	0.64	0.16	0.64	31.2
All Vehicles			1833	0.6	1833	0.6	0.868	11.1	LOS B	23.6	591.9	0.54	0.17	0.54	31.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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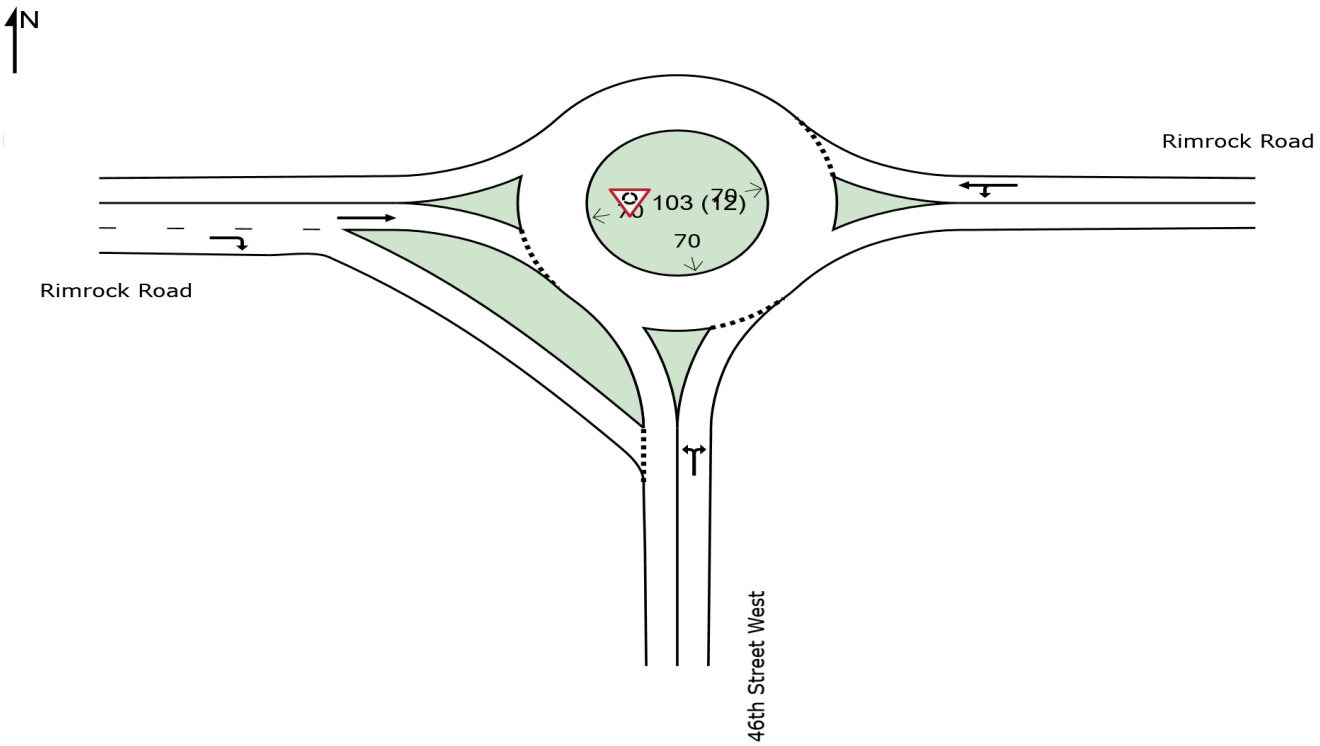
SITE LAYOUT

Site: [103 (12)] Rimrock Rd & 46th St AM Improved EB RT Slip
(Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: [103 (12)] Rimrock Rd & 46th St AM Improved EB RT Slip

(Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
West: Rimrock Road															
2	T1	All MCs	1291	1.7	1291	1.7	0.956	19.3	LOS C	50.3	1274.7	1.00	0.44	1.02	29.2
12	R2	All MCs	66	2.7	66	2.7	0.051	3.1	LOS A	0.2	5.6	0.13	0.04	0.13	28.8
Approach			1358	1.7	1358	1.7	0.956	18.5	LOS C	50.3	1274.7	0.96	0.42	0.98	29.2
South: 46th Street West															
3	L2	All MCs	14	0.0	14	0.0	0.251	14.0	LOS B	0.9	22.3	0.79	0.80	0.82	24.6
18	R2	All MCs	72	2.5	72	2.5	0.251	15.5	LOS C	0.9	22.3	0.79	0.80	0.82	24.6
Approach			86	2.1	86	2.1	0.251	15.2	LOS C	0.9	22.3	0.79	0.80	0.82	24.6
East: Rimrock Road															
1	L2	All MCs	36	0.0	36	0.0	0.364	5.1	LOS A	2.3	59.2	0.11	0.02	0.11	27.7
6	T1	All MCs	446	3.2	446	3.2	0.364	5.3	LOS A	2.3	59.2	0.11	0.02	0.11	35.2
Approach			482	3.0	482	3.0	0.364	5.3	LOS A	2.3	59.2	0.11	0.02	0.11	34.5
All Vehicles			1925	2.1	1925	2.1	0.956	15.0	LOS C	50.3	1274.7	0.74	0.34	0.75	30.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [103 (13)] Rimrock Rd & 46th St PM Improved EB RT Slip

(Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
West: Rimrock Road															
2	T1	All MCs	579	1.2	579	1.2	0.446	7.0	LOS A	2.9	72.4	0.31	0.12	0.31	34.8
12	R2	All MCs	28	0.0	28	0.0	0.022	3.0	LOS A	0.1	2.4	0.20	0.08	0.20	28.8
Approach			608	1.1	608	1.1	0.446	6.8	LOS A	2.9	72.4	0.30	0.12	0.30	34.5
South: 46th Street West															
3	L2	All MCs	25	0.0	25	0.0	0.081	5.3	LOS A	0.3	7.9	0.56	0.47	0.56	27.1
18	R2	All MCs	34	5.3	34	5.3	0.081	6.2	LOS A	0.3	7.9	0.56	0.47	0.56	26.9
Approach			59	3.0	59	3.0	0.081	5.8	LOS A	0.3	7.9	0.56	0.47	0.56	27.0
East: Rimrock Road															
1	L2	All MCs	84	0.0	84	0.0	0.868	13.1	LOS B	23.6	591.9	0.64	0.16	0.64	25.3
6	T1	All MCs	1083	0.2	1083	0.2	0.868	13.1	LOS B	23.6	591.9	0.64	0.16	0.64	31.7
Approach			1166	0.2	1166	0.2	0.868	13.1	LOS B	23.6	591.9	0.64	0.16	0.64	31.2
All Vehicles			1833	0.6	1833	0.6	0.868	10.8	LOS B	23.6	591.9	0.52	0.16	0.52	32.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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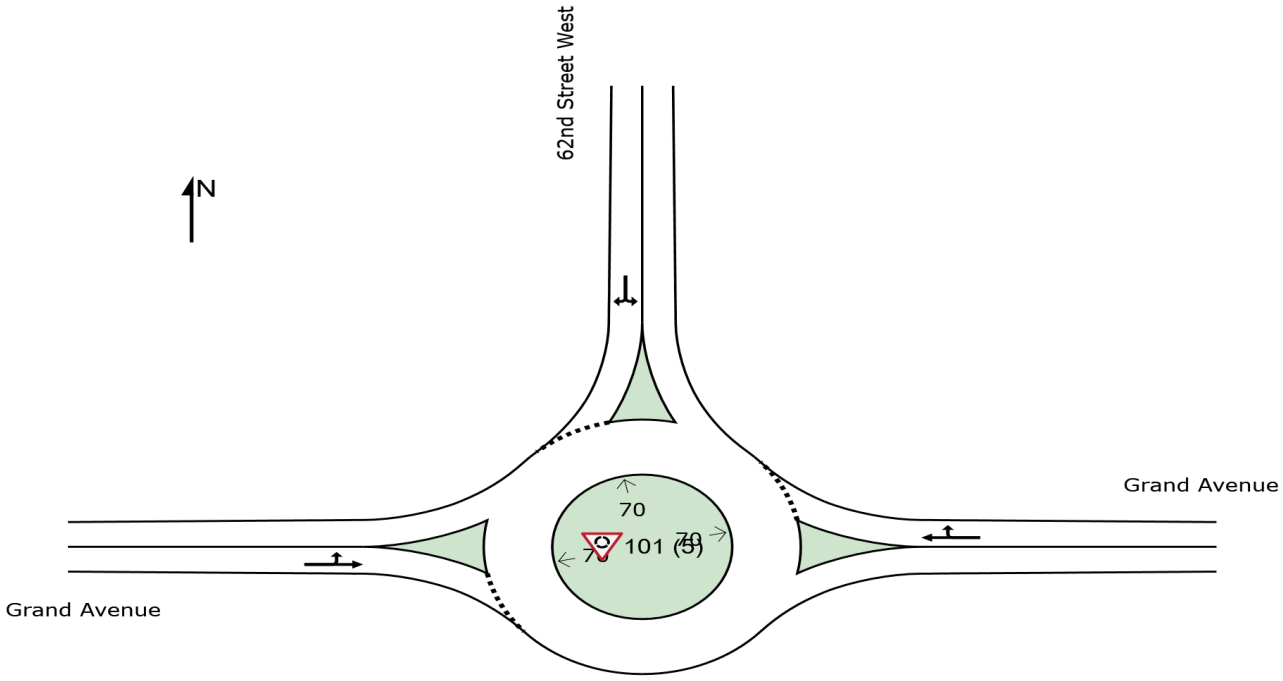
SITE LAYOUT

Site: [101 (5)] Grand Ave & 62nd St AM Improved (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: [101 (5)] Grand Ave & 62nd St AM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 62nd Street West															
7	L2	All MCs	288	1.2	288	1.2	0.331	6.3	LOS A	1.9	46.7	0.41	0.22	0.41	32.8
14	R2	All MCs	91	0.0	91	0.0	0.331	6.2	LOS A	1.9	46.7	0.41	0.22	0.41	33.3
Approach			379	0.9	379	0.9	0.331	6.3	LOS A	1.9	46.7	0.41	0.22	0.41	32.9
West: Grand Avenue															
5	L2	All MCs	55	0.0	55	0.0	0.333	6.8	LOS A	1.8	44.2	0.52	0.34	0.52	33.9
2	T1	All MCs	282	1.3	282	1.3	0.333	7.0	LOS A	1.8	44.2	0.52	0.34	0.52	34.4
Approach			337	1.1	337	1.1	0.333	6.9	LOS A	1.8	44.2	0.52	0.34	0.52	34.3
East: Grand Avenue															
6	T1	All MCs	162	6.6	162	6.6	0.182	4.4	LOS A	0.9	22.7	0.19	0.07	0.19	35.5
16	R2	All MCs	59	12.1	59	12.1	0.182	4.7	LOS A	0.9	22.7	0.19	0.07	0.19	34.3
Approach			221	8.1	221	8.1	0.182	4.4	LOS A	0.9	22.7	0.19	0.07	0.19	35.1
All Vehicles			937	2.7	937	2.7	0.333	6.1	LOS A	1.9	46.7	0.40	0.23	0.40	33.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [101 (6)] Grand Ave & 62nd St PM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 62nd Street West															
7	L2	All MCs	84	0.0	84	0.0	0.160	5.2	LOS A	0.7	18.0	0.47	0.33	0.47	34.0
14	R2	All MCs	73	0.0	73	0.0	0.160	5.2	LOS A	0.7	18.0	0.47	0.33	0.47	34.4
Approach			157	0.0	157	0.0	0.160	5.2	LOS A	0.7	18.0	0.47	0.33	0.47	34.2
West: Grand Avenue															
5	L2	All MCs	98	0.0	98	0.0	0.285	5.2	LOS A	1.6	39.9	0.27	0.11	0.27	34.5
2	T1	All MCs	260	1.4	260	1.4	0.285	5.3	LOS A	1.6	39.9	0.27	0.11	0.27	35.0
Approach			358	1.0	358	1.0	0.285	5.3	LOS A	1.6	39.9	0.27	0.11	0.27	34.8
East: Grand Avenue															
6	T1	All MCs	338	0.0	338	0.0	0.438	7.1	LOS A	3.0	75.0	0.36	0.16	0.36	34.9
16	R2	All MCs	209	0.0	209	0.0	0.438	7.1	LOS A	3.0	75.0	0.36	0.16	0.36	34.7
Approach			547	0.0	547	0.0	0.438	7.1	LOS A	3.0	75.0	0.36	0.16	0.36	34.8
All Vehicles			1061	0.3	1061	0.3	0.438	6.2	LOS A	3.0	75.0	0.34	0.17	0.34	34.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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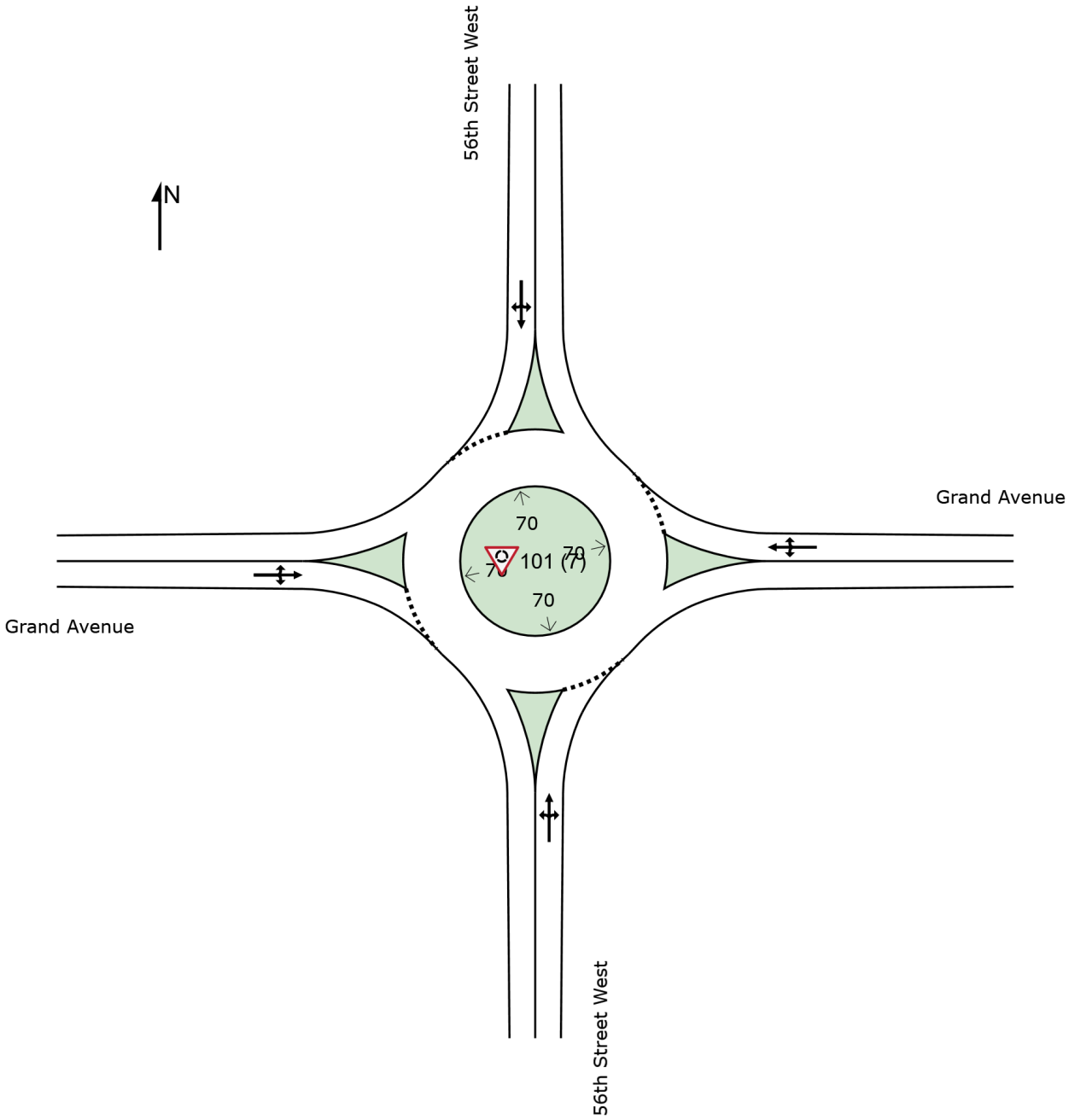
SITE LAYOUT

Site: [101 (7)] Grand Ave & 56th St AM Improved 1LN (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (7)] Grand Ave & 56th St AM Improved 1LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	1	0.0	1	0.0	0.005	5.5	LOS A	0.0	0.5	0.58	0.41	0.58	29.3
4	T1	All MCs	1	0.0	1	0.0	0.005	5.5	LOS A	0.0	0.5	0.58	0.41	0.58	29.7
14	R2	All MCs	1	0.0	1	0.0	0.005	5.5	LOS A	0.0	0.5	0.58	0.41	0.58	29.5
Approach			3	0.0	3	0.0	0.005	5.5	LOS A	0.0	0.5	0.58	0.41	0.58	29.5
West: Grand Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.962	33.3	LOS D	51.7	1308.5	1.00	1.62	2.26	21.8
2	T1	All MCs	855	1.0	855	1.0	0.962	33.4	LOS D	51.7	1308.5	1.00	1.62	2.26	22.0
12	R2	All MCs	239	3.7	239	3.7	0.962	33.8	LOS D	51.7	1308.5	1.00	1.62	2.26	21.9
Approach			1096	1.6	1096	1.6	0.962	33.5	LOS D	51.7	1308.5	1.00	1.62	2.26	22.0
South: 56th Street West															
3	L2	All MCs	50	10.7	50	10.7	0.471	16.6	LOS C	2.1	57.0	0.76	0.82	1.02	25.7
8	T1	All MCs	1	0.0	1	0.0	0.471	13.7	LOS B	2.1	57.0	0.76	0.82	1.02	26.1
18	R2	All MCs	175	9.2	175	9.2	0.471	16.1	LOS C	2.1	57.0	0.76	0.82	1.02	25.9
Approach			226	9.5	226	9.5	0.471	16.2	LOS C	2.1	57.0	0.76	0.82	1.02	25.9
East: Grand Avenue															
1	L2	All MCs	157	8.0	157	8.0	0.515	8.3	LOS A	4.0	103.5	0.31	0.11	0.31	28.4
6	T1	All MCs	488	2.6	488	2.6	0.515	7.8	LOS A	4.0	103.5	0.31	0.11	0.31	28.9
16	R2	All MCs	1	0.0	1	0.0	0.515	7.6	LOS A	4.0	103.5	0.31	0.11	0.31	28.8
Approach			646	3.9	646	3.9	0.515	7.9	LOS A	4.0	103.5	0.31	0.11	0.31	28.8
All Vehicles			1971	3.3	1971	3.3	0.962	23.1	LOS C	51.7	1308.5	0.75	1.03	1.47	24.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (8)] Grand Ave & 56th St PM Improved 1LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	1	0.0	1	0.0	0.006	6.9	LOS A	0.0	0.6	0.63	0.50	0.63	28.8
4	T1	All MCs	1	0.0	1	0.0	0.006	6.9	LOS A	0.0	0.6	0.63	0.50	0.63	29.2
14	R2	All MCs	1	0.0	1	0.0	0.006	6.9	LOS A	0.0	0.6	0.63	0.50	0.63	29.0
Approach			3	0.0	3	0.0	0.006	6.9	LOS A	0.0	0.6	0.63	0.50	0.63	29.0
West: Grand Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.576	10.0	LOS B	4.4	110.7	0.60	0.34	0.60	28.1
2	T1	All MCs	535	0.7	535	0.7	0.576	10.1	LOS B	4.4	110.7	0.60	0.34	0.60	28.5
12	R2	All MCs	109	1.6	109	1.6	0.576	10.2	LOS B	4.4	110.7	0.60	0.34	0.60	28.4
Approach			645	0.9	645	0.9	0.576	10.1	LOS B	4.4	110.7	0.60	0.34	0.60	28.5
South: 56th Street West															
3	L2	All MCs	136	1.3	136	1.3	0.585	13.7	LOS B	4.8	121.4	0.78	0.80	1.19	26.4
8	T1	All MCs	1	0.0	1	0.0	0.585	13.4	LOS B	4.8	121.4	0.78	0.80	1.19	26.7
18	R2	All MCs	310	3.4	310	3.4	0.585	14.0	LOS B	4.8	121.4	0.78	0.80	1.19	26.6
Approach			447	2.8	447	2.8	0.585	13.9	LOS B	4.8	121.4	0.78	0.80	1.19	26.5
East: Grand Avenue															
1	L2	All MCs	190	1.9	190	1.9	0.672	12.0	LOS B	6.6	165.5	0.63	0.32	0.63	27.2
6	T1	All MCs	608	0.3	608	0.3	0.672	11.8	LOS B	6.6	165.5	0.63	0.32	0.63	27.6
16	R2	All MCs	1	0.0	1	0.0	0.672	11.8	LOS B	6.6	165.5	0.63	0.32	0.63	27.4
Approach			799	0.7	799	0.7	0.672	11.9	LOS B	6.6	165.5	0.63	0.32	0.63	27.5
All Vehicles			1893	1.2	1893	1.2	0.672	11.7	LOS B	6.6	165.5	0.66	0.44	0.75	27.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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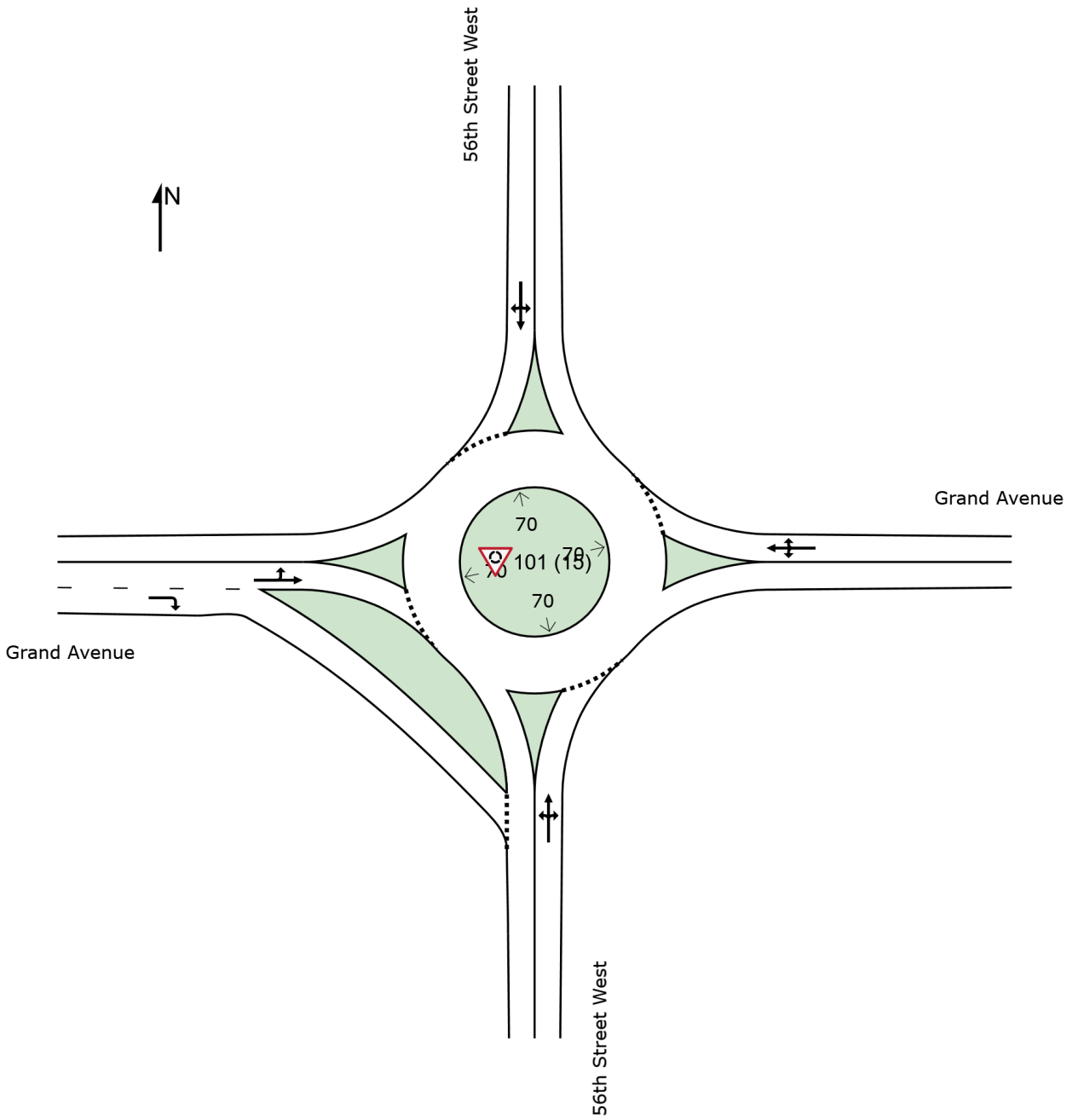
SITE LAYOUT

Site: [101 (15)] Grand Ave & 56th St AM Improved 1LN EB RT

Slip (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (15)] Grand Ave & 56th St AM Improved 1LN EB RT

Slip (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	1	0.0	1	0.0	0.005	5.5	LOS A	0.0	0.5	0.58	0.41	0.58	29.3
4	T1	All MCs	1	0.0	1	0.0	0.005	5.5	LOS A	0.0	0.5	0.58	0.41	0.58	29.7
14	R2	All MCs	1	0.0	1	0.0	0.005	5.5	LOS A	0.0	0.5	0.58	0.41	0.58	29.5
Approach			3	0.0	3	0.0	0.005	5.5	LOS A	0.0	0.5	0.58	0.41	0.58	29.5
West: Grand Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.713	13.0	LOS B	9.5	240.0	0.69	0.45	0.82	27.1
2	T1	All MCs	855	1.0	855	1.0	0.713	13.1	LOS B	9.5	240.0	0.69	0.45	0.82	27.5
12	R2	All MCs	239	3.7	239	3.7	0.214	5.1	LOS A	1.0	26.5	0.36	0.19	0.36	30.2
Approach			1096	1.6	1096	1.6	0.713	11.4	LOS B	9.5	240.0	0.62	0.40	0.72	28.1
South: 56th Street West															
3	L2	All MCs	50	10.7	50	10.7	0.471	16.6	LOS C	2.2	58.2	0.76	0.83	1.05	25.7
8	T1	All MCs	1	0.0	1	0.0	0.471	13.7	LOS B	2.2	58.2	0.76	0.83	1.05	26.1
18	R2	All MCs	175	9.2	175	9.2	0.471	16.1	LOS C	2.2	58.2	0.76	0.83	1.05	25.9
Approach			226	9.5	226	9.5	0.471	16.2	LOS C	2.2	58.2	0.76	0.83	1.05	25.9
East: Grand Avenue															
1	L2	All MCs	157	8.0	157	8.0	0.515	8.3	LOS A	4.0	103.5	0.31	0.11	0.31	28.4
6	T1	All MCs	488	2.6	488	2.6	0.515	7.8	LOS A	4.0	103.5	0.31	0.11	0.31	28.9
16	R2	All MCs	1	0.0	1	0.0	0.515	7.6	LOS A	4.0	103.5	0.31	0.11	0.31	28.8
Approach			646	3.9	646	3.9	0.515	7.9	LOS A	4.0	103.5	0.31	0.11	0.31	28.8
All Vehicles			1971	3.3	1971	3.3	0.713	10.8	LOS B	9.5	240.0	0.53	0.35	0.62	28.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (16)] Grand Ave & 56th St PM Improved 1LN EB RT

Slip (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	1	0.0	1	0.0	0.006	6.9	LOS A	0.0	0.6	0.63	0.50	0.63	28.8
4	T1	All MCs	1	0.0	1	0.0	0.006	6.9	LOS A	0.0	0.6	0.63	0.50	0.63	29.2
14	R2	All MCs	1	0.0	1	0.0	0.006	6.9	LOS A	0.0	0.6	0.63	0.50	0.63	29.0
Approach			3	0.0	3	0.0	0.006	6.9	LOS A	0.0	0.6	0.63	0.50	0.63	29.0
West: Grand Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.455	7.7	LOS A	2.7	69.1	0.47	0.26	0.47	29.0
2	T1	All MCs	535	0.7	535	0.7	0.455	7.7	LOS A	2.7	69.1	0.47	0.26	0.47	29.4
12	R2	All MCs	109	1.6	109	1.6	0.098	4.1	LOS A	0.4	10.8	0.34	0.20	0.34	30.7
Approach			645	0.9	645	0.9	0.455	7.1	LOS A	2.7	69.1	0.45	0.25	0.45	29.6
South: 56th Street West															
3	L2	All MCs	136	1.3	136	1.3	0.585	13.7	LOS B	4.8	122.2	0.78	0.81	1.19	26.4
8	T1	All MCs	1	0.0	1	0.0	0.585	13.4	LOS B	4.8	122.2	0.78	0.81	1.19	26.7
18	R2	All MCs	310	3.4	310	3.4	0.585	14.0	LOS B	4.8	122.2	0.78	0.81	1.19	26.6
Approach			447	2.8	447	2.8	0.585	13.9	LOS B	4.8	122.2	0.78	0.81	1.19	26.5
East: Grand Avenue															
1	L2	All MCs	190	1.9	190	1.9	0.672	12.0	LOS B	6.6	165.5	0.63	0.32	0.63	27.2
6	T1	All MCs	608	0.3	608	0.3	0.672	11.8	LOS B	6.6	165.5	0.63	0.32	0.63	27.6
16	R2	All MCs	1	0.0	1	0.0	0.672	11.8	LOS B	6.6	165.5	0.63	0.32	0.63	27.4
Approach			799	0.7	799	0.7	0.672	11.9	LOS B	6.6	165.5	0.63	0.32	0.63	27.5
All Vehicles			1893	1.2	1893	1.2	0.672	10.7	LOS B	6.6	165.5	0.60	0.41	0.70	27.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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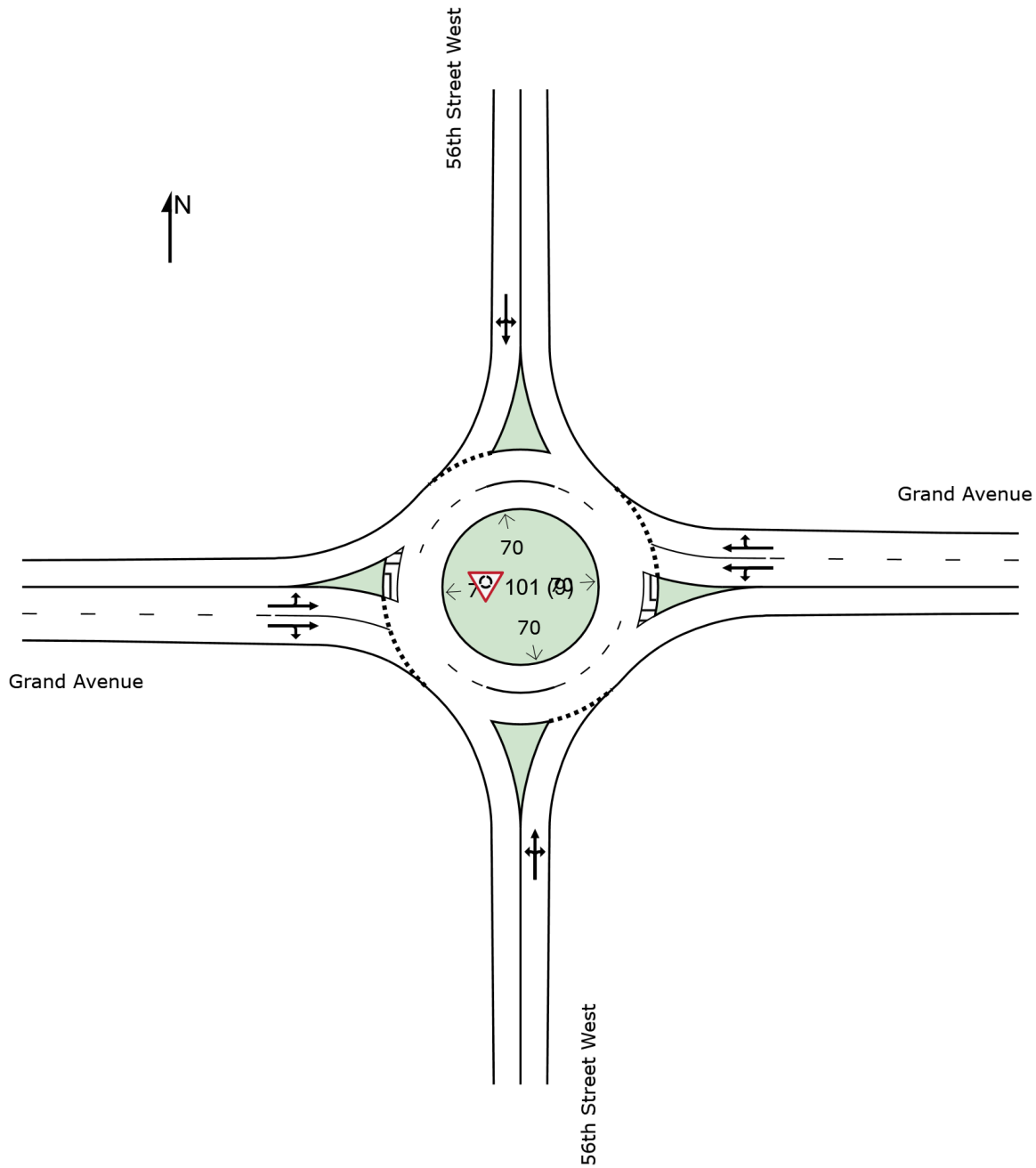
SITE LAYOUT

Site: [101 (9)] Grand Ave & 56th St AM Improved 2LN (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (9)] Grand Ave & 56th St AM Improved 2LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	1	0.0	1	0.0	0.004	4.7	LOS A	0.0	0.4	0.52	0.36	0.52	29.6
4	T1	All MCs	1	0.0	1	0.0	0.004	4.7	LOS A	0.0	0.4	0.52	0.36	0.52	30.0
14	R2	All MCs	1	0.0	1	0.0	0.004	4.7	LOS A	0.0	0.4	0.52	0.36	0.52	29.8
Approach			3	0.0	3	0.0	0.004	4.7	LOS A	0.0	0.4	0.52	0.36	0.52	29.8
West: Grand Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.713	13.0	LOS B	9.5	240.2	0.69	0.45	0.82	27.1
2	T1	All MCs	855	1.0	855	1.0	0.713	13.1	LOS B	9.5	240.2	0.69	0.45	0.82	27.5
12	R2	All MCs	239	3.7	239	3.7	0.205	4.9	LOS A	0.9	23.3	0.33	0.18	0.33	30.1
Approach			1096	1.6	1096	1.6	0.713	11.3	LOS B	9.5	240.2	0.61	0.39	0.71	28.0
South: 56th Street West															
3	L2	All MCs	50	10.7	50	10.7	0.413	13.5	LOS B	1.6	43.5	0.69	0.73	0.91	26.6
8	T1	All MCs	1	0.0	1	0.0	0.413	10.4	LOS B	1.6	43.5	0.69	0.73	0.91	27.1
18	R2	All MCs	175	9.2	175	9.2	0.413	13.0	LOS B	1.6	43.5	0.69	0.73	0.91	26.9
Approach			226	9.5	226	9.5	0.413	13.1	LOS B	1.6	43.5	0.69	0.73	0.91	26.8
East: Grand Avenue															
1	L2	All MCs	157	8.0	157	8.0	0.413	6.8	LOS A	2.5	64.3	0.24	0.08	0.24	28.9
6	T1	All MCs	488	2.6	488	2.6	0.413	5.7	LOS A	2.5	64.3	0.22	0.08	0.22	29.8
16	R2	All MCs	1	0.0	1	0.0	0.086	3.2	LOS A	0.3	8.9	0.16	0.06	0.16	30.9
Approach			646	3.9	646	3.9	0.413	5.9	LOS A	2.5	64.3	0.22	0.08	0.22	29.6
All Vehicles			1971	3.3	1971	3.3	0.713	9.7	LOS A	9.5	240.2	0.49	0.33	0.57	28.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (10)] Grand Ave & 56th St PM Improved 2LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 56th Street West															
7	L2	All MCs	1	0.0	1	0.0	0.005	5.7	LOS A	0.0	0.4	0.57	0.44	0.57	29.2
4	T1	All MCs	1	0.0	1	0.0	0.005	5.7	LOS A	0.0	0.4	0.57	0.44	0.57	29.6
14	R2	All MCs	1	0.0	1	0.0	0.005	5.7	LOS A	0.0	0.4	0.57	0.44	0.57	29.5
Approach			3	0.0	3	0.0	0.005	5.7	LOS A	0.0	0.4	0.57	0.44	0.57	29.4
West: Grand Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.454	7.6	LOS A	2.7	68.8	0.47	0.26	0.47	29.0
2	T1	All MCs	535	0.7	535	0.7	0.454	7.7	LOS A	2.7	68.8	0.47	0.26	0.47	29.4
12	R2	All MCs	109	1.6	109	1.6	0.095	3.9	LOS A	0.4	9.6	0.31	0.18	0.31	30.6
Approach			645	0.9	645	0.9	0.454	7.1	LOS A	2.7	68.8	0.44	0.25	0.44	29.6
South: 56th Street West															
3	L2	All MCs	136	1.3	136	1.3	0.523	11.0	LOS B	3.5	90.5	0.68	0.67	0.98	27.2
8	T1	All MCs	1	0.0	1	0.0	0.523	10.7	LOS B	3.5	90.5	0.68	0.67	0.98	27.6
18	R2	All MCs	310	3.4	310	3.4	0.523	11.4	LOS B	3.5	90.5	0.68	0.67	0.98	27.4
Approach			447	2.8	447	2.8	0.523	11.3	LOS B	3.5	90.5	0.68	0.67	0.98	27.4
East: Grand Avenue															
1	L2	All MCs	190	1.9	190	1.9	0.533	8.7	LOS A	3.8	95.0	0.45	0.23	0.45	28.2
6	T1	All MCs	608	0.3	608	0.3	0.533	7.5	LOS A	3.8	95.0	0.41	0.20	0.41	29.1
16	R2	All MCs	1	0.0	1	0.0	0.111	3.8	LOS A	0.5	11.7	0.27	0.13	0.27	30.8
Approach			799	0.7	799	0.7	0.533	7.8	LOS A	3.8	95.0	0.42	0.21	0.42	28.9
All Vehicles			1893	1.2	1893	1.2	0.533	8.3	LOS A	3.8	95.0	0.49	0.33	0.56	28.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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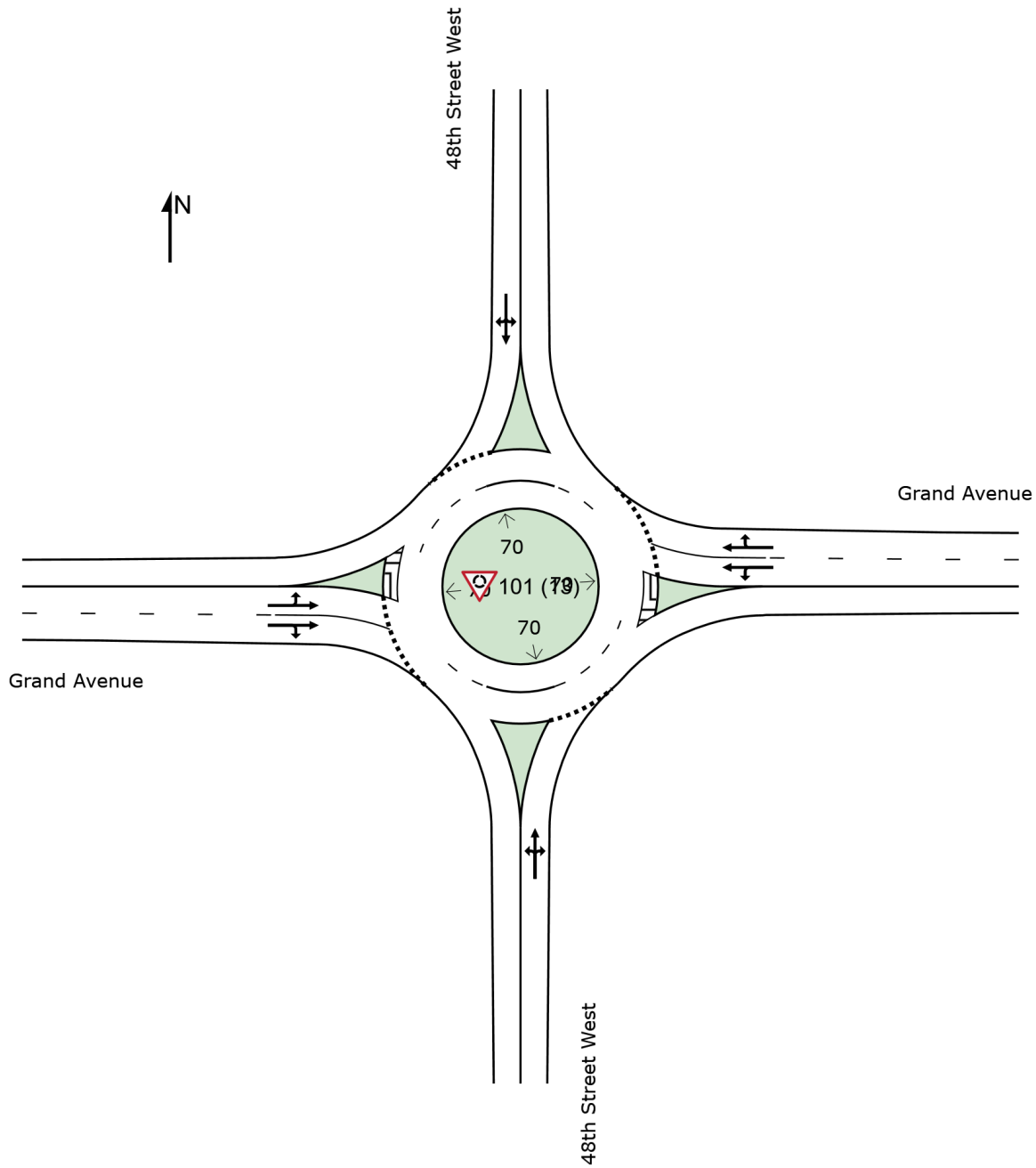
SITE LAYOUT

Site: [101 (13)] Grand Ave & 48th St AM Improved 2LN (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (13)] Grand Ave & 48th St AM Improved 2LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	16	0.0	16	0.0	0.031	4.5	LOS A	0.1	2.7	0.49	0.39	0.49	25.6
4	T1	All MCs	9	0.0	9	0.0	0.031	4.5	LOS A	0.1	2.7	0.49	0.39	0.49	25.9
14	R2	All MCs	1	0.0	1	0.0	0.031	4.5	LOS A	0.1	2.7	0.49	0.39	0.49	25.8
Approach			26	0.0	26	0.0	0.031	4.5	LOS A	0.1	2.7	0.49	0.39	0.49	25.7
West: Grand Avenue															
5	L2	All MCs	37	0.0	37	0.0	0.837	18.2	LOS C	21.9	551.3	0.92	0.69	1.26	22.6
2	T1	All MCs	1023	1.2	1023	1.2	0.837	17.9	LOS C	21.9	551.3	0.90	0.67	1.23	25.9
12	R2	All MCs	184	1.0	184	1.0	0.175	4.4	LOS A	0.8	19.5	0.29	0.15	0.29	30.4
Approach			1243	1.1	1243	1.1	0.837	15.9	LOS C	21.9	551.3	0.81	0.59	1.09	26.4
South: 48th Street West															
3	L2	All MCs	47	15.4	47	15.4	0.440	21.0	LOS C	1.8	46.4	0.73	0.81	0.96	26.2
8	T1	All MCs	16	0.0	16	0.0	0.440	13.1	LOS B	1.8	46.4	0.73	0.81	0.96	23.4
18	R2	All MCs	162	0.0	162	0.0	0.440	13.1	LOS B	1.8	46.4	0.73	0.81	0.96	26.6
Approach			225	3.2	225	3.2	0.440	14.6	LOS B	1.8	46.4	0.73	0.81	0.96	26.2
East: Grand Avenue															
1	L2	All MCs	117	1.5	117	1.5	0.402	6.5	LOS A	2.3	59.8	0.33	0.15	0.33	29.0
6	T1	All MCs	422	3.8	422	3.8	0.402	6.4	LOS A	2.3	59.8	0.32	0.14	0.32	29.5
16	R2	All MCs	67	0.0	67	0.0	0.084	3.4	LOS A	0.3	8.6	0.22	0.10	0.22	26.6
Approach			607	2.9	607	2.9	0.402	6.1	LOS A	2.3	59.8	0.31	0.14	0.31	29.1
All Vehicles			2101	1.9	2101	1.9	0.837	12.8	LOS B	21.9	551.3	0.65	0.48	0.84	27.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (14)] Grand Ave & 48th St PM Improved 2LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	5	0.0	5	0.0	0.019	8.3	LOS A	0.1	1.5	0.69	0.67	0.69	24.5
4	T1	All MCs	2	0.0	2	0.0	0.019	8.3	LOS A	0.1	1.5	0.69	0.67	0.69	24.8
14	R2	All MCs	1	0.0	1	0.0	0.019	8.3	LOS A	0.1	1.5	0.69	0.67	0.69	24.7
Approach			9	0.0	9	0.0	0.019	8.3	LOS A	0.1	1.5	0.69	0.67	0.69	24.6
West: Grand Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.444	7.6	LOS A	2.6	65.9	0.47	0.27	0.47	25.4
2	T1	All MCs	525	0.7	525	0.7	0.444	7.6	LOS A	2.6	65.9	0.47	0.27	0.47	29.5
12	R2	All MCs	100	0.0	100	0.0	0.093	3.8	LOS A	0.4	9.4	0.32	0.19	0.32	30.6
Approach			626	0.6	626	0.6	0.444	7.0	LOS A	2.6	65.9	0.45	0.26	0.45	29.6
South: 48th Street West															
3	L2	All MCs	151	1.2	151	1.2	0.290	7.2	LOS A	1.2	30.3	0.55	0.45	0.55	28.3
8	T1	All MCs	1	0.0	1	0.0	0.290	7.0	LOS A	1.2	30.3	0.55	0.45	0.55	25.0
18	R2	All MCs	105	0.0	105	0.0	0.290	7.0	LOS A	1.2	30.3	0.55	0.45	0.55	28.5
Approach			258	0.7	258	0.7	0.290	7.1	LOS A	1.2	30.3	0.55	0.45	0.55	28.3
East: Grand Avenue															
1	L2	All MCs	200	0.0	200	0.0	0.815	17.1	LOS C	19.4	485.3	0.87	0.66	1.20	25.6
6	T1	All MCs	1007	0.0	1007	0.0	0.815	14.6	LOS B	19.4	485.3	0.76	0.56	1.02	26.8
16	R2	All MCs	9	0.0	9	0.0	0.170	4.3	LOS A	0.8	18.9	0.30	0.15	0.30	26.5
Approach			1215	0.0	1215	0.0	0.815	14.9	LOS B	19.4	485.3	0.77	0.57	1.04	26.6
All Vehicles			2108	0.3	2108	0.3	0.815	11.6	LOS B	19.4	485.3	0.65	0.46	0.80	27.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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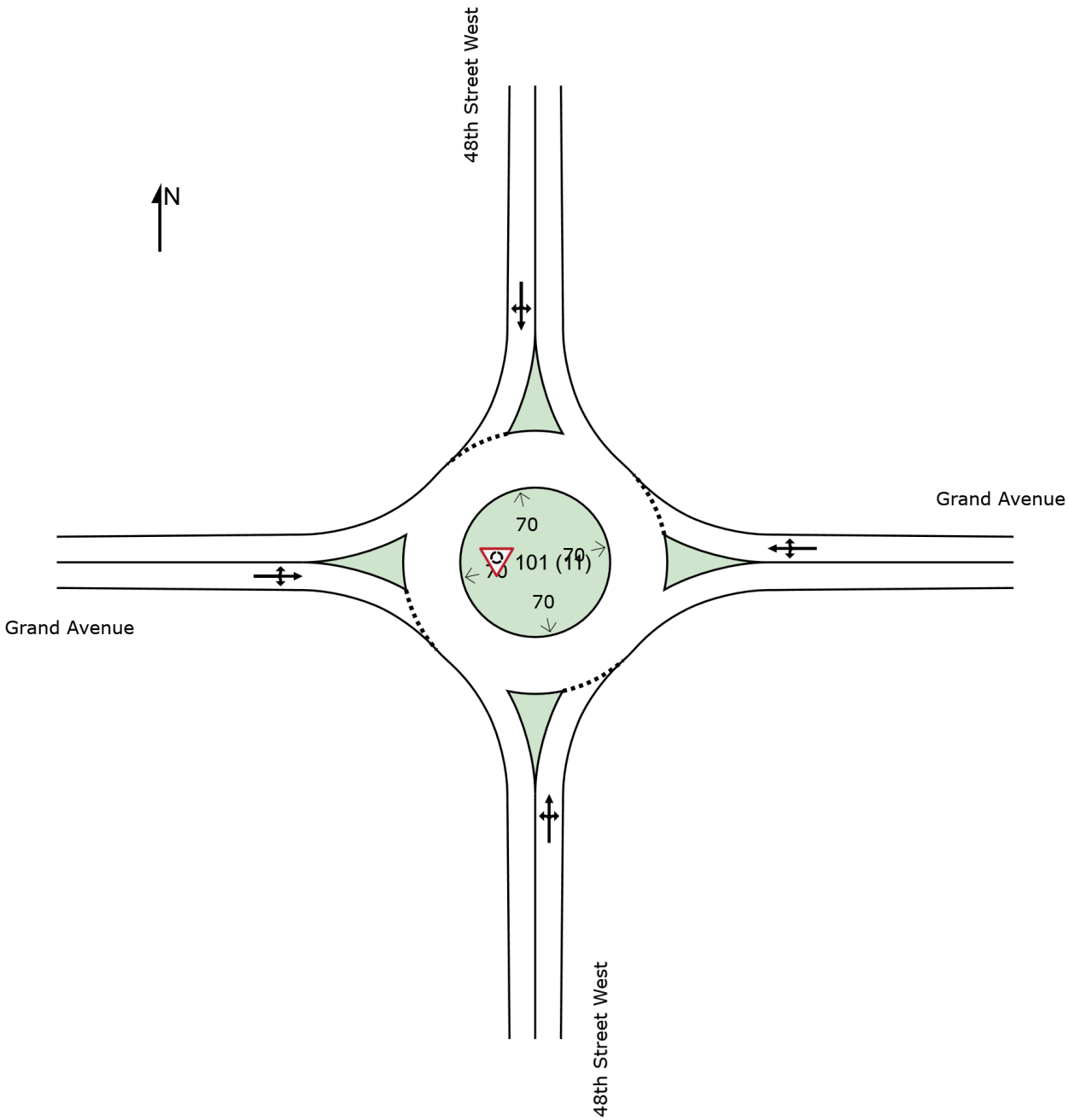
SITE LAYOUT

Site: [101 (11)] Grand Ave & 48th St AM Improved 1LN (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [101 (11)] Grand Ave & 48th St AM Improved 1LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	16	0.0	16	0.0	0.035	5.2	LOS A	0.1	3.4	0.55	0.45	0.55	25.4
4	T1	All MCs	9	0.0	9	0.0	0.035	5.2	LOS A	0.1	3.4	0.55	0.45	0.55	25.7
14	R2	All MCs	1	0.0	1	0.0	0.035	5.2	LOS A	0.1	3.4	0.55	0.45	0.55	25.6
Approach			26	0.0	26	0.0	0.035	5.2	LOS A	0.1	3.4	0.55	0.45	0.55	25.5
West: Grand Avenue															
5	L2	All MCs	37	0.0	37	0.0	1.056	53.1	LOS F	82.5	2081.6	1.00	2.13	2.72	16.7
2	T1	All MCs	1023	1.2	1023	1.2	1.056	53.2	LOS F	82.5	2081.6	1.00	2.13	2.72	18.4
12	R2	All MCs	184	1.0	184	1.0	1.056	53.2	LOS F	82.5	2081.6	1.00	2.13	2.72	18.4
Approach			1243	1.1	1243	1.1	1.056	53.2	LOS F	82.5	2081.6	1.00	2.13	2.72	18.4
South: 48th Street West															
3	L2	All MCs	47	15.4	47	15.4	0.500	23.3	LOS C	2.3	59.9	0.79	0.87	1.05	25.1
8	T1	All MCs	16	0.0	16	0.0	0.500	16.9	LOS C	2.3	59.9	0.79	0.87	1.05	22.6
18	R2	All MCs	162	0.0	162	0.0	0.500	16.9	LOS C	2.3	59.9	0.79	0.87	1.05	25.5
Approach			225	3.2	225	3.2	0.500	18.1	LOS C	2.3	59.9	0.79	0.87	1.05	25.2
East: Grand Avenue															
1	L2	All MCs	117	1.5	117	1.5	0.504	8.1	LOS A	3.7	94.5	0.41	0.19	0.41	28.5
6	T1	All MCs	422	3.8	422	3.8	0.504	8.3	LOS A	3.7	94.5	0.41	0.19	0.41	28.9
16	R2	All MCs	67	0.0	67	0.0	0.504	8.0	LOS A	3.7	94.5	0.41	0.19	0.41	25.1
Approach			607	2.9	607	2.9	0.504	8.2	LOS A	3.7	94.5	0.41	0.19	0.41	28.3
All Vehicles			2101	1.9	2101	1.9	1.056	35.9	LOS E	82.5	2081.6	0.80	1.41	1.85	21.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [101 (12)] Grand Ave & 48th St PM Improved 1LN (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	5	0.0	5	0.0	0.024	10.4	LOS B	0.1	2.1	0.75	0.74	0.75	24.0
4	T1	All MCs	2	0.0	2	0.0	0.024	10.4	LOS B	0.1	2.1	0.75	0.74	0.75	24.3
14	R2	All MCs	1	0.0	1	0.0	0.024	10.4	LOS B	0.1	2.1	0.75	0.74	0.75	24.1
Approach			9	0.0	9	0.0	0.024	10.4	LOS B	0.1	2.1	0.75	0.74	0.75	24.1
West: Grand Avenue															
5	L2	All MCs	1	0.0	1	0.0	0.561	9.8	LOS A	4.2	104.9	0.59	0.34	0.59	24.7
2	T1	All MCs	525	0.7	525	0.7	0.561	9.9	LOS A	4.2	104.9	0.59	0.34	0.59	28.6
12	R2	All MCs	100	0.0	100	0.0	0.561	9.8	LOS A	4.2	104.9	0.59	0.34	0.59	28.5
Approach			626	0.6	626	0.6	0.561	9.9	LOS A	4.2	104.9	0.59	0.34	0.59	28.6
South: 48th Street West															
3	L2	All MCs	151	1.2	151	1.2	0.326	8.4	LOS A	1.5	38.6	0.63	0.52	0.63	27.8
8	T1	All MCs	1	0.0	1	0.0	0.326	8.2	LOS A	1.5	38.6	0.63	0.52	0.63	24.7
18	R2	All MCs	105	0.0	105	0.0	0.326	8.2	LOS A	1.5	38.6	0.63	0.52	0.63	28.1
Approach			258	0.7	258	0.7	0.326	8.3	LOS A	1.5	38.6	0.63	0.52	0.63	27.9
East: Grand Avenue															
1	L2	All MCs	200	0.0	200	0.0	1.032	47.1	LOS F	74.8	1871.2	1.00	2.04	2.63	19.2
6	T1	All MCs	1007	0.0	1007	0.0	1.032	47.1	LOS F	74.8	1871.2	1.00	2.04	2.63	19.4
16	R2	All MCs	9	0.0	9	0.0	1.032	47.1	LOS F	74.8	1871.2	1.00	2.04	2.63	17.6
Approach			1215	0.0	1215	0.0	1.032	47.1	LOS E	74.8	1871.2	1.00	2.04	2.63	19.3
All Vehicles			2108	0.3	2108	0.3	1.032	31.1	LOS D	74.8	1871.2	0.83	1.35	1.77	22.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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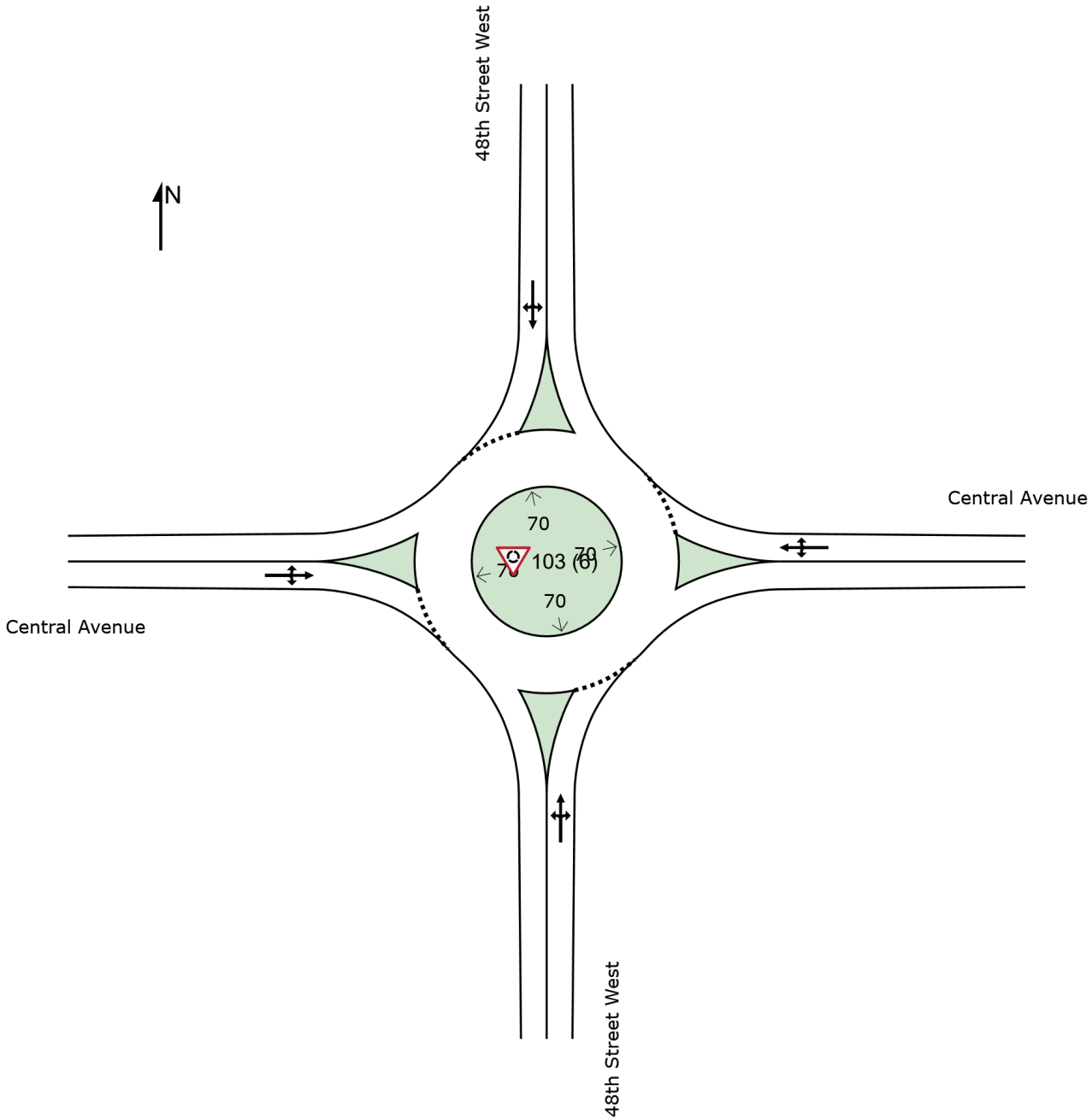
SITE LAYOUT

Site: [103 (6)] Central Ave & 48th St AM Improved (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [103 (6)] Central Ave & 48th St AM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	125	0.0	125	0.0	0.245	5.5	LOS A	1.2	31.0	0.41	0.24	0.41	35.0
4	T1	All MCs	125	0.0	125	0.0	0.245	5.5	LOS A	1.2	31.0	0.41	0.24	0.41	35.6
14	R2	All MCs	22	0.0	22	0.0	0.245	5.5	LOS A	1.2	31.0	0.41	0.24	0.41	35.3
Approach			272	0.0	272	0.0	0.245	5.5	LOS A	1.2	31.0	0.41	0.24	0.41	35.3
West: Central Avenue															
5	L2	All MCs	20	0.0	20	0.0	0.428	8.0	LOS A	2.5	63.6	0.56	0.36	0.56	34.5
2	T1	All MCs	357	0.5	357	0.5	0.428	8.1	LOS A	2.5	63.6	0.56	0.36	0.56	36.2
12	R2	All MCs	66	2.7	66	2.7	0.428	8.3	LOS A	2.5	63.6	0.56	0.36	0.56	35.6
Approach			442	0.8	442	0.8	0.428	8.1	LOS A	2.5	63.6	0.56	0.36	0.56	36.0
South: 48th Street West															
3	L2	All MCs	14	12.5	14	12.5	0.219	8.2	LOS A	0.9	23.8	0.58	0.46	0.58	34.3
8	T1	All MCs	70	5.1	70	5.1	0.219	7.1	LOS A	0.9	23.8	0.58	0.46	0.58	35.1
18	R2	All MCs	87	2.0	87	2.0	0.219	6.7	LOS A	0.9	23.8	0.58	0.46	0.58	36.3
Approach			171	4.1	171	4.1	0.219	7.0	LOS A	0.9	23.8	0.58	0.46	0.58	35.6
East: Central Avenue															
1	L2	All MCs	25	0.0	25	0.0	0.179	4.3	LOS A	0.8	21.8	0.27	0.12	0.27	37.5
6	T1	All MCs	167	3.2	167	3.2	0.179	4.5	LOS A	0.8	21.8	0.27	0.12	0.27	37.7
16	R2	All MCs	20	18.2	20	18.2	0.179	5.6	LOS A	0.8	21.8	0.27	0.12	0.27	34.1
Approach			212	4.2	212	4.2	0.179	4.5	LOS A	0.8	21.8	0.27	0.12	0.27	37.3
All Vehicles			1097	1.8	1097	1.8	0.428	6.6	LOS A	2.5	63.6	0.47	0.30	0.47	36.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [103 (7)] Central Ave & 48th St PM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	64	0.0	64	0.0	0.282	7.9	LOS A	1.3	31.8	0.63	0.53	0.63	34.0
4	T1	All MCs	130	1.4	130	1.4	0.282	8.1	LOS A	1.3	31.8	0.63	0.53	0.63	34.5
14	R2	All MCs	17	0.0	17	0.0	0.282	7.9	LOS A	1.3	31.8	0.63	0.53	0.63	34.4
Approach			212	0.9	212	0.9	0.282	8.0	LOS A	1.3	31.8	0.63	0.53	0.63	34.3
West: Central Avenue															
5	L2	All MCs	27	0.0	27	0.0	0.302	6.1	LOS A	1.5	39.6	0.47	0.29	0.47	35.4
2	T1	All MCs	253	2.8	253	2.8	0.302	6.4	LOS A	1.5	39.6	0.47	0.29	0.47	36.8
12	R2	All MCs	34	5.3	34	5.3	0.302	6.7	LOS A	1.5	39.6	0.47	0.29	0.47	36.0
Approach			314	2.8	314	2.8	0.302	6.4	LOS A	1.5	39.6	0.47	0.29	0.47	36.6
South: 48th Street West															
3	L2	All MCs	82	0.0	82	0.0	0.284	6.6	LOS A	1.4	35.2	0.53	0.38	0.53	35.8
8	T1	All MCs	150	0.0	150	0.0	0.284	6.6	LOS A	1.4	35.2	0.53	0.38	0.53	35.5
18	R2	All MCs	42	0.0	42	0.0	0.284	6.6	LOS A	1.4	35.2	0.53	0.38	0.53	36.2
Approach			274	0.0	274	0.0	0.284	6.6	LOS A	1.4	35.2	0.53	0.38	0.53	35.7
East: Central Avenue															
1	L2	All MCs	50	0.0	50	0.0	0.566	10.4	LOS B	4.9	122.8	0.65	0.45	0.75	34.2
6	T1	All MCs	449	0.4	449	0.4	0.566	10.4	LOS B	4.9	122.8	0.65	0.45	0.75	34.8
16	R2	All MCs	95	3.8	95	3.8	0.566	10.8	LOS B	4.9	122.8	0.65	0.45	0.75	33.1
Approach			593	0.9	593	0.9	0.566	10.5	LOS B	4.9	122.8	0.65	0.45	0.75	34.5
All Vehicles			1393	1.2	1393	1.2	0.566	8.4	LOS A	4.9	122.8	0.58	0.41	0.62	35.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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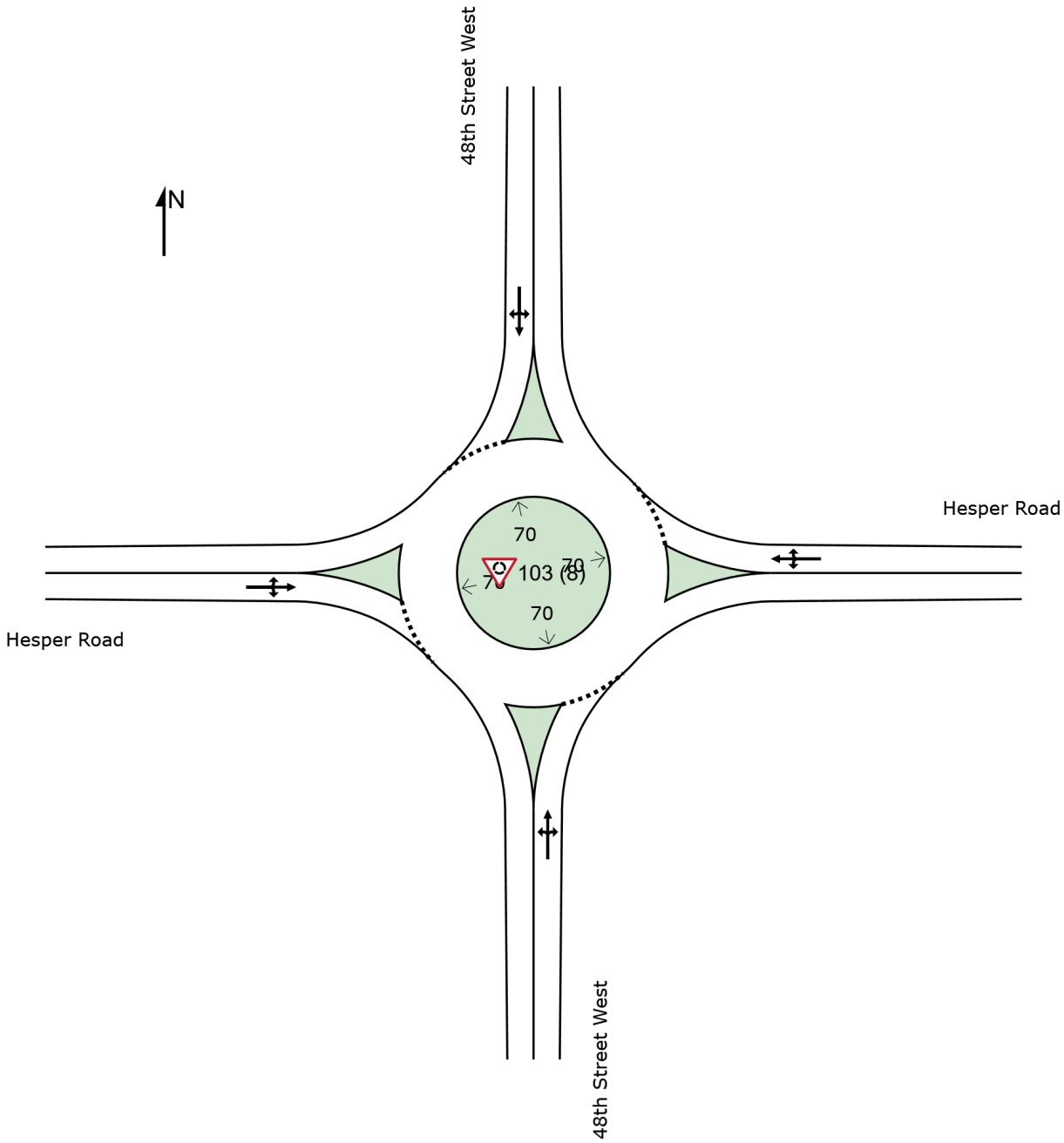
SITE LAYOUT

Site: [103 (8)] Hesper Rd & 48th St AM Improved (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [103 (8)] Hesper Rd & 48th St AM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	116	1.5	116	1.5	0.170	4.6	LOS A	0.8	20.0	0.36	0.20	0.36	35.8
4	T1	All MCs	50	3.6	50	3.6	0.170	4.8	LOS A	0.8	20.0	0.36	0.20	0.36	36.2
14	R2	All MCs	22	8.3	22	8.3	0.170	5.2	LOS A	0.8	20.0	0.36	0.20	0.36	35.2
Approach			188	2.8	188	2.8	0.170	4.7	LOS A	0.8	20.0	0.36	0.20	0.36	35.9
West: Hesper Road															
5	L2	All MCs	30	5.9	30	5.9	0.431	7.9	LOS A	2.6	67.3	0.48	0.27	0.48	34.8
2	T1	All MCs	426	5.4	426	5.4	0.431	7.9	LOS A	2.6	67.3	0.48	0.27	0.48	35.6
12	R2	All MCs	9	0.0	9	0.0	0.431	7.4	LOS A	2.6	67.3	0.48	0.27	0.48	36.0
Approach			465	5.3	465	5.3	0.431	7.9	LOS A	2.6	67.3	0.48	0.27	0.48	35.6
South: 48th Street West															
3	L2	All MCs	9	20.0	9	20.0	0.120	9.0	LOS A	0.4	11.7	0.58	0.49	0.58	33.4
8	T1	All MCs	50	3.6	50	3.6	0.120	6.2	LOS A	0.4	11.7	0.58	0.49	0.58	36.5
18	R2	All MCs	23	7.7	23	7.7	0.120	6.8	LOS A	0.4	11.7	0.58	0.49	0.58	35.6
Approach			82	6.5	82	6.5	0.120	6.6	LOS A	0.4	11.7	0.58	0.49	0.58	35.9
East: Hesper Road															
1	L2	All MCs	14	0.0	14	0.0	0.166	4.0	LOS A	0.7	20.0	0.25	0.11	0.25	37.6
6	T1	All MCs	148	9.6	148	9.6	0.166	4.6	LOS A	0.7	20.0	0.25	0.11	0.25	37.0
16	R2	All MCs	30	5.9	30	5.9	0.166	4.3	LOS A	0.7	20.0	0.25	0.11	0.25	37.1
Approach			192	8.3	192	8.3	0.166	4.5	LOS A	0.7	20.0	0.25	0.11	0.25	37.0
All Vehicles			927	5.5	927	5.5	0.431	6.4	LOS A	2.6	67.3	0.41	0.24	0.41	35.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [103 (9)] Hesper Rd & 48th St PM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: 48th Street West															
7	L2	All MCs	34	5.3	34	5.3	0.131	6.7	LOS A	0.5	13.4	0.57	0.48	0.57	35.2
4	T1	All MCs	48	0.0	48	0.0	0.131	5.9	LOS A	0.5	13.4	0.57	0.48	0.57	36.7
14	R2	All MCs	16	0.0	16	0.0	0.131	5.9	LOS A	0.5	13.4	0.57	0.48	0.57	36.4
Approach			98	1.8	98	1.8	0.131	6.2	LOS A	0.5	13.4	0.57	0.48	0.57	36.1
West: Hesper Road															
5	L2	All MCs	14	12.5	14	12.5	0.249	6.0	LOS A	1.3	32.7	0.32	0.16	0.32	35.2
2	T1	All MCs	278	1.9	278	1.9	0.249	5.2	LOS A	1.3	32.7	0.32	0.16	0.32	37.7
12	R2	All MCs	2	0.0	2	0.0	0.249	5.1	LOS A	1.3	32.7	0.32	0.16	0.32	37.7
Approach			295	2.4	295	2.4	0.249	5.2	LOS A	1.3	32.7	0.32	0.16	0.32	37.6
South: 48th Street West															
3	L2	All MCs	3	0.0	3	0.0	0.112	4.7	LOS A	0.5	12.1	0.45	0.31	0.45	37.7
8	T1	All MCs	73	0.0	73	0.0	0.112	4.7	LOS A	0.5	12.1	0.45	0.31	0.45	38.5
18	R2	All MCs	34	0.0	34	0.0	0.112	4.7	LOS A	0.5	12.1	0.45	0.31	0.45	38.1
Approach			110	0.0	110	0.0	0.112	4.7	LOS A	0.5	12.1	0.45	0.31	0.45	38.3
East: Hesper Road															
1	L2	All MCs	45	0.0	45	0.0	0.513	8.1	LOS A	4.0	99.7	0.39	0.17	0.39	35.5
6	T1	All MCs	522	0.7	522	0.7	0.513	8.1	LOS A	4.0	99.7	0.39	0.17	0.39	36.1
16	R2	All MCs	75	0.0	75	0.0	0.513	8.1	LOS A	4.0	99.7	0.39	0.17	0.39	35.9
Approach			641	0.6	641	0.6	0.513	8.1	LOS A	4.0	99.7	0.39	0.17	0.39	36.0
All Vehicles			1143	1.1	1143	1.1	0.513	6.9	LOS A	4.0	99.7	0.40	0.21	0.40	36.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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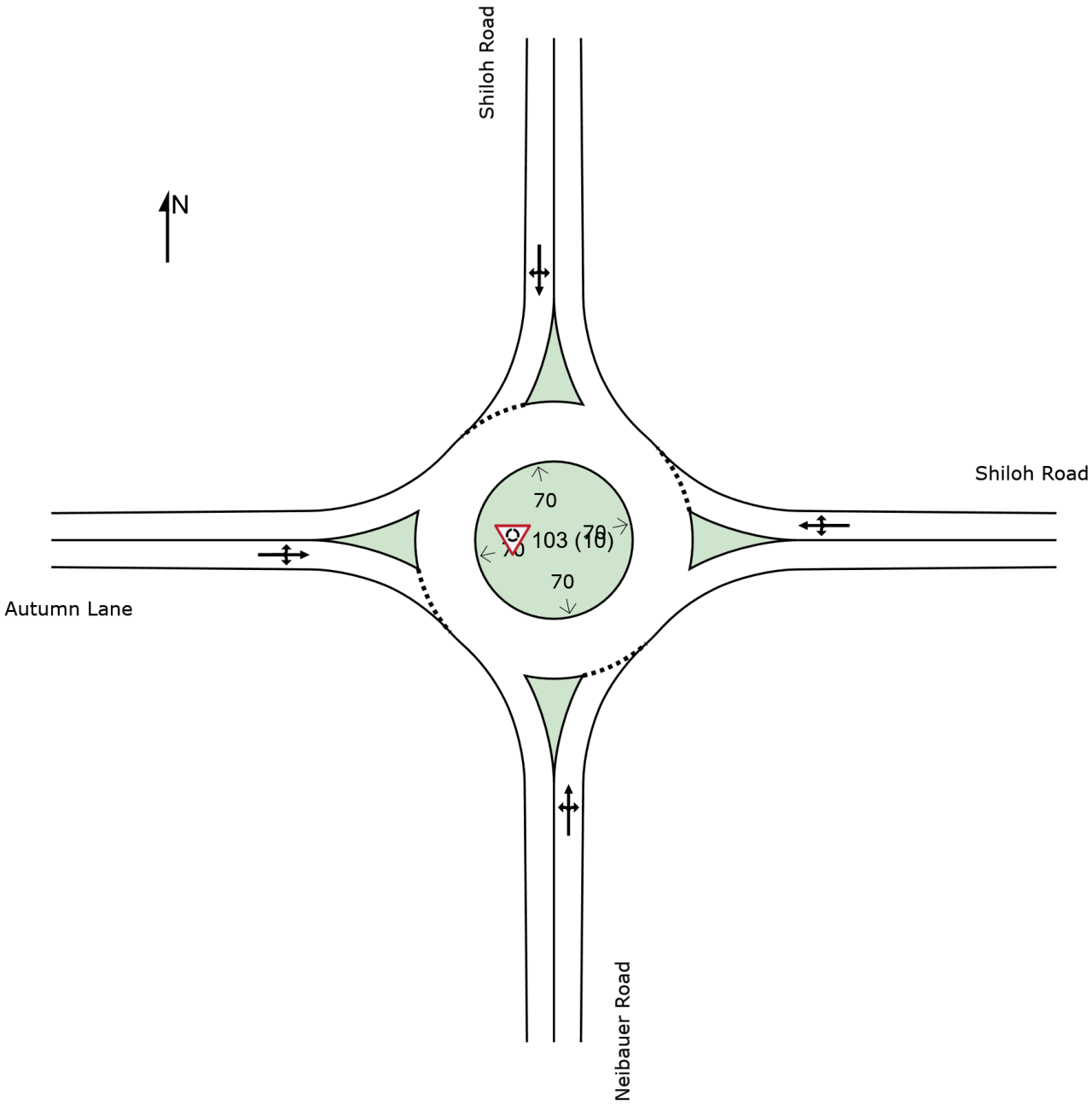
SITE LAYOUT

Site: [103 (10)] Neibauer Rd & Shiloh Rd AM Improved (Future (2044) w/ Improvements)

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: [103 (10)] Neibauer Rd & Shiloh Rd AM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: Shiloh Road															
7	L2	All MCs	142	2.5	142	2.5	0.303	5.6	LOS A	1.5	41.4	0.36	0.18	0.36	33.3
4	T1	All MCs	187	15.0	187	15.0	0.303	6.6	LOS A	1.5	41.4	0.36	0.18	0.36	32.4
14	R2	All MCs	1	0.0	1	0.0	0.303	5.4	LOS A	1.5	41.4	0.36	0.18	0.36	34.0
Approach			330	9.6	330	9.6	0.303	6.2	LOS A	1.5	41.4	0.36	0.18	0.36	32.8
West: Autumn Lane															
5	L2	All MCs	1	0.0	1	0.0	0.004	4.4	LOS A	0.0	0.4	0.50	0.31	0.50	34.9
2	T1	All MCs	1	0.0	1	0.0	0.004	4.4	LOS A	0.0	0.4	0.50	0.31	0.50	35.6
12	R2	All MCs	1	0.0	1	0.0	0.004	4.4	LOS A	0.0	0.4	0.50	0.31	0.50	35.3
Approach			3	0.0	3	0.0	0.004	4.4	LOS A	0.0	0.4	0.50	0.31	0.50	35.3
South: Neibauer Road															
3	L2	All MCs	1	0.0	1	0.0	0.485	7.9	LOS A	3.1	83.7	0.47	0.24	0.47	33.5
8	T1	All MCs	374	10.0	374	10.0	0.485	8.8	LOS A	3.1	83.7	0.47	0.24	0.47	32.8
18	R2	All MCs	153	4.7	153	4.7	0.485	8.3	LOS A	3.1	83.7	0.47	0.24	0.47	33.2
Approach			528	8.4	528	8.4	0.485	8.6	LOS A	3.1	83.7	0.47	0.24	0.47	33.0
East: Shiloh Road															
1	L2	All MCs	120	13.4	120	13.4	0.457	11.2	LOS B	2.8	73.8	0.66	0.54	0.78	30.5
6	T1	All MCs	1	0.0	1	0.0	0.457	9.3	LOS A	2.8	73.8	0.66	0.54	0.78	32.8
16	R2	All MCs	268	0.7	268	0.7	0.457	9.4	LOS A	2.8	73.8	0.66	0.54	0.78	32.5
Approach			389	4.6	389	4.6	0.457	9.9	LOS A	2.8	73.8	0.66	0.54	0.78	31.9
All Vehicles			1251	7.5	1251	7.5	0.485	8.4	LOS A	3.1	83.7	0.50	0.32	0.54	32.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
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Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [103 (11)] Neibauer Rd & Shiloh Rd PM Improved (Future (2044) w/ Improvements)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

New Site
Site Category: (None)
Roundabout
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed mph
North: Shiloh Road															
7	L2	All MCs	260	0.0	260	0.0	0.513	8.2	LOS A	3.9	97.9	0.43	0.20	0.43	32.7
4	T1	All MCs	371	0.5	371	0.5	0.513	8.3	LOS A	3.9	97.9	0.43	0.20	0.43	33.3
14	R2	All MCs	1	0.0	1	0.0	0.513	8.2	LOS A	3.9	97.9	0.43	0.20	0.43	33.1
Approach			632	0.3	632	0.3	0.513	8.3	LOS A	3.9	97.9	0.43	0.20	0.43	33.0
West: Autumn Lane															
5	L2	All MCs	1	0.0	1	0.0	0.005	5.6	LOS A	0.0	0.5	0.58	0.42	0.58	34.2
2	T1	All MCs	1	0.0	1	0.0	0.005	5.6	LOS A	0.0	0.5	0.58	0.42	0.58	34.9
12	R2	All MCs	1	0.0	1	0.0	0.005	5.6	LOS A	0.0	0.5	0.58	0.42	0.58	34.6
Approach			3	0.0	3	0.0	0.005	5.6	LOS A	0.0	0.5	0.58	0.42	0.58	34.6
South: Neibauer Road															
3	L2	All MCs	1	0.0	1	0.0	0.313	6.3	LOS A	1.6	41.0	0.48	0.31	0.48	34.5
8	T1	All MCs	229	5.4	229	5.4	0.313	6.8	LOS A	1.6	41.0	0.48	0.31	0.48	34.4
18	R2	All MCs	86	0.0	86	0.0	0.313	6.3	LOS A	1.6	41.0	0.48	0.31	0.48	34.8
Approach			316	3.9	316	3.9	0.313	6.7	LOS A	1.6	41.0	0.48	0.31	0.48	34.5
East: Shiloh Road															
1	L2	All MCs	105	1.7	105	1.7	0.727	15.0	LOS C	12.5	316.9	0.82	0.71	1.26	30.1
6	T1	All MCs	1	0.0	1	0.0	0.727	14.8	LOS B	12.5	316.9	0.82	0.71	1.26	30.8
16	R2	All MCs	661	1.6	661	1.6	0.727	15.0	LOS C	12.5	316.9	0.82	0.71	1.26	30.4
Approach			767	1.6	767	1.6	0.727	15.0	LOS C	12.5	316.9	0.82	0.71	1.26	30.4
All Vehicles			1718	1.5	1718	1.5	0.727	11.0	LOS B	12.5	316.9	0.61	0.44	0.81	32.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c >1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Planning Board

Date:	06/09/2026
Title:	Yellowstone Club Estates, 8th Filing - Preliminary Plat discussion
Presented by:	Hunter Kelly, Planner 1
Department:	Planning & Community Services
Presentation:	Yes

Information

RECOMMENDATION

Staff proposes the Planning Board recommend to City Council that the preliminary plat of Yellowstone Club Estates, 8th Filing be conditionally approved, the variances accepted, and the Findings of Fact adopted as presented in the staff report.

BACKGROUND (Consistency with Adopted Plans and Policies, if applicable)

On May 1, 2026, Performance Engineering, on behalf of 22500 NOL, LLC (DBA Yellowstone Country Club), applied for preliminary subsequent major plat approval for Yellowstone Club Estates, 8th Filing. The proposed subdivision creates nine (9) lots for development. The subject property is generally located near Tommy Armour Circle & Ben Hogan Lane. The property is zoned N3 – Suburban Neighborhood Residential for Lots 2-8 within the city, and P1- Parks and Open Space for Lots 1 and 9 within the county. The land is currently vacant land.

This subdivision is a dual-jurisdiction application. Lots 2-8 have been annexed into the City of Billings via a previous application, and Lots 1 and 9 will remain in Yellowstone County. The property also has an existing agricultural covenant. The agricultural covenant will be modified to remove Lots 2-8 which are within the City of Billings and will contain only Lots 1 and 9.

VARIANCES

One (1) variance has been requested. The applicant is requesting a variance from Section 23-406.C.1 of the City of Billings Subdivision regulations, and Section 4.6.D of the Yellowstone County Subdivision Regulations, which requires new subdivisions to comply with the currently adopted Active Transportation Plan. The plan currently depicts a multi-use trail in the vicinity of Lots 2 and 3 of the proposed subdivision. That specific area of land contains topographic constraints, including slopes approaching 50% and elevation differences ranging from approximately 18 to 22 feet. Staff is recommending approval of the variance, based on the following criteria:

1. The granting of the variance will not be detrimental to the public health, safety, or general welfare or injurious to other adjoining properties.
    - The proposed trail on the Active Transportation Plan does not have a significant or developed connection adjacent to the subject property. This variance does not remove the requirement for a trail connection altogether, but would simply delay the connection and adjust the location of the connection for future development.
2. Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, an undue hardship to the owner would result if the strict letter of the regulation was enforced.
    - The area designated for a trail connection as-written contains changes in grade approaching 50%, with sudden elevation changes ranging from 18 to 22 feet high. Current road and trail development standards limit grades for a given road to approximately 12%. (See grading map on the applicant's request letter)
3. The variance will not result in an increase in taxpayer burden.
    - Since this variance would delay the construction and future maintenance of a trail network, it will not increase taxpayer burden.
4. The variance will not in any manner place the subdivision in non-conformance with any adopted zoning regulations or Growth Policy.
    - The delay of the connection to the trail network would not place this subdivision in conflict with the 2016 Growth Policy.
5. The subdivider must prove that the alternative design is equally effective, and the objectives of the improvements are satisfied.
    - The SIA included provisions that ensure the trail network will be constructed as part of future development on Lot 1 or Lot 9.

PROPOSED CONDITIONS OF APPROVAL

1. To minimize the effects on local service prior to final plat approval, the applicant will coordinate with the USPS to determine what type of delivery system is preferred and to locate and provide the correct amount of space for safely

delivering the mail to the residents.
2. To minimize the effects on the natural environment, a weed management plan shall be completed on Lots 1 and 9.
3. Minor changes may be made in the SIA and final documents, as requested by the Planning, Legal or Public Works Departments to clarify the documents and bring them into the standard acceptable format.
4. The final plat shall comply with all requirements of the City of Billings Subdivision Regulations, rules, regulations, policies, and resolutions of the City of Billings, and the laws and Administrative Rules of the State of Montana.

PROCEDURAL HISTORY

Pre-Application Meeting: April 2, 2026
Preliminary Plat application submitted to Planning Division: May 1, 2026
Departmental Review Meeting: May 15, 2026
Preliminary Plat Resubmittal: May 22, 2026
Planning Board Plat Review: June 9, 2026
Planning Board Public Hearing: June 23, 2026
Preliminary Plat to Board of County Commissioners: July 21, 2026
Preliminary Plat to City Council: July 27, 2026
60 Working-Day Preliminary Plat Review period ends: July 28, 2026

PLAT INFORMATION

General Location: near Tommy Armour Circle & Ben Hogan Lane
Legal Description: Agricultural Tract 11-A-2 of the amended Tract 11-A of the Remainder of Tract 11 of Certificate Of Survey No. 836 located in the N1/2 of Section 30, Township 01 North, Range 25 East, P.M.M., Yellowstone County, Montana
Owner/Subdivider: 22500 NOL, LLC (DBA Yellowstone Country Club)
Engineer/Surveyor: Performance Engineering
Existing Zoning: N3 – Suburban Neighborhood Residential and P1- Parks and Open Space
Existing Land Use: Vacant Land
Proposed Zoning: N3 – Suburban Neighborhood Residential and P1- Parks and Open Space
Proposed Land Use: Residential
Gross & Net Area: 84.04 Acres
Lot Size:
    Minimum: 0.48 Acres
    Maximum: 47.38 Acres
Parkland Requirements: 0.55 Acres, provided through Cash-in-lieu contribution

This subdivision is not subject to the Billings 2045 Land Use Plan and Future Land Use Map as it was submitted prior to adoption or effective dates of the new land use regulations. Incidentally, this request matches the Future Land Use Map designations for this area as Urban Residential Limited. Applications that will be subject to the new regulations, Plan and Map will be processed after July 1, 2026.

STAKEHOLDERS

There are no stakeholder responses at this time. Stakeholder input will be received at a public hearing scheduled for this subdivision on June 23, 2026.

ALTERNATIVES

In accordance with state law, the City Council has 60 working days to act upon this major preliminary plat. The 60 working day review period for the proposed plat ends July 28, 2026. State and City subdivision regulations also require that preliminary plat be reviewed using specific criteria, as stated within this report. The City may not unreasonably restrict an owner's ability to develop land if the subdivider provides evidence that any identified adverse effects can be mitigated. Within the 60 working day review period, the City Council is required to:

1. Approve;
2. Conditionally Approve; or
3. Deny the Preliminary Plat

FISCAL EFFECTS

The preliminary plat of this subdivision will have no financial impact on the Planning Division.

SUMMARY

One of the purposes of the City's and County's subdivision review process is to identify potential negative effects of property being subdivided. Negative effects that are identified become the subdivider's responsibility to mitigate. Various

City and County departments, private service/utility providers and the affected school district/s, have reviewed this application and provided input on effects and mitigation. The Findings of Fact, which are presented as an attachment, discuss potential negative impacts of the subdivision and conditions of approval are recommended as measures to further mitigate any impacts. In this case, there were found to be minimal impacts from this proposed subdivision.

Attachments

Preliminary Plat
Draft Subdivision Improvement Agreement
Findings of Fact
Variance Request Letter
Agricultural Covenant

SITE DATA	
GROSS AREA	84.04 AC
MAX. LOT AREA	47.38 AC
MIN. LOT AREA	0.48 AC
NO. OF LOTS	9
EXISTING ZONING	P1
PROPOSED ZONING	P1, N3
EXISTING LAND USE	VACANT
PROPOSED LAND USE	VACANT W/ RESIDENTIAL
PARKLAND DEDICATION REQ'D.	0.55 AC
PARKLAND PROVIDED	CASH IN LIEU
WATER / SEWER PROVIDER	CITY OF BILLINGS
FIRE SERVICE AREA	CITY OF BILLINGS/BUFSA

PRELIMINARY PLAT OF

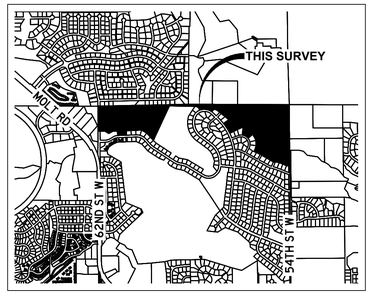
YELLOWSTONE CLUB ESTATES, 8TH FILING

BEING AGRICULTURAL TRACT 11-A-2 OF THE AMENDED TRACT 11-A OF THE REMAINDER OF TRACT 11 OF CERTIFICATE OF SURVEY NO. 836 LOCATED IN THE N1/2 OF SECTION 30, TOWNSHIP 01 NORTH, RANGE 25 EAST, P.M.M., YELLOWSTONE COUNTY, MONTANA

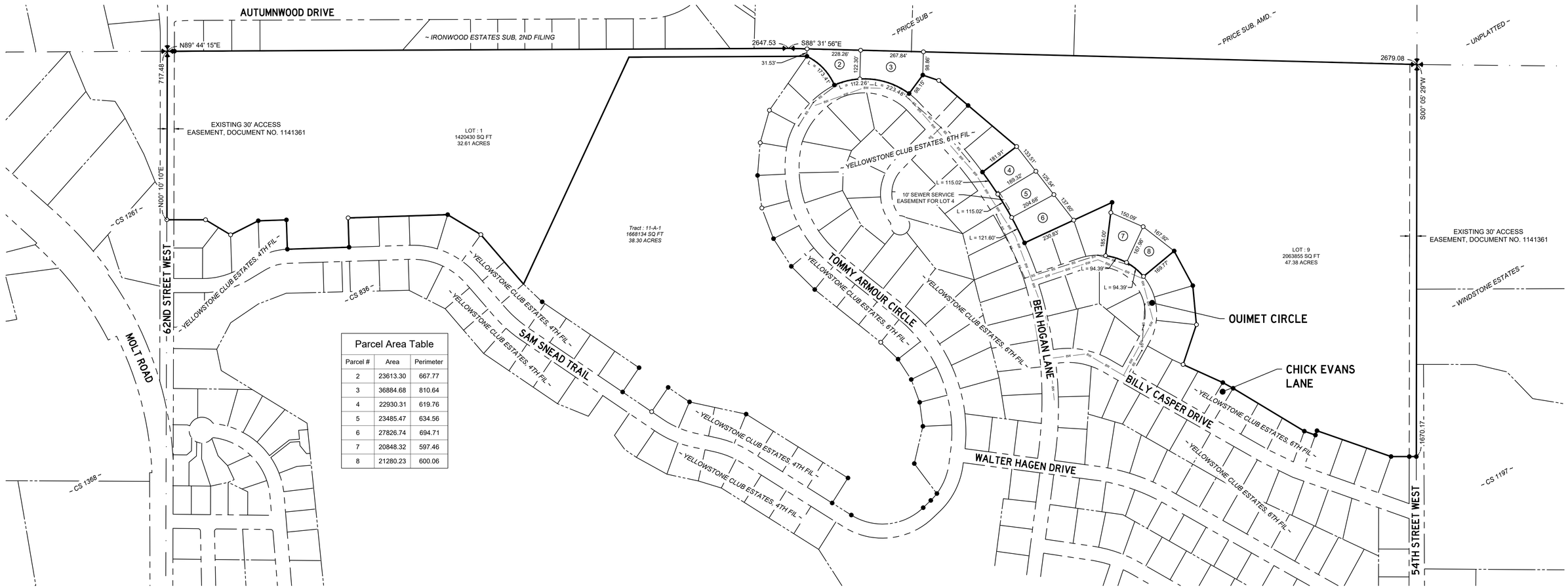
PREPARED FOR : 22500 NOL, LLC

PREPARED BY : PERFORMANCE ENGINEERING, LLC

TOTAL AREA OF SUBDIVISION : ± 84.04 ACRES



VICINITY MAP
NOT TO SCALE



Parcel Area Table		
Parcel #	Area	Perimeter
2	23613.30	667.77
3	36884.68	810.64
4	22930.31	619.76
5	23485.47	634.56
6	27826.74	694.71
7	20848.32	597.46
8	21280.23	600.06

LEGEND

- PROPERTY CORNER, FOUND
- PROPERTY CORNER, SET
- SECTION CORNER, FOUND
- QUARTER CORNER, FOUND
- SURVEY BOUNDARY
- PROPOSED PROPERTY LINE
- EXISTING PROPERTY LINE
- SECTION LINE
- RIGHT-OF-WAY LINE

0 200 400
IN FEET

SHEET 1 OF 1

5/7/2025 10:38:44 AM

Z:\Yellowstone Country Club\2025-002 YCC Due Diligence\CAD\DWG\Plats\25-002 Prelim Plat.dwg

SUBDIVISION IMPROVEMENTS AGREEMENT
& WAIVER OF RIGHT TO PROTEST FURTURE SPECIAL IMPROVEMENT DISTRICTS

Yellowstone Club Estates, 8th Filing

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SUBDIVISION IMPROVEMENTS AGREEMENT & WAIVER OF RIGHT TO PROTEST FUTURE SPECIAL IMPROVEMENT DISTRICTS

Yellowstone Club Estates, 8th Filing

This agreement is made and entered into this ____ day of _____, 200__, by and between *22500 NOL, LLC,* whose address for the purpose of this agreement is **3200 Paul Allen Way, Billings, MT 59106**, hereinafter referred to as "Subdivider," and the **CITY OF BILLINGS**, Billings, Montana, hereinafter referred to as "City", and **YELLOWSTONE COUNTY**, Montana, hereinafter referred to as "County."

WITNESSETH:

WHEREAS, the plat of *Yellowstone Club Estates, 8th Filing* located in Yellowstone County, Montana, was submitted to the Yellowstone County Board of Planning; and

WHEREAS, at a regular meeting conducted on _____ day of _____, 20__, the Board of Planning recommended conditional approval of a preliminary plat of *Yellowstone Club Estates, 8th Filing* and

WHEREAS, at a regular meeting conducted on _____ day of _____, 20__, the City Council conditionally approved a preliminary plat of *Yellowstone Club Estates, 8th Filing* and

WHEREAS, at a regular meeting conducted on _____ day of _____, 20__, the Yellowstone County Board of County Commissioners conditionally approved a preliminary plat of *Yellowstone Club Estates, 8th Filing*; and

WHEREAS, a Subdivision Improvements Agreement is required by the City and County prior to the approval of the final plat.

WHEREAS, the provisions of this agreement shall be effective and applicable to *Yellowstone Club Estates, 8th Filing* upon the filing of the final plat thereof in the office of the Clerk and Recorder of Yellowstone County, Montana. The Subdivision shall comply with all requirements of the City of Billings Subdivision Regulations, the rules, regulations, policies, and resolutions of the City of Billings, and the laws and administrative rules of the State of Montana.

THEREFORE, THE PARTIES TO THIS AGREEMENT, for and in consideration of the mutual promises herein contained and for other good and valuable consideration, do hereby agree as follows:

I. VARIANCES

A. A variance has been requested and approved from Section 23-406.C.1 of the City of Billings Subdivision regulations requiring provision of a multi-use trail connection as depicted on the Active Transportation Plan of the City. Such trail connection is impractical as shown on the Active Transportation Plan due to existing topography in the depicted location consisting of roughly 50% grades and elevation differences of roughly 18 to 22 feet. A condition of the approved variance is provision of a trail connection upon Agricultural Tract 1 in the future when development of said tract is applied for.

II. PROPERTY CONDITIONS AND INFORMATION FOR LOT PURCHASERS

A. Lot owners should be aware that this subdivision is being built in close proximity to prime deer and antelope habitat and it is likely that homeowners will experience problems with damage to landscaped shrubs, flowers, and gardens. The Montana Fish, Wildlife, and Parks Department does not provide damage assistance unless there is damage to commercial crops and/or a threat to public health and safety.

B. Lot owners should be aware that soil characteristics within the area of this subdivision, as described in the 1972 Yellowstone County Soil Survey, indicate that there could be potential limitations for proposed construction on the lots, which may require a geotechnical survey prior to construction.

C. No water rights have been transferred to the lot owners. Irrigation ditches that may exist on the perimeter of this development are for the benefit of other properties. Perimeter ditches and drains shall remain in place and shall not be altered by the Subdivider or subsequent owners.

D. There is attached hereto a Waiver waiving the right to protest the creation of the special improvement district or districts which by this reference is expressly incorporated herein and made as much a part hereof as though fully and completely set forth herein at this point. The Waiver will be filed with the plat, shall run with the land, and shall constitute the guarantee by the Subdivider and property owner or owners of the developments described herein. Said Waiver is effective upon filing and is not conditioned on the completion of the conditions set forth in this Agreement. The Subdivider and owner specifically agree that they are waiving valuable rights and do so voluntarily.

E. The subdivider and subsequent contractors/builders acknowledge that there is a Stormwater Pollution and Prevention Plan (SWPPP) filed with the city and the Montana Department of Environmental Quality (MDEQ). This SWPPP shall be adhered to during all phases of construction and shall be updated as required by

MDEQ under the General Permit for Stormwater Discharges Associated with Construction Activity, Chapter 28, BMCC and the Billings Stormwater Management Manual.

F. Individual lot owners should be aware that Best Management Practices for stormwater control shall be required for new construction on lots. Best Management Practices are defined within Section 28-201, BMCC and detailed in the Billings Stormwater Management Manual.

III. TRANSPORTATION

A. Streets

- All public roadways adjacent to Lots 2-8 in the Subdivision, inclusive, have been completed as part of previous projects including Ben Hogan Lane/Tommy Armour Circle and Ouimet Circle.

- 30'-wide access easements have been provided upon Lot 1 and Lot 9 along 62nd Street West/Bushwood Drive and 54th Street West, respectively. As Lot 1 and Lot 9 are larger than 20 acres and are being left as agricultural tracts, further right-of-way dedication would be provided at the time of future development on those parcels.

- Lot owners will be required to construct their driveways and obtain an approach permit from the City prior to construction.

B. Sidewalks

- Sidewalks do not currently exist within Yellowstone Club Estates, 4th and 6th Filing, along Sam Snead Trail, Ben Hogan Lane, and Billy Casper Drive. Construction of sidewalks by individual lot owners will not be required at the time of development.

- No sidewalks within the public right-of-way are proposed for the development; however, sidewalks are included in the waiver of right to protest.

C. Street Lighting

- No street lighting is proposed for the development; however, street lighting is included in the waiver of right to protest.

D. Traffic Control Devices

- No additional traffic control devices are proposed for the development; however, traffic control devices are included in the waiver of right to protest.

- A TIS is not required for the development as it falls below the threshold set forth by the City.

- Traffic control devices within and adjacent to the Yellowstone Club Estates Subdivision, including along Sam Snead Trail, Ben Hogan Lane, and Billy Casper Drive, have been previously installed in accordance with applicable City of Billings standards. No new traffic control devices, including street name signs, regulatory signs, or warning signs, are required or proposed.

- The existing traffic control devices are considered adequate to serve the proposed development. Any repair or replacement of existing signs or devices necessitated by construction activities shall be the responsibility of the developer and shall be completed in accordance with City of Billings specifications.

E. Access

- The development will be accessed via the existing public right-of-way.

- Lot owners will be required to construct their driveways and obtain an approach permit from the City prior to construction.

- Access to all lots will be provided by existing public streets, including Sam Snead Trail, Ben Hogan Lane, Ouimet Circle, and Chick Evans Lane. These right-of-ways are currently constructed and in service, and no new access points, street connections, or extensions are proposed as part of this development. The existing street network provides adequate access to each lot, and no additional access improvements are required. All access will continue to comply with applicable City of Billings standards.

F. Billings Area Bikeway and Trail Master Plan

- The Billings Area Bikeway and Trail Master Plan identifies a future bicycle boulevard along Ben Hogan Lane, adjacent to the subdivision. As denoted within the variance application associated with this subdivision, at time of future development of Agricultural Tract 1 and/or Tract 11-A-1 of the Amended Plat of Certificate of Survey No. 836, a trail connection from Sam Snead Trail shall be made to the Block 12 Park of Ironwood Estates Subdivision 2nd Filing (Tax Code A316560).

G. Public Transit

- No improvements to public transit service are proposed for this subdivision.

IV. EMERGENCY SERVICE

Construction of buildings made of combustible materials shall have adequate fire apparatus access roads and water supply (fire hydrants) in place to allow for fire suppression requirements. Prior to the issuance of a building permit for construction using combustible materials (i.e. lumber, plywood, wood trusses, etc.), fire apparatus access roads and water supply requirements shall be provided in accordance with the International Fire Code as adopted by the City of Billings.

At a minimum, the following is required:

- An unobstructed gravel road or gravel road base must be within 150 feet of the furthest portion of a building under construction as measured along the approved route.
- The access roads are required to support fire apparatus vehicle loading (40 tons) during all weather conditions and shall be a minimum of twenty (20) feet wide.
- An operational fire hydrant shall be located within 600 feet of the furthest portion of a residence under construction or within 400 feet of the furthest portion of a commercial building under construction as measured along the access roads to the site.
- The above requirements do not alter or effect the current minimum subdivision requirements for fire apparatus access and water supply.

V. STORM DRAINAGE

All drainage improvements shall comply with the provisions set forth in Chapter 28, BMCC, and the Stormwater Management Manual in place at the time of lot development for Lots 2-8, inclusive. A complete stormwater management plan shall be submitted to the Engineering Division for review and approval at the time of development.

No new stormwater drainage facilities are proposed as part of this filing. Any drainage associated with individual lot development shall comply with City of Billings requirements and shall not adversely impact adjacent properties or existing infrastructure.

Any development outside Lots 2-8 (i.e., Lot 1 and Lot 9) shall comply with stormwater management requirements of the Montana Department of Environmental Quality and the Yellowstone County Road Construction Manual.

VI. UTILITIES

The Subdivision Improvements Agreement does not constitute an approval for extension of or connection to water mains and sanitary sewers. The property owner shall make application for extension/connection of water mains and sanitary sewers to the Public Works Department – Engineering Division, if required to serve the subject properties. The extension/connection of/to water mains and sanitary sewers is subject to the approval of the applications and the conditions of approval. Applications shall be submitted for processing prior to the start of any construction and prior to review and approval of any project plans and specifications.

The Developer/Owner acknowledges that the subdivision shall be subject to the applicable System Development Fees in effect at the time new water and/or sanitary sewer service connections are made.

The design/installation of sanitary sewers and appurtenances, and water mains and appurtenances (fire hydrants, etc) shall be in accordance with design standards, specifications, rules, regulations of and as approved by the City of Billings Public Works Department, Fire Department and the Montana Department of Environmental Quality.

A. Water

- Water service for Lots 2-6, inclusive, will be provided by connection to the existing 8-inch public water main located within Ben Hogan Lane. Water service for Lots 7 and 8 will be provided by connection to the existing 6-inch public water main located within Ouimet Circle. No extensions of the public water system are required as part of this development, and individual lots will be served by service connections to the existing water main in accordance with City of Billings standards and specifications. Water service connections shall be of the size and material as approved by the City of Billings at the time of construction.

- Lots 1 and 9 are not annexed into the City of Billings, and no facilities with water supply are allowed without separate application for annexation into the City of Billings.

B. Sanitary Sewer

- Sewer service for Lots 2-6, inclusive, will be provided by connection to the existing 8-inch public sewer main located within Ben Hogan Lane. A sewer service easement shall be provided to allow for provision of sewer service to Lot 4 through Lot 5 from the existing 8-inch public sewer main in Ben Hogan Lane. Sewer service for Lots 7 and 8 will be provided by connection to the existing 8-inch public sewer main located within Ouimet Circle. No extensions of the public sewer system are required as part of this development, and individual lots will be served by service connections to the existing sewer main in accordance with City of Billings standards and specifications.

- Lots 1 and 9 are not annexed into the City of Billings, and no facilities with sewer service are allowed without separate application for annexation into the City of Billings.

C. Power, Telephone, Gas, and Cable Television

- Electric, telephone, natural gas, and cable television service will be provided by connections to existing utility infrastructure within Sam Snead Trail, Ben Hogan Lane, and Ouimet Circle. No new utility mains or lines are proposed as part of this development. Individual lot owners will

connect to the existing services in accordance with the standards and requirements of the respective utility providers.

VII. PARKS/OPEN SPACE

- Section 23-1002 of the City of Billings Subdivision Regulations covers the parkland requirements for subdivisions. The required parkland for this filing is 0.55 acres. In accordance with prior filings in the subdivision, the required parkland will be provided as a cash-in-lieu payment rather than as dedicated land.

VIII. IRRIGATION

No water rights have been transferred to the lot owners. Irrigation ditches that may exist on the perimeter of this development are for the benefit of other properties. Perimeter ditches and drains shall remain in place and shall not be altered by the Subdivider or subsequent owners unless authorization from current and downstream users is provided.

IX. SOILS/GEOTECHNICAL STUDY

A geotechnical study has not been completed as part of this subdivision. It will be required for the developers of the lots to conduct their own, site specific, geotechnical study prior to development of the lots. Lot owners should be aware that soil characteristics within the subdivision, as described in the 1972 Yellowstone County Soil Survey, may present limitations for proposed construction.

X. PHASING OF IMPROVEMENTS

Ther is no phasing of improvements.

XI. FINANCIAL GUARANTEES

Except as otherwise provided, Subdivider shall install and construct said required public improvements with cash or by utilizing the mechanics of a private contract secured by letters of credit or a letter of commitment to lend funds from a commercial lender. All engineering and legal work in connection with such improvements shall be paid by the contracting parties pursuant to said private contract, and the improvements shall be installed as approved by the City Engineer and Utility Department Manager.

XII. LEGAL PROVISIONS APPLYING TO SUBDIVIDER

A. Subdivider agrees to guarantee all public improvements for a period of two years from the date of final acceptance by the City of Billings.

B. The owners of the properties involved in this proposed Subdivision by signature subscribed herein below agree, consent, and shall be bound by the provisions of this Agreement.

C. The covenants, agreements, and all statements in this Agreement run with the land and apply to and shall be binding on the heirs, personal representatives, successors, assigns and transferees of the respective parties.

D. In the event it becomes necessary for either party to this Agreement to retain an attorney to enforce any of the terms or conditions of this Agreement or to give any notice required herein, then the prevailing party or the party giving notice shall be entitled to reasonable attorney fees and costs.

E. Any amendments or modifications of this Agreement or any provisions herein shall be made in writing and executed in the same manner as this original document and shall after execution become a part of this Agreement.

F. Subdivider shall comply with all applicable federal, state, and local statutes, ordinances, and administrative regulations during the performance and discharge of its obligations. Subdivider acknowledges and agrees that nothing contained herein shall relieve or exempt it from such compliance.

IN WITNESS WHEREOF, the parties hereto have set their hands and official seals on the date first above written.

"SUBDIVIDER" *22500 NOL, LLC*

By: _____

Title: _____

STATE OF MONTANA)
: ss
County of)

On this _____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____ _____, known to me to be the _____ of *22500 NOL, LLC,* who executed the foregoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

This agreement is hereby approved and accepted by the City of Billings, this ____ day of _____, 20__.

"CITY"
CITY OF BILLINGS
MONTANA

By: _____
Mayor

Attest: _____
City Clerk

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____ and _____, known to me to be the Mayor and City Clerk, respectively, of the City of Billings, Montana, whose names are subscribed to the foregoing instrument in such capacity and acknowledged to me that they executed the same on behalf of the City of Billings, Montana.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

This agreement is hereby approved and accepted by Yellowstone County, this ____ day of _____, 20__.

"COUNTY"
COUNTY OF YELLOWSTONE
MONTANA

County of Yellowstone
Board of County Commissioners

By: _____
Chairman

_____
Commissioner

_____
Commissioner

Attest: _____
County Clerk and Recorder

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____, _____, and _____, known to me to be the Board of County Commissioners and the County Clerk and Recorder, respectively, of Yellowstone County, Montana, whose names are subscribed to the foregoing instrument in such capacity and acknowledged to me that they executed the same on behalf of Yellowstone County, Montana.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

Waiver of Right to Protest
FUTURE SPECIAL IMPROVEMENT DISTRICTS

FOR VALUABLE CONSIDERATION, the undersigned, being the Subdivider and all of the owners of the hereinafter described real property, do hereby waive the right to protest the formation of one or more special improvement district(s) for a period of no more than twenty years from the recording of this waiver, for street light maintenance and energy, and for the construction of streets, street widening, sidewalks, survey monuments, street name signs, curb and gutter, street lights, driveways, traffic signals, and traffic control devices, parks and park maintenance, trails, sanitary sewer lines, water lines, storm drains (either within or outside the area), and other improvements which the City of Billings may require.

This Waiver and Agreement is independent from all other agreements and is supported by sufficient independent consideration to which the undersigned are parties and shall run with the land and shall be binding upon the undersigned, their successors and assigns, and the same shall be recorded in the office of the County Clerk and Recorder of Yellowstone County, Montana.

This Waiver is in addition to any other recorded waiver related to the property described herein and is not intended to replace, supersede, or invalidate any such waiver.

The real property hereinabove mentioned is more particularly described as follows:

Yellowstone Club Estates, 8th Filing

Signed and dated this _____ day of _____, 20___.

Subdivider/Owner

_____

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20___, before me, a Notary Public in and for the State of Montana, personally appeared _____, known to me to be *22500 NOL, LLC*, the person who executed the forgoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

FINDINGS OF FACT

The Planning staff has prepared the Findings of Fact for the preliminary plat of Yellowstone Club Estates, 8th Filing. These findings are based on the preliminary plat application and supplemental documents and address the review criteria required by the Montana Subdivision and Platting Act (76-3-608, MCA) and the Billings Subdivision Regulations (Section 23-303(H), BMCC).

A. What are the effects on agriculture, local services, the natural environment, wildlife, wildlife habitat, and public health, safety, and welfare? [MCA 76-3-608 (3) (a) and BMCC 23-302.H.2.]

1. Effect on agriculture and agricultural water user facilities

The subject property is vacant land that currently has an agricultural covenant. The subdivider is proposing to modify the agricultural covenant to remove Lots 2-8 which will be developed within the city. This will leave Lots 1 and 9 within the county. The perimeter ditches and drains shall remain in place and not be altered by the subdivider or subsequent owners. The subdivision should not affect agricultural water users' facilities.

2. Effect on local services

a. **Utilities** – Water service will be provided by the City of Billings. New individual services will be provided to all the lots, and new fire hydrants will be installed as required by the City Fire Department. The water service for this subdivision comes from Ben Hogan Lane and Ouimet Circle. Any needed extension of those water lines will be installed by the subdivider to meet the requirements of the City of Billings Engineering Department regulations. The subdivider will install all new water lines in the local streets and individual services for each lot in accordance with design standards, specifications, rules, and regulations of the City of Billings Engineering/Public Works Department and MDEQ. This is outlined in the SIA under Section 'VI – Utilities, Subsection A – Water'.

   Sanitary sewer service will be provided by connecting to the existing City of Billings' sewer mains. There is an existing sewer mains found in Ben Hogan Lane and Quimet Circle. All new services shall be installed in accordance with design standards, specifications, rules, and regulations of the City of Billings Public Works Department and MDEQ. This is outlined in the SIA under Section 'VI – Utilities, Subsection B – Sanitary Sewer'.

   Private Utilities will be provided from existing facilities to the subdivision. No additional easements on the lot frontage have been requested.

   Stormwater – Stormwater drainage for the public streets is proposed to be provided by curb and gutters that discharge into storm water pipes. These and all other drainage improvements shall satisfy the criteria set forth by the *City of Billings Stormwater Management Manual* and will be subject to review and approval by the City Engineering Department.

b. **Solid Waste** – The City of Billings will provide solid waste collection and disposal. The City's landfill has adequate capacity for this waste.

c. **Streets** – The subdivision is adjacent to Sam Snead Trail, Ben Hogan Lane, Quimet Circle, and Chick Evans Lane. These rights-of-way are currently constructed and in service, and no new access points, street connections, or extensions are proposed as part of this development. Street improvements are included in the Waiver of Right to Protest Future Special Improvement Districts.

   Sidewalks are not currently installed along Sam Snead Trail, Ben Hogan Lane, or Billy Casper Drive. No sidewalks will be installed as part of this subdivision, but such improvements are included in the Waiver of Right to Protest Future Special Improvement Districts. This information is all in the SIA under Section 'III - Transportation.'

d. **Emergency Services** – The Billings Police and Fire Departments will respond to emergencies within the proposed subdivision. The nearest fire station is Station #7, approximately 1.9 road miles or 5 minutes driving time to the subject property. The subdivision is located within the ambulance service area of American Medical Response (AMR).

e. **Schools** –School District #2 provides educational services to elementary through high school students. The school district did not raise any special requests or concerns during their review of this proposal.

f. **Parks and Recreation** – This subdivision requires 0.55 Acres of parkland. The developer is meeting this requirement via a cash-in-lieu contribution.

g. **Mail Delivery -** The United States Postal Service will provide postal service to the subdivision and has indicated that centralized mailbox units will be required as were installed for the previous filings of this subdivision. The developer will need to coordinate mailbox locations with the postal service **(Condition #1).**

3. Effect on the natural environment

The subject property is currently vacant land with the proposed use of residential land. The property is not located in a floodplain. During development, storm water pollution prevention best management practices are required to be used and monitored to prevent erosion on exposed ground. Overall, the effect on the natural environment should be minimal. Lots 1 and 9 within the county will be required to obtain a Weed Management Plan **(Condition #2)**.

4. Effect on wildlife and wildlife habitat

There are no known endangered or threatened species on the property. There is a paragraph in the SIA that warns future lot owners of the presence of deer in the area, which may cause damage to their landscaping. This subdivision should have a minimal effect on wildlife and wildlife habitat.

5. Effect on the public health, safety, and welfare

There will be no significant impacts to public health, safety, and welfare because of this subdivision.

B. Was an Environmental Assessment required? [(MCA 76-3-616 and BMCC 23-302.H.1.]

The proposed subdivision is exempt from the requirement for an Environmental Assessment pursuant to Section 76-3-616, MCA.

C. Does the subdivision conform to the City of Billings 2016 Growth Policy, the 2014 Transportation Plan, and the Billings Area Bikeway and Trail Master Plan? [BMCC 23-302.H.4.]

1. City of Billings 2016 Growth Policy

The proposed subdivision is consistent with the following goals of the Growth Policy:

1. **Strong Neighborhoods** (livable, safe, sociable, and resilient neighborhoods): Neighborhoods that are safe and attractive and provide essential services are much desired.
2. **Home Base** (healthy, safe, and diverse housing options): Planning and construction of interconnected sidewalks and trails are important to the economy and livability of Billings.
3. **Essential Investments** (relating public and private expenditures to public values): Planning and construction of safe and affordable interconnected sidewalks and trails are important to the economy and livability of Billings.

This subdivision is not subject to the Billings 2045 Land Use Plan and Future Land Use Map as it was submitted prior to adoption or effective dates of the new land use regulations. Incidentally, this request matches the Future Land Use Map designations for this area as Urban Residential Limited. Applications that will be subject to the new regulations, Plan and Map will be processed after July 1, 2026.

3. 2023 Billings Urban Area Long Range Transportation Plan

The proposed subdivision adheres to the goals and objectives of the 2023 Transportation Plan and preserves the street network and street hierarchy specified in the plan.

4. Billings Area Bikeway and Trail Master Plan (BABTMP)

The proposed subdivision is within the jurisdiction of the Billings Area Bikeways and Trail Master Plan. There is a proposed trail network that would connect the subdivision to Canyonwoods Drive multi-use trail, however the applicant is requesting a variance from

Section 23-406.C.1 of the City of Billings Subdivision regulations, and Section 4.6.D of the Yellowstone County Subdivision Regulations, which requires new subdivisions to comply with the currently adopted Active Transportation Plan. The applicant is requesting this variance due to topographic constraints on the area in question, with slopes reaching over 50% in grade. Construction of this connection will be deferred to a time of future develop of either Lot 1 or 9, as stipulated in the SIA, under Section 'III - Transportation, subsection F- Billings Area Bikeway and Trail Master Plan.'

D. Does the subdivision conform to the Montana Subdivision and Platting Act and to local subdivision regulations? [MCA 76-3-608 (3) (b) and BMCC 23-302.H.3.a.]

The proposed subdivision satisfies the requirements of the Montana Subdivision and Platting Act and the design standards specified in the local subdivision regulations. The subdivider and the local government have complied with the subdivision review and approval procedures set forth in the local and state subdivision regulations.

E. Does the proposed subdivision conform to all requirements of the zoning in effect? [BMCC 23-302.H.3.e.]

The subject property is zoned N3 – Suburban Neighborhood Residential for Lots 2-8 within the city and P1- Parks and Open Space for Lots 1 and 9 within the county. The lot frontages conform to the requirements of this zone. Other building setbacks and structure specific requirements will be reviewed for compliance at the time of building permit review.

F. Does the proposed plat provide easements for the location and installation of any utilities? [MCA 76-3-608 (3) (c) and BMCC 23-302.H.3.b.]

The subdivider will provide utility easements as requested by private utility companies on the face of the plat.

G. Does the proposed plat provide legal and physical access to each parcel within the subdivision and notation of that access on the plat? [MCA 76-3-608 (3) (d) and BMCC 23-302.H.3.c.]

Legal and physical access is provided to the proposed will be from Sam Snead Trail, Ben Hogan Lane, Quimet Circle, and Chick Evans Lane. No new internal accesses created as part of this subdivision.

CONCLUSIONS OF FINDINGS OF FACT

- The preliminary plat of Yellowstone Club Estates, 8th Filing does not create any adverse impacts that warrant denial of the subdivision.

- The proposed subdivision conforms to several of the goals and policies of the 2016 Growth Policy and does not conflict with the Transportation or Bikeway/Trail Plans.

- The proposed subdivision complies with state and local subdivision regulations, local zoning, and sanitary requirements and provides legal and physical access to each lot.

- Any potential negative or adverse impacts will be mitigated with the proposed conditions of approval.

RECOMMENDATION

Staff recommends to County Commissioners that the preliminary plat of Yellowstone Club Estates, 8th Filing be conditionally approved and adopt the Findings of Fact as presented in the staff report.

Approved by the Yellowstone County Commissioners July 21, 2026

_____
Mark Morse, County Commissioner

_____
Mike Waters, County Commissioner

_____
Chris White, County Commissioner

RECOMMENDATION

Staff recommends to City Council that the preliminary plat of Yellowstone Club Estates, 8th Filing be conditionally approved and adopt the Findings of Fact as presented in the staff report.

Approved by the Billings City Council, July 27, 2026

_____
Mike Nelson, Mayor

Variance Request – Multi-Use Trail Connection
Yellowstone Club Estates, 8th Filing

Yellowstone Club Estates, 8th Filing (Subdivision) proposes development on land adjacent to existing developed subdivisions including Price Subdivision and Ironwood Subdivision. As part of the City of Billings Subdivision Regulations, **Section 23-406.C.1** requires subdivisions to comply with the Currently adopted Active Transportation Plan, depicting a multi-use trail in the vicinity of Lots 2 and 3 of the proposed Subdivision. This variance request seeks relief from strict application of Section 23-406.C.1 as it relates to providing direct trail connectivity through the site in the location shown on the Active Transportation Plan.

---

1. The granting of the variance will not be detrimental to the public health, safety, or general welfare or injurious to other adjoining properties.
The granting of this variance will not be detrimental to public health, safety, or general welfare, nor injurious to adjoining properties. The conceptual trail connection identified in the Active Transportation Plan traverses terrain with extreme topographic constraints, including slopes approaching 50% and elevation differences ranging from approximately 18 to 22 feet as can be seen on the included exhibit depicting the surrounding area. Construction of a trail in this location would present safety concerns related to slope stability, user accessibility, and long-term maintenance.

Furthermore, the alignment would require connection through the Price Subdivision, which is already developed and lacks legal access for such a connection. As such, enforcing the connection at this location would not provide a safe or functional public facility and could create conflicts with existing development.

The proposed variance avoids forcing an unsafe or impractical connection while preserving the opportunity for a future trail connection to be constructed in a more appropriate location.

---

2. Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, an undue hardship to the owner would result if the strict letter of the regulation was enforced.
Strict application of Section 23-406 would create an undue hardship due to the unique topographical constraints of the property. The site contains steep slopes on the order of 50% and significant vertical elevation changes (18 to 22 feet) across the area where the conceptual trail connection is shown.

These conditions make construction of a compliant and accessible trail infeasible without extensive grading, retaining structures, or other extraordinary engineering measures. Such improvements would result in disproportionate costs and environmental disturbance relative to the benefit provided.

In addition, the required connection as shown on the Active Transportation Plan would extend into the Price Subdivision, which is governed by an existing Subdivision Improvement Agreement (agreement between the City of Billings and Price Subdivision) and Codes of

Covenants and Restrictions that do not provide for this access and disallow further development where legal access for the trail planned in the Active Transportation Plan could be required by the City. The SIA further limits additional development or modification within Price Subdivision under current conditions, making implementation of the connection outside the control of the applicant.

These combined physical and legal constraints constitute a clear hardship specific to this property.

---

3. The variance will not result in an increase in taxpayer burden.
Approval of this variance will not result in an increased burden to taxpayers. Constructing a trail in this location would require significant grading, structural improvements, and ongoing maintenance due to the steep terrain, all of which could impose long-term public costs if dedicated to the City.

By deferring the connection to a more feasible future location, the City avoids the cost of maintaining a facility that is difficult to construct, potentially unsafe, and inefficient to serve users.

Future development of Agricultural Tract 1, as identified in this Subdivision's Subdivision Improvement Agreement, will be required to provide a trail connection to the existing park in Ironwood Subdivision. This ensures that the intended connectivity is ultimately achieved without premature or inefficient public expenditure.

---

4. The variance will not in any manner place the subdivision in nonconformance with any adopted zoning regulations or Growth Policy.
The requested variance will not place the subdivision in nonconformance with any adopted zoning regulations or the City of Billings Growth Policy. The subdivision will continue to comply with all applicable zoning requirements, including land use, lot design, and development standards.

While the Active Transportation Plan identifies a conceptual trail connection in this vicinity, the plan allows for flexibility in implementation based on site-specific conditions. Deferring the connection to a more feasible alignment through future development maintains consistency with the overall intent of the plan while recognizing existing constraints.

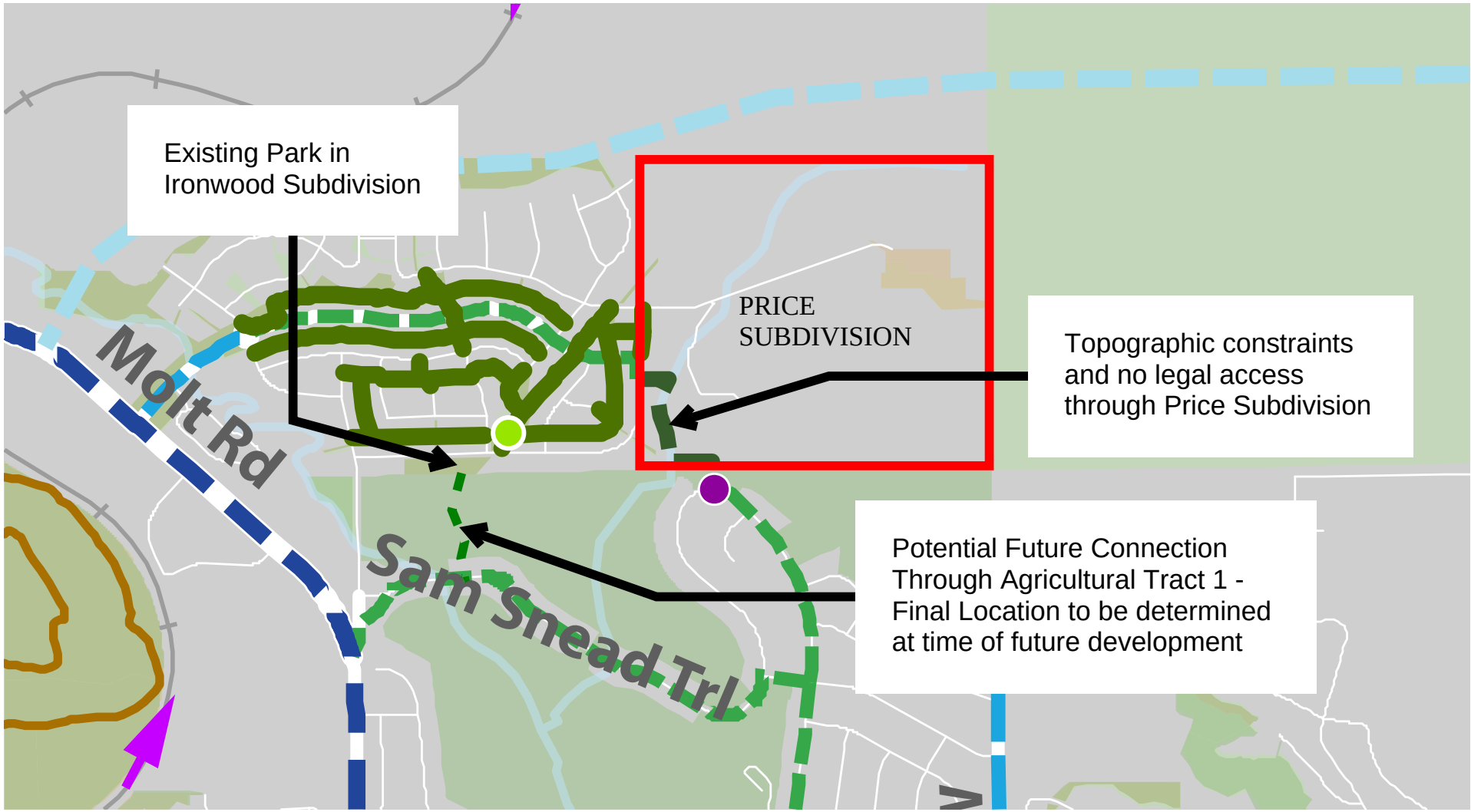
---

5. The subdivider must prove that the alternative design is equally effective, and the objectives of the improvements are satisfied.
The proposed alternative design is equally effective in meeting the intent of Section 23-406.C.1 and the City's transportation planning objectives. While the immediate construction of the conceptual trail connection is not feasible at this location, the overall goal of providing connectivity to parks and the non-motorized network will still be achieved.

As documented in this Subdivision's Subdivision Improvement Agreement, future development of Agricultural Tract 1 will be required to construct a trail connection to the existing park within Ironwood Subdivision. This alternative ensures that a safe, functional, and accessible trail

connection is ultimately provided in a location that is better suited for construction and long-term use.

This approach satisfies the objectives of connectivity, safety, and efficient infrastructure development without imposing undue hardship or creating impractical design conditions.


Existing Park in
Ironwood Subdivision
PRICE
SUBDIVISION
Topographic constraints
and no legal access
through Price Subdivision
Molt Rd
Sam Snead Trl
Potential Future Connection
Through Agricultural Tract 1 -
Final Location to be determined
at time of future development

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NOTES

1. CONTOURS AT 1' AND 5' INTERVALS.

ADDENDUM/REVISION	DATE	BY	CHECKED BY

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED.
LINE BELOW MEASURES ONE-INCH ON ORIGINAL DRAWING.

MODIFY SCALE ACCORDINGLY

BGR — DESIGNED BY
BGR — DRAWN BY
QUALITY ASSURANCE
TJK — CHECKED BY

EXHIBIT

PERFORMANCE ENGINEERING
3412 COLTON BLVD, STE 202 (406) 384-0080
BILLINGS, MT 59102 performance-ec.com

YELLOWSTONE CLUB ESTATES, 8TH FILING

TRAIL MASTER PLAN CONNECTION POINT

PROJECT NUMBER
2025-002

SHEET NUMBER
1 OF 2

DRAWING NUMBER
EX A

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NOTES

1. CONTOURS AT 1' AND 5' INTERVALS.

LOT : 3
30135 SQ FT
0.692 ACRES

LOT : 2
30363 SQ FT
0.697 ACRES

TRACT : 11-A-1
1668134 SQ FT
38.295 ACRES

TOMMY ARMOUR CIR.

CANYONWOODS DR.

AUTUMNWOOD DR.

Potential Connection Point - Behind gated private drive cul-de-sac

Potential Connection Point - Currently developed and landscaped by current lot owners.

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IN FEET

ADDENDUM/REVISION	DATE	BY	CHECKED BY

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED.
LINE BELOW MEASURES ONE-INCH ON ORIGINAL DRAWING.

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BGR
DESIGNED BY

BGR
DRAWN BY

QUALITY ASSURANCE
TJK
CHECKED BY

EXHIBIT

PERFORMANCE ENGINEERING
3412 COLTON BLVD, STE 202 (406) 384-0080
BILLINGS, MT 59102 performance-ec.com

YELLOWSTONE CLUB ESTATES, 8TH FILING

TRAIL MASTER PLAN CONNECTION POINT

PROJECT NUMBER
2025-002

SHEET NUMBER
2 OF 2

DRAWING NUMBER
EX B

COPYRIGHT 2025 ©

Return Address:
Performance Engineering
3412 Colton Boulevard, Suite 202
Billings, MT 59102

Termination and Revocation of Certificate of Survey-Agricultural Exemption

THIS AGREEMENT is made and entered into by **22500 NOL, LLC**, as owners of Agricultural Tract 11-A-2 of the Amended Tract 11-A of the Remainder of Tract 11, Certificate of Survey No. 836 in Yellowstone County, Montana, and **YELLOWSTONE COUNTY**, MONTANA, as the governing body.

WHEREAS, Agricultural Tract 11-A-2 of the Amended Tract 11-A of the Remainder of Tract 11, Certificate of Survey No. 836 (Document No. 4042155), situated in the N ½ of Section 30, Township 01 North, Range 25 East, P.M.M., Yellowstone County, Montana, was subject to a Declaration of Agricultural Covenant (Document No. 4042156); and

WHEREAS, said tract was surveyed and platted as Yellowstone Club Estates, 8th Filing creating nine lots, which complied with all requirements, rules, regulations, policies, and resolutions of the City of Billings and Yellowstone County, and the laws and administrative rules of the State of Montana; and,

WHEREAS, Lots 2 through 8, inclusive, of said Yellowstone Club Estates, 8th Filing, have been annexed into the City of Billings and it is agreed upon between 22500 NOL, LLC and Yellowstone County that said Declaration of Agricultural Covenant is terminated and revoked on said lots; and,

WHEREAS, Only Lot 1 and 9 of Yellowstone Club Estates, 8th Filing, shall continue to remain bound by the terms of the original Declaration of Agricultural Covenant (Document No. 4042156),

WHEREAS, the Plat of Yellowstone Club Estates, 8th Filing, was filed under Document No. _____, records of Yellowstone County, Montana; and

WHEREAS, Yellowstone Club Estates, 8th Filing, consists of 9 lots and the owners desire to lift the agricultural covenant on seven of said nine lots including Lots 2 through 8, inclusive;

THEREFORE, the parties to this agreement do hereby agree that the provisions of the Declaration of Agricultural Covenant (Document No. 4042156) imposed on Agricultural Tract 11-A-2 of the Amended

Tract 11-A of the Remainder of Tract 11, Certificate of Survey No. 836 (Document No. 4042155) is hereby removed from Lots 2 through 8, inclusive, of Yellowstone Club Estates, 8th Filing.

Dated this_____ day of _____ 20__.

22500 NOL, LLC

_____ _____
Title: Date

State of Montana)
:
County of Yellowstone)

On this _____ day of _____, 20___, before me, a Notary Public for the State of Montana, personally appeared, _____, being the _____ of 22500 NOL, LLC known to me to be the persons whose name is subscribed to the within instrument and acknowledged to me that they executed the same.

IN WITNESS, WHEREOF, I have hereunto set my hand and affixed my notary seal the day and year first above written.

(seal) _____

Print Name: _____
Notary Public for the State of Montana
Residing at Billings, Montana
My commission expires_____

Yellowstone County Commissioners

_____
Chairperson

_____
Commissioner

_____
Commissioner

Attest:

_____
Jeff Martin, Clerk & Recorder

State of Montana)
:
County of Yellowstone)

On this _____ day of _____, 20___, before me, a Notary Public for the State of Montana, personally appeared, _____, _____, and _____, members of the Board of County Commissioners, and Jeff Martin, County Clerk & Recorder, known to me to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same.

IN WITNESS, WHEREOF, I have hereunto set my hand and affixed my notary seal the day and year first above written.

(seal)

_____

Print Name: _____
Notary Public for the State of Montana
Residing at Billings, Montana
My commission expires_____

Planning Board

Date:	06/09/2026
Title:	44 West Subdivision, 2nd Filing, Major Preliminary Plat Review
Presented by:	David Green
Department:	Planning & Community Services
Presentation:	Yes

Information

RECOMMENDATION

Staff recommends the Planning Board recommend to City Council that the preliminary plat of 44 West Subdivision, 2nd Filing be conditionally approved, and the Findings of Fact adopted as presented in the staff report.

BACKGROUND (Consistency with Adopted Plans and Policies, if applicable)

On May 1, 2026, Performance Engineering, on behalf of McCall Development, applied for preliminary plat approval for 44 West Subdivision, 2nd Filing. The proposed subdivision creates 108 lots for development. The subject property is generally located south of Central Avenue, and west of Twin Pines Townhomes. The property is currently zoned Mixed Residential 2 (NX2), Mixed Residential 1 (NX1) and Corridor Mixed Use 1 (CMU1).

VARIANCES

The applicant is not applying for any variances from subdivision regulations.

PROPOSED CONDITIONS OF APPROVAL

1. Minor changes may be made in the SIA and final documents, as requested by the Planning, Legal or Public Works Departments to clarify the documents and bring them into the standard acceptable format.
2. The final plat shall comply with all requirements of the City of Billings Subdivision Regulations, rules, regulations, policies, and resolutions of the City of Billings, and the laws and Administrative Rules of the State of Montana.

PROCEDURAL HISTORY

Pre-Application Meeting: April 2, 2026
Preliminary Plat application submitted to Planning Division: April 2, 2026
Departmental Review Meeting: May 14, 2026
Preliminary Plat Resubmittal: May 21, 2026
Planning Board Plat Review: June 9, 2026
Planning Board Public Hearing: June 23, 2026
Preliminary Plat to City Council: July 27, 2026
60 Working-Day Preliminary Plat Review period ends: July 28, 2026

PLAT INFORMATION

General Location: South of Central Avenue, and west of Twin Pines Townhomes
Legal Description: Being Lot 3, Block 1 of Clearwater Estates Subdivision, 2nd Filing and Lot 11 and portions of Lot 12 of Block 3 of 44 West Subdivision.
Owner/Subdivider: McCall Development, Inc.
Engineer/Surveyor: Performance Engineering
Existing Zoning: NX2, NX1, and CMU1
Existing Land Use: Agricultural land
Proposed Land Use: Residential
Gross Area: ± 18.11 Acres
Proposed number of lots: 108
Lot Size:
Minimum: ± 2,497 square feet
Maximum: ± 4.13 acres
Parkland Requirements: Subdivision regulations require a dedication of 1.39 acres. The applicant is proposing to provide 1.94 acres of private parkland.

Traffic Impact Study

A traffic impact study (TIS) was completed for the entire subdivision, 44 West, at full build out. This includes the 55 acres of farmland to the south of 44 West Subdivision 1st, 2nd, and 3rd Filings. From Central Avenue to the Monad Drain, on the southern end of the 55 acres of farmland. In the SIA under the heading 'III Transportation. A. Street', the agent shows the percentage of contribution that this filing will be responsible for at final plat. All required intersection improvement

contributions identified therein shall be completed by the Subdivider at the Subdivider's expense. The percent of traffic contributions to the following intersections for this filing:

a. S. 48th and Central – 0.30%
b. Shiloh and Broadwater – 0.50%
c. Shiloh and Central – 1.70%
d. Shiloh and Monad – 0.40%
e. Central and S 44th West – 2.50%

The cash contributions shall be based on the percent of traffic contributions to the intersections based on the total cost of an intersection as determined by City Engineering for the year in which the contribution is made. These cash contributions for the intersection improvement will be made prior to final plat approval.

The TIS shows that a left-turn lane on Central Avenue at the 44th Street West intersection with Central, is required to be constructed with this filing, 44 West Subdivision, 2nd Filing.

STAKEHOLDERS

There are no stakeholder responses at this time. Stakeholder input will be received at a public hearing scheduled for this subdivision on June 23, 2026.

ALTERNATIVES

In accordance with state law, the City Council has 60 working days to act upon this major preliminary plat. The 60 working day review period for the proposed plat ends July 28, 2026. State and City subdivision regulations also require that the preliminary plat be reviewed using specific criteria, as stated within this report. The City may not unreasonably restrict an owner's ability to develop land if the subdivider provides evidence that any identified adverse effects can be mitigated. Within the 60 working day review period, the City Council is required to:

1. Approve;
2. Conditionally Approve; or
3. Deny the Preliminary Plat

FISCAL EFFECTS

The preliminary plat of this subdivision will have no financial impact on the Planning Division.

SUMMARY

One of the purposes of the City's subdivision review process is to identify potential negative effects of property being subdivided. Negative effects that are identified become the subdivider's responsibility to mitigate. Various City departments, private service/utility providers and the affected school district/s, have reviewed this application and provided input on effects and mitigation. The Findings of Fact, which are presented as an attachment, discuss potential negative impacts of the subdivision and conditions of approval are recommended as measures to further mitigate any impacts. In this case, there were found to be minimal impacts from this proposed subdivision.

Attachments

Proposed Plat
Draft SIA
Findings of Fact
Traffic Study
TIS Studied Intersections

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ADJOINING PROPERTY OWNER INFORMATION:

1. 44 WEST DEVELOPMENT, LLC
1536 MULLOWNEY LANE, SUITE 100
BILLINGS, MT 59101

2. BRADLEY W & TAMMY JO HARDT
4620 CENTRAL AVENUE
BILLINGS, MT 59106

3. 4 MT HOMES INC.
PO BOX 51366
BILLINGS, MT 59105

4. BROWN DEVELOPMENT, LLC
745 SOUTH 56TH STREET WEST
BILLINGS, MT 59106

5. LEITZ, BRYAN KARL
4420 CENTRAL AVE
BILLINGS, MT 59106

6. HOFMANN, EDWARD L JR
4246 CENTRAL AVE
BILLINGS, MT 59106

7. JANET B BERGMAN REVOCABLE TRUST
1322 BROADWATER AVE
BILLINGS, MT 59102

PRELIMINARY PLAT OF

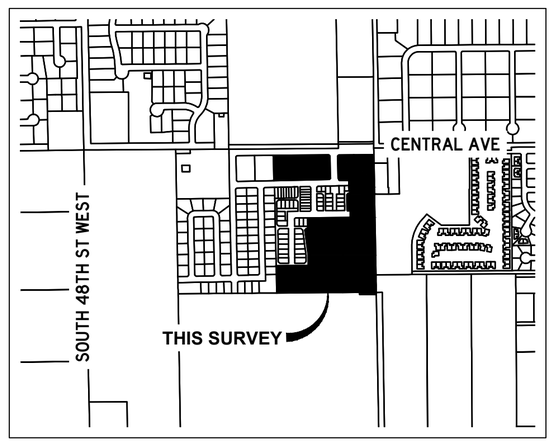
44 WEST SUBDIVISION, 2ND FILING

BEING LOT 3, BLOCK 1 OF CLEARWATER ESTATES SUBDIVISION, 2ND FILING AND LOT 11 AND PORTIONS OF LOT 12 OF BLOCK 3 OF 44 WEST SUBDIVISION LOCATED IN THE NW1/4 OF SECTION 10, TOWNSHIP 01 SOUTH, RANGE 26 EAST, P.M.M., CITY OF BILLINGS, YELLOWSTONE COUNTY, MONTANA

PREPARED FOR : 44 WEST DEVELOPMENT, LLC

PREPARED BY : PERFORMANCE ENGINEERING, LLC

TOTAL AREA OF SUBDIVISION : ± 18.11 ACRES



VICINITY MAP
NOT TO SCALE

SITE DATA	
GROSS AREA	18.11 AC
NET AREA	14.35 AC
LOT COUNT	108
MAX. LOT AREA	180,154 SF
MIN. LOT AREA	2,497 SF
ZONING	NX1/NX2/CMU1
PARKLAND DED.	1.94 AC

0 50 100
IN FEET

Z:\McCall\2026-055 44 West 2nd & 3rd\CAD\DWG\Plat\26-067 44 West 2nd Prelim.dwg

SUBDIVISION IMPROVEMENTS AGREEMENT
&WAIVER OF RIGHT TO PROTEST FUTURE SPECIAL IMPROVEMENT DISTRICTS

44 West Subdivision, 2nd Filing

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(City of Billings)

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SUBDIVISION IMPROVEMENTS AGREEMENT & WAIVER OF RIGHT TO PROTEST FUTURE SPECIAL IMPROVEMENT DISTRICTS

44 West Subdivision, 2nd Filing

This agreement is made and entered into this ____ day of _____, 20__, by and between *44 West Development, LLC*, whose address for the purpose of this agreement is **1536 Mullowney Lane, Suite 100; Billings, Montana 59101**, hereinafter referred to as "Subdivider," and **CITY OF BILLINGS**, Billings, Montana, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the plat of *44 West Subdivision, 2nd Filing*, located in Yellowstone County, Montana was submitted to the Yellowstone County Board of Planning; and

WHEREAS, at a regular meeting conducted on _____ day of _____, 20__, the Board of Planning recommended conditional approval of a preliminary plat of *44 West Subdivision, 2nd Filing*; and

WHEREAS, at a regular meeting conducted on _____ day of _____, 20__, the City Council conditionally approved a preliminary plat of *44 West Subdivision, 2nd Filing*; and

WHEREAS, a Subdivision Improvements Agreement is required by the City prior to the approval of the final plat.

WHEREAS, the provisions of this agreement shall be effective and applicable to *44 West Subdivision, 2nd Filing* upon the filing of the final plat thereof in the office of the Clerk and Recorder of Yellowstone County, Montana. The Subdivision shall comply with all requirements of the City of Billings Subdivision Regulations, the rules, regulations, policies, and resolutions of the City of Billings, and the laws and administrative rules of the State of Montana.

THEREFORE, THE PARTIES TO THIS AGREEMENT, for and in consideration of the mutual promises herein contained and for other good and valuable consideration, do hereby agree as follows:

I. VARIANCES

A. Subdivider has requested, and the City hereby grants, the following variances by City Council from the strict interpretation of the City's Subdivision Regulations (Section 23.1101, BMCC):

1. No variances are requested.

II. PROPERTY CONDITIONS AND INFORMATION FOR LOT PURCHASERS

A. Lot owners will be required to construct that segment of the required sidewalk that fronts their property at the time of lot development. If sidewalk is not constructed within 5 years, the City has the right to construct the sidewalk and assess the property owners.

B. Lot owners should be aware that this subdivision is being built in close proximity to prime deer and antelope habitat and it is likely that homeowners will experience problems with damage to landscaped shrubs, flowers, and gardens. The Montana Fish, Wildlife, and Parks Department does not provide damage assistance unless there is damage to commercial crops and/or a threat to public health and safety.

C. Lot owners should be aware that soil characteristics within the area of this subdivision, as described in the 1972 Yellowstone County Soil Survey, indicate that there could be potential limitations for proposed construction on the lots, which may require a geotechnical survey prior to construction.

D. No water rights have been transferred to the lot owners. Irrigation ditches that exist on the perimeter of this development are for the benefit of other properties. Perimeter ditches and drains shall remain in place and shall not be altered by the Subdivider or subsequent owners.

E. There is attached hereto a Waiver waiving the right to protest the creation of the special improvement district or districts which by this reference is expressly incorporated herein and made as much a part hereof as though fully and completely set forth herein at this point. The Waiver will be filed with the plat, shall run with the land, and shall constitute the guarantee by the Subdivider and property owner or owners of the developments described herein. Said Waiver is effective upon filing and is not conditioned on the completion of the conditions set forth in this Agreement. The Subdivider and owner specifically agree that they are waiving valuable rights and do so voluntarily.

F. The subdivider and subsequent contractors/builders acknowledge that there is a Stormwater Pollution and Prevention Plan (SWPPP) filed with the City and the Montana Department of Environmental Quality (MDEQ). This SWPPP shall be adhered to during all phases of construction and shall be updated as required by MDEQ under the General Permit for Stormwater Discharges Associated with Construction Activity, Chapter 28, BMCC and the Billings Stormwater Management Manual.

G. Individual lot owners should be aware that Best Management Practices for stormwater control shall be required for new construction on lots. Best Management Practices are defined within Section 28-201, BMCC and detailed in the Billings Stormwater Management Manual.

III. TRANSPORTATION

A. Streets

- All internal access roads and site improvements within the subdivision will be in accordance with the City of Billings Site Development Ordinance, City Zoning Ordinance, the Stormwater Management Manual, and other applicable City codes, rules, and regulations.

- All internal streets to provide a 34-foot back of curb to back of curb street width. The street improvements will be completed by private contract or SID

- A traffic accessibility study has been completed for the *44 West Subdivision, 2nd Filing.* All required intersection improvement contributions identified therein shall be completed by the Subdivider at the Subdivider's expense. The percent of traffic contributions to the following intersections shall be in accordance with the traffic accessibility study:

    a. S. 48th and Central – 0.30%
    b. Shiloh and Broadwater – 0.50%
    c. Shiloh and Central – 1.70%
    d. Shiloh and Monad – 0.40%
    e. Central and 44th S West – 2.50%

  The cash contributions shall be based on the percent of traffic contributions to the intersections based on the total cost of an intersection as determined by City Engineering for the year in which the contribution is made. These cash contributions for the intersection improvement will be made prior to final plat approval.

- A left turn lane on Central Avenue at the 44th Street West intersection is required to be constructed with this subdivision.

B. Carriage Lanes

- All carriage lanes within the subdivision shall be built to grade with a satisfactory subbase, base course, and asphalt surface or concrete surface. All carriage lane approaches constructed with asphalt shall be replaced with concrete by the Subdivider at the time when home construction is complete. In the event asphalt approaches within the subdivision are not

replace with concrete within three years of the date of recording of the final plat, the City may construct the concrete approaches and assess the Subdivider for the costs associated with the approach construction. Carriage Lane pavement widths shall be 12 feet. No trees are allowed to be planted in Carriage Lane rights-of-way. In addition, no shrubs taller than two (2) feet are allowed to be planted in Carriage Lane rights-of-way.

C. Sidewalks

- Individual lot owners will be responsible for the construction of the sidewalks within public right-of-way or easements adjacent to or through their lot at the time of lot construction and shall be included in each building permit. The Subdivider shall construct sidewalk adjacent to private parks at the time of private park development.

- Sidewalks shall be 5-foot wide with a minimum 5-foot boulevard planting strip between the sidewalk and the curb with handicap ramps and aprons installed where necessary.

D. Street Lighting

- Street lighting will be installed by private contract or SID. A Street Light Maintenance District will be created in the future and is included in the waiver of right to protest.

E. Traffic Control Devices

- Street name signs for streets within the subdivision, or located immediately adjacent thereto, shall be furnished and installed in accordance with the specifications of the City of Billings Public Works and Fire Departments.

- No traffic signals are required within this subdivision.

- The Subdivider shall furnish and install all necessary traffic control devices in accordance with the Manual of Uniform Traffic Control Devices and approved by the City of Billings Public Works Department.

F. Access

- Access to the Subdivision will be provided by Dryfly Lane, Hatch Lane and Driftboat Trail. Carriage Lane access is also provided to all residential lots within the subdivision.

G. Billings Area Bikeway and Trail Master Plan

- The Subdivision is within the Billings Area Bikeway and Trail Master Plan. A 10-foot-wide multi-use trail was constructed as part of a previous filing along Central Avenue. No additional trail improvements are required.

H. Public Transit

- MET Transit provides services along Central Avenue with the closest stop at the intersection of Central Avenue and Shiloh Road, approximately 0.5 miles east of the Subdivision. No improvements are required to ensure public transit service.

IV. EMERGENCY SERVICE

Construction of buildings made of combustible materials shall have adequate fire apparatus access roads and water supply (fire hydrants) in place to allow for fire suppression requirements. Prior to the issuance of a building permit for construction using combustible materials (i.e. lumber, plywood, wood trusses, etc.), fire apparatus access roads and water supply requirements shall be provided in accordance with the International Fire Code as adopted by the City of Billings.

At a minimum, the following is required:

- An unobstructed gravel road or gravel road base must be within 150 feet of the furthest portion of a building under construction as measured along the approved route.
- The access roads are required to support fire apparatus vehicle loading (40 tons) during all weather conditions and shall be a minimum of twenty (20) feet wide.
- An operational fire hydrant shall be located within 600 feet of the furthest portion of a residence under construction or within 400 feet of the furthest portion of a commercial building under construction as measured along the access roads to the site.
- The above requirements do not alter or effect the current minimum subdivision requirements for fire apparatus access and water supply.

V. STORM DRAINAGE

All drainage improvements shall comply with the provisions set forth in Chapter 28, BMCC, and the Stormwater Management Manual in place at the time of development. Additionally, a comprehensive drainage study has been completed for the Monad Drain with requirements that superseded the Stormwater Management Manual. The *Comprehensive Drainage Plan for the Monad Drain* is on-file at the City Engineering Department. A complete stormwater management plan shall be submitted to the Engineering Division for review and approval at the time of development.

Stormwater drainage will discharge to a drainage ditch constructed as part of the 44 West Subdivision, 1st Filing private contract. The ditch conveys stormwater drainage south to a stormwater detention facility that is located within an off-site area on Tract 3, Certificate of Survey No. 3844. This detention facility has been sized to accept runoff generated from the *44 West Subdivision, 2nd Filing*. The detention facility will outfall to the Monad Drain as described in the *Comprehensive Drainage Plan for the Monad Drain.*

Per the *Comprehensive Drainage Plan for the Monad Drain*, construction of a dike and control structure within the drain will be required as part of a future subdivision of Tract 3 of Certificate of Survey No. 3844, or as determined necessary by City Engineering. These improvements are included as part of the Waiver of Right to Protest a Special Improvement District.

The HOA is responsible for participating in the maintenance of stormwater facilities directly associated with the treatment and detention of runoff produced by the Subdivision.

VI. UTILITIES

The Subdivision Improvements Agreement does not constitute an approval for extension of or connection to water mains and sanitary sewers. The property owner shall make application for extension/connection of water mains and sanitary sewers to the Public Works Department – Engineering Division. The extension/connection of/to water mains and sanitary sewers is subject to the approval of the applications and the conditions of approval. Applications shall be submitted for processing prior to the start of any construction and prior to review and approval of any project plans and specifications.

The Developer/Owner acknowledges that the subdivision shall be subject to the applicable System Development Fees in effect at the time new water and/or sanitary sewer service connections are made.

The design/installation of sanitary sewers and appurtenances, and water mains and appurtenances (fire hydrants, etc.) shall be in accordance with design standards, specifications, rules, regulations of and as approved by the City of Billings Public Works Department, Fire Department and the Montana Department of Environmental Quality.

A. Water

- The Subdivision is served by existing 12-inch water main in Tippet Trail and existing 8-inch water mains located in Hatch Lane, Dryfly Lane, and Driftboat Trail.
- Water mains no less than 8 inches in diameter will be extended throughout the Subdivision. Mains shall be sized to accommodate future growth inside and outside of the Subdivision.

B. Sanitary Sewer

- Gravity sewer mains no less than 8 inches in diameter will be extended throughout the Subdivision. Mains shall be sized to accommodate future growth inside and outside of the Subdivision.

C. Power, Telephone, Gas, and Cable Television

- Private utility facilities currently exist to serve the subdivision. The private utility facilities will be installed within Carriage Lane right-of-way and by easements included on the plat, as requested by the utility companies, to provide routes to the Carriage Lanes.

VII. PARKS/OPEN SPACE

Section 76-3-621 of the Montana Code Annotated covers the park dedication requirement. Paragraph (1) calls for park area to be 11 percent of the land proposed to be subdivided into parcels of one-half acre or smaller. The required Parkland Dedication for the *44 West Subdivision, 2nd Filing* is 1.39 acres. Parkland dedications, in the amount of 1.94 acres, are depicted on the face of the plat as PRIVATE PARK.

Parks will be privately owned and maintained by a Private HOA created by the Subdivider.

VIII. POSTAL DELIVERY

The Subdivider shall provide centralized delivery boxes with sufficient pullout to accommodate a mail carrier vehicle. The location of the boxes shall be reviewed and approved by the United States Postal Service.

IX. IRRIGATION

No water rights have been transferred to the lot owners. Irrigation ditches that exist on the perimeter of this development are for the benefit of other properties. Perimeter ditches and drains shall remain in place and shall not be altered by the Subdivider or subsequent owners.

X. SOILS/GEOTECHNICAL STUDY

A soils/geotechnical study has been performed for the subdivision. A copy of this report is included as part of the infrastructure permitting documents and made public record through the Engineering Department. Lot owners and contractors/builders are encouraged to review the report and its recommendations or complete a site-specific geotechnical investigation.

XI. PHASING OF IMPROVEMENTS

The Subdivision is not proposed to be constructed in phases.

XII. FINANCIAL GUARANTEES

Except as otherwise provided, Subdivider shall install and construct said required improvements with cash or by utilizing the mechanics of a private contract secured by letters of credit or a letter of commitment to lend funds from a commercial lender, or by SID. All engineering and legal work in connection with such improvements shall be paid by the contracting parties pursuant to said private contract, and the improvements shall be installed as approved by the City Engineer and Utility Department Manager.

XIII. LEGAL PROVISIONS APPLYING TO SUBDIVIDER

A. Subdivider agrees to guarantee all public improvements for a period of two (2) years from the date of final acceptance by the City of Billings.

B. The owners of the properties involved in this proposed Subdivision by signature subscribed herein below agree, consent, and shall be bound by the provisions of this Agreement.

C. The covenants, agreements, and all statements in this Agreement run with the land and apply to and shall be binding on the heirs, personal representatives, successors, assigns and transferees of the respective parties.

D. In the event it becomes necessary for either party to this Agreement to retain an attorney to enforce any of the terms or conditions of this Agreement or to give any notice required herein, then the prevailing party or the party giving notice shall be entitled to reasonable attorney fees and costs.

E. Any amendments or modifications of this Agreement or any provisions herein shall be made in writing and executed in the same manner as this original document and shall after execution become a part of this Agreement.

F. Subdivider shall comply with all applicable federal, state, and local statutes, ordinances, and administrative regulations during the performance and discharge of its obligations. Subdivider acknowledges and agrees that nothing contained herein shall relieve or exempt it from such compliance.

IN WITNESS WHEREOF, the parties hereto have set their hands and official seals on the date first above written.

"SUBDIVIDER" *44 West Development, LLC*

By: _____

Title: _____

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____, known to me to be the _____ of *44 West Development, LLC*, who executed the foregoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

This agreement is hereby approved and accepted by the City of Billings, this ____ day of _____, 20__.

"CITY"
CITY OF BILLINGS
MONTANA

By: _____
Mayor

Attest: _____
City Clerk

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____ and _____, known to me to be the Mayor and City Clerk, respectively, of the City of Billings, Montana, whose names are subscribed to the foregoing instrument in such capacity and acknowledged to me that they executed the same on behalf of the City of Billings, Montana.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

Waiver of Right to Protest
FUTURE SPECIAL IMPROVEMENTS DISTRICTS

FOR VALUABLE CONSIDERATION, the undersigned, being the Subdivider and all of the owners of the hereinafter described real property, do hereby waive the right to protest the formation of one or more Special Improvement District(s) for a period of no more than twenty years from the recording of this waiver, for street light maintenance and energy, and for the construction of streets, street widening, sidewalks, survey monuments, street name signs, curb and gutter, street lights, driveways, traffic signals, and traffic control devices, parks and park maintenance, trails, sanitary sewer lines, water lines, storm drains (either within or outside the area), and other improvements which the City of Billings may require.

This Waiver and Agreement is independent from all other agreements and is supported by sufficient independent consideration to which the undersigned are parties, and shall run with the land and shall be binding upon the undersigned, their successors and assigns, and the same shall be recorded in the office of the County Clerk and Recorder of Yellowstone County, Montana.

This Waiver is in addition to any other recorded waiver related to the property described herein and is not intended to replace, supersede, or invalidate any such waiver.

The real property hereinabove mentioned is more particularly described as follows:

44 West Subdivision, 2nd Filing

Signed and dated this _____ day of _____, 20__.

44 West Development, LLC

By:_____

Title:_____

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____, known to me to be the _____ of *44 West Development, LLC*, who executed the foregoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

FINDINGS OF FACT

The Planning staff has prepared the Findings of Fact for the preliminary plat of 44 West Subdivision, 2nd Filing. These findings are based on the preliminary plat application and supplemental documents and address the review criteria required by the Montana Subdivision and Platting Act (76-3-608, MCA) and the Billings Subdivision Regulations (Section 23-303(H), BMCC).

A. What are the effects on agriculture, local services, the natural environment, wildlife, wildlife habitat, and public health, safety and welfare? [MCA 76-3-608 (3) (a) and BMCC 23-302.H.2.]

1. Effect on agriculture and agricultural water user facilities

The subject property has been used for agricultural purposes in the past. The Monad Drain is to the south of this proposed subdivision and is not part of the proposed area to be subdivided. Perimeter ditches and drains shall remain in place and not be altered by the subdivider or subsequent owners. The subdivision should not affect agricultural water users' facilities. With farming activity wildlife habitat has not been maintained. Perimeter areas are good for birds to hide in and smaller ungulates, such as deer.

2. Effect on local services

a. **Utilities** – Water service will be provided by the City of Billings. A 16-inch water main will be extended along Central Avenue for the proposed subdivision. 12-inch and 8-inch water lines will be provided within the proposed subdivision. 12-inch in the northern area and 8-inch throughout the majority of the subdivision. New individual services will be provided to all the lots, and new fire hydrants will be installed as required by the City Fire Department.

   Sanitary sewer service to the subdivision will be by an existing 10-inch sanitary sewer main located within the alleyway along the western boundary at the south end of the Subdivision. The Subdivider is responsible for extending an 8-inch gravity sewer main to Central Avenue via South 44th Street West to allow for future connections to the north of the Subdivision. Sewer lines within the subdivision shall be no smaller than 8-inches in diameter.

   The subdivider will install all new water lines and sewer lines in the local streets and individual services for each lot in accordance with design standards, specifications, rules, and regulations of the City of Billings Engineering/Public Works Department and MDEQ. This is outlined in the SIA under the heading 'VI. Utilities.'

   Private Utilities will be provided from existing facilities to the subdivision. The private utilities will be installed within the Carriage Lane right-of-way and by easements included on the plat, as requested by the utility companies, to provide routes to the Carriage Lanes.

   Stormwater – The storm drainage system for 44 West Subdivision, 2nd Filing, will consist of a curb and gutter surface collection and curb inlets that drain into storm drainage piping,

as well as surface conveyance. The Subdivision will be allowed to discharge stormwater into the Monad Drain as part of its stormwater management strategy. A complete stormwater management plan has been submitted to the Engineering Division for review and approval with the 44 West Subdivision, 1st Filing at the time of its development. This is outlined in the SIA under the heading V. Storm Drainge.

All drainage improvements shall satisfy the criteria set forth by the *City of Billings Stormwater Management Manual* and will be subject to review and approval by the City Engineering Department.

b. **Solid Waste** – The City of Billings will provide solid waste collection and disposal. The City's landfill has adequate capacity for this waste.

c. **Streets** – All internal streets within the subdivision shall be built to grade with a satisfactory subbase, base course, curb and gutter, and asphalt surface. All public roads will be built to provide a 34-foot back-to-back curb street width.

All internal streets and carriage lanes will be built according to the standards of the City of Billings Public Works Department. Street improvements are included in the Waiver of Right to Protest Future Special Improvement Districts.

The sidewalks will be installed by the respective lot owners on a lot-by-lot basis, as lots develop. Sidewalks along the street frontage shall be minimum 5-foot-wide and separated with a boulevard width not less than five feet. The developer will also install all ADA required ramps at the intersections within the proposed subdivision. The developer shall construct the 5-foot-wide boulevard sidewalk adjacent to private parks. This information is all in the SIA under the heading Transportation.

A left turn lane on Central Avenue at the 44th Street West intersection is required to be constructed with this subdivision.

Traffic Impact Study overview:

A traffic accessibility study has been completed for the 44 West Subdivision, 2nd Filing. A TIS was done for the entire subdivision at full build out. All required intersection improvement contributions identified therein shall be completed by the Subdivider at the Subdivider's expense. The percent of traffic contributions to the following intersections:

a. S. 48th and Central – 0.30%
b. Shiloh and Broadwater – 0.50%
c. Shiloh and Central – 1.70%
d. Shiloh and Monad – 0.40%
e. Central and S 44th West – 2.50%

The cash contributions shall be based on the percent of traffic contributions to the intersections based on the total cost of an intersection as determined by City Engineering for the year in which

the contribution is made. These cash contributions for the intersection improvement will be made prior to final plat approval.

A left turn lane on Central Avenue at the 44th Street West intersection is required to be constructed with this subdivision.

Street lighting is required for this subdivision. In the SIA the applicant has indicated that street lighting will be installed by private contract or SID. A Street Light Maintenance District will be created for operation and maintenance of the lighting at a future date and is included in the waiver of right to protest. This is outlined in the SIA under the heading 'III. Transportation, D. Street Lighting.'

d. **Emergency Services** – The Billings Police and Fire Departments will respond to emergencies within the proposed subdivision. The fire station that provides service for this area is Fire Station #7, is located at 1501 54th Street West. The subdivision is located within the ambulance service area of American Medical Response (AMR).

e. **Schools** – School District #2 provides service to students within this subdivision for elementary through high school. Big Sky for elementary school, capacity is shown as 394 with a current enrollment of 368. Ben Steele for middle school, capacity is shown as 750 with a current enrollment of 744. West for high school, capacity shown as 1731with current enrollment of 2133.

f. **Parks and Recreation** – This subdivision is required to provide 1.39 acres of parkland. The applicant will be providing 1.94 acres of private parkland for this subdivision. The parkland will be maintained by the Homeowner Association. The Parks Department responded that they approved of the proposed parkland for the subdivision.

g. **Mail Delivery -** The developer shall coordinate with the United States Postal Service to determine the preferred type and location of mail delivery system for this subdivision. This requirement is outlined in the SIA under the heading 'VIII. Postal Delivery.'

h. **Phasing of Development** – This subdivision will not be developed in phases.

3. Effect on the natural environment

The subject property is currently vacant with the proposed use of residential development with a small portion of possible commercial development. The property is not located within a floodplain. During development, storm water pollution prevention best management practices are required to be used and monitored to prevent erosion on exposed ground. Overall, the effect on the natural environment should be minimal.

4. Effect on wildlife and wildlife habitat

There are no known endangered or threatened species on the property. There is a paragraph in the SIA that warns future lot owners of the presence of deer in the area, which may cause damage to their landscaping. This subdivision should have a minimal effect on wildlife and wildlife habitat.

5. Effect on public health, safety and welfare

There will be no significant impacts to public health, safety and welfare because of this subdivision.

B. Was an Environmental Assessment required? [(MCA 76-3-616 and BMCC 23-302.H.1.]

The proposed subdivision is exempt from the requirement for an Environmental Assessment pursuant to Section 76-3-616, MCA.

C. Does the subdivision conform to the City of Billings 2016 Growth Policy, the 2014 Transportation Plan, and the Billings Area Bikeway and Trail Master Plan? [BMCC 23-302.H.4.]

1. City of Billings 2016 Growth Policy

The proposed subdivision is consistent with the following goals of the Growth Policy:

> **Strong Neighborhoods (livable, safe, sociable and resilient neighborhoods):** Neighborhoods that are safe and attractive and provide essential services are much desired.
>
> **Home Base (healthy, safe and diverse housing options):** Planning and construction of interconnected sidewalks and trails are important to the economy and livability of Billings.
>
> **Essential Investments (relating public and private expenditures to public values)**: Planning and construction of safe and affordable interconnected sidewalks and trails are important to the economy and livability of Billings.
>
> Developed parks that provide recreation and active living opportunities are desirable for an attractive and healthy community.

3. 2023 Billings Urban Area Long Range Transportation Plan

The proposed subdivision adheres to the goals and objectives of the 2023 Transportation Plan and preserves the street network and street hierarchy specified in the plan.

4. Billings Area Bikeway and Trail Master Plan (BABTMP)

The proposed subdivision is within the Billings Area Bikeways and Trail Master Plan. There are no trails identified within the subdivision. There is a 10-foot-wide bike and pedestrian trail already built along the south side of Central Avenue. This was installed with previous filings of 44 West Subdivision. No additional improvements of this nature are anticipated.

D. Does the subdivision conform to the Montana Subdivision and Platting Act and to local subdivision regulations? [MCA 76-3-608 (3) (b) and BMCC 23-302.H.3.a.]

The proposed subdivision satisfies the requirements of the Montana Subdivision and Platting Act, and the design standards specified in the local subdivision regulations. The subdivider and the local government have complied with the subdivision review and approval procedures set forth in the local and state subdivision regulations.

E. Does the proposed subdivision conform to all requirements of the zoning in effect? [BMCC 23-302.H.3.e.]

The subject property is located within NX2 – Mixed Residential 2 (2 to 8 units), NX1 Mixed Residential 1 (1 to 4 units) and CMU1 - Corridor Mixed Use 1. The lot frontages conform to the requirements of this zone. Other building setbacks and structure specific requirements will be reviewed for compliance at the time of building permit review.

F. Does the proposed plat provide easements for the location and installation of any utilities? [MCA 76-3-608 (3) (c) and BMCC 23-302.H.3.b.]

The subdivider will provide utility easements as requested by private utility companies on the face of the plat.

G. Does the proposed plat provide legal and physical access to each parcel within the subdivision and notation of that access on the plat? [MCA 76-3-608 (3) (d) and BMCC 23-302.H.3.c.]

Legal and physical access to the subdivision will be provided by Central Avenue, South 44th Street West and Tippet Trail and Road E (temporary name). Carriage Lane access is also provided to residential lots within the subdivision.

CONCLUSIONS OF FINDINGS OF FACT

- The preliminary plat of 44 West Subdivision, 2nd Filing does not create any adverse impacts that warrant denial of the subdivision.

- The proposed subdivision conforms to several of the goals and policies of the 2016 Growth Policy and does not conflict with the Transportation or Bikeway/Trail Plans.

- The proposed subdivision complies with state and local subdivision regulations, local zoning, and sanitary requirements and provides legal and physical access to each lot.

- Any potential negative or adverse impacts will be mitigated with the proposed conditions of approval.

RECOMMENDATION

Staff proposes the Planning Board recommends to City Council that the preliminary plat of 44 West Subdivision, 2nd Filing, be conditionally approved and the Findings of Fact adopted as presented in the staff report.

Traffic Impact Study

Prepared for submittal to:

CITY OF Billings

for the project:

Clearwater/44 West Subdivision

on behalf of:

Performance Engineering
3412 Colton Blvd., Suite 202
Billings, MT 59102

by:

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August 2025

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A: Original Raw Count Data for Intersections

B: Intersection Analysis Software Output

C: Estimated Future Traffic Volume Maps

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E: 44th at Central Avenue Intersection Signal Warrant Summaries

F: Intersection Cost Participation Calculations

1 INTRODUCTION

This report documents the Traffic Impact Study (TIS) conducted for the Clearwater/44 West subdivision project in northwest Billings. This is a working title for the project. Some parts of the site could be marketed under a different name before final occupancy. The study was conducted by and under the direction of a Professional Traffic Operations Engineer and Montana-licensed PE with expertise and experience in traffic engineering.

1.1 PROJECT SITE AND STUDY AREA

The overall subdivision site is shown in **Exhibit 1** along with the intersections studied. The existing study intersections were identified during preapplication review with City of Billings staff as:

1. S. 48th Street West at Central Avenue
2. Shiloh Road at Broadwater Avenue
3. Shiloh Road at Central Avenue
4. Shiloh Road at Bell Avenue
5. Shiloh Road at Monad Road

From here forward in this report, existing intersections are generally referred to only by their distinguishing street names (e.g., “Shiloh at Central”) for the sake of brevity. The two new subdivision access points on Central Avenue, Double Haul Lane and S. 44th Street West, have been analyzed for all future scenarios that include project traffic. The site’s third access will be to existing Bell Avenue, which is expected to be extended west into the site to serve the final phase. The new western terminus of Bell will be built to accommodate a potential future connection to the property west of this site, but no such connection has been planned there at the time of this study. The east-west Bell Avenue alignment generally separates the subdivision site into northern and southern parts of similar size.

1.2 LAND USE AND PHASING

The site is currently agricultural land, though it was in the process of being cleared for construction at the time of this study. The subdivision’s proposed land uses will be almost exclusively residential, with 259 single-family detached homes and 125 attached ones. The latter will include 60 attached multi-story units (townhomes) and 65 “cottage” units that would be smaller units not directly classifiable as apartments. One commercial lot sized to support two 11,000 square-foot buildings will be situated near the northwest corner of the site, abutting Central Avenue and Double Haul Lane.

The project is divided into two logical phases. All 125 of the “attached” type of residential units are included in Phase 1 and are located on the northern part of the site. Phase 1 also includes about one half (131) of the total single-family detached units. Phase 2 includes the commercial parcel and all residential lots on the southern part of the site, which are for the remaining 128 single-family homes. Phase 1 is further divided into three sub-phases, termed A, B, and C for this study, to help identify when certain traffic impact mitigation improvements would be needed. The dwelling unit totals for each sub-phase are described later in this report, in the context of this sensitivity analysis. Bell Avenue access was only assumed to be available for Phase 2.

Because the site is generally rural, the types and locations of specific pathways or other facilities and connections for pedestrians and bicycles have not yet been identified. A brief examination of potential traffic calming needs indicated that some streets have long enough blocks that the need for such measures could arise. On-street parking is expected to be allowed throughout the site wherever street width and sight distance allow for it and such parking does not interfere with operations at the Central Avenue access intersections.

Exhibit 2 shows the Clearwater/44 West site plan on which the analysis here is based. It includes land use types, streets, alleys, access points, and parkland areas, as well as phasing. This site plan drawing is provided for illustrative purposes only. The full high-resolution drawing is submitted separately by the applicant.

Exhibit 1. Overall Site Location and Study Intersections

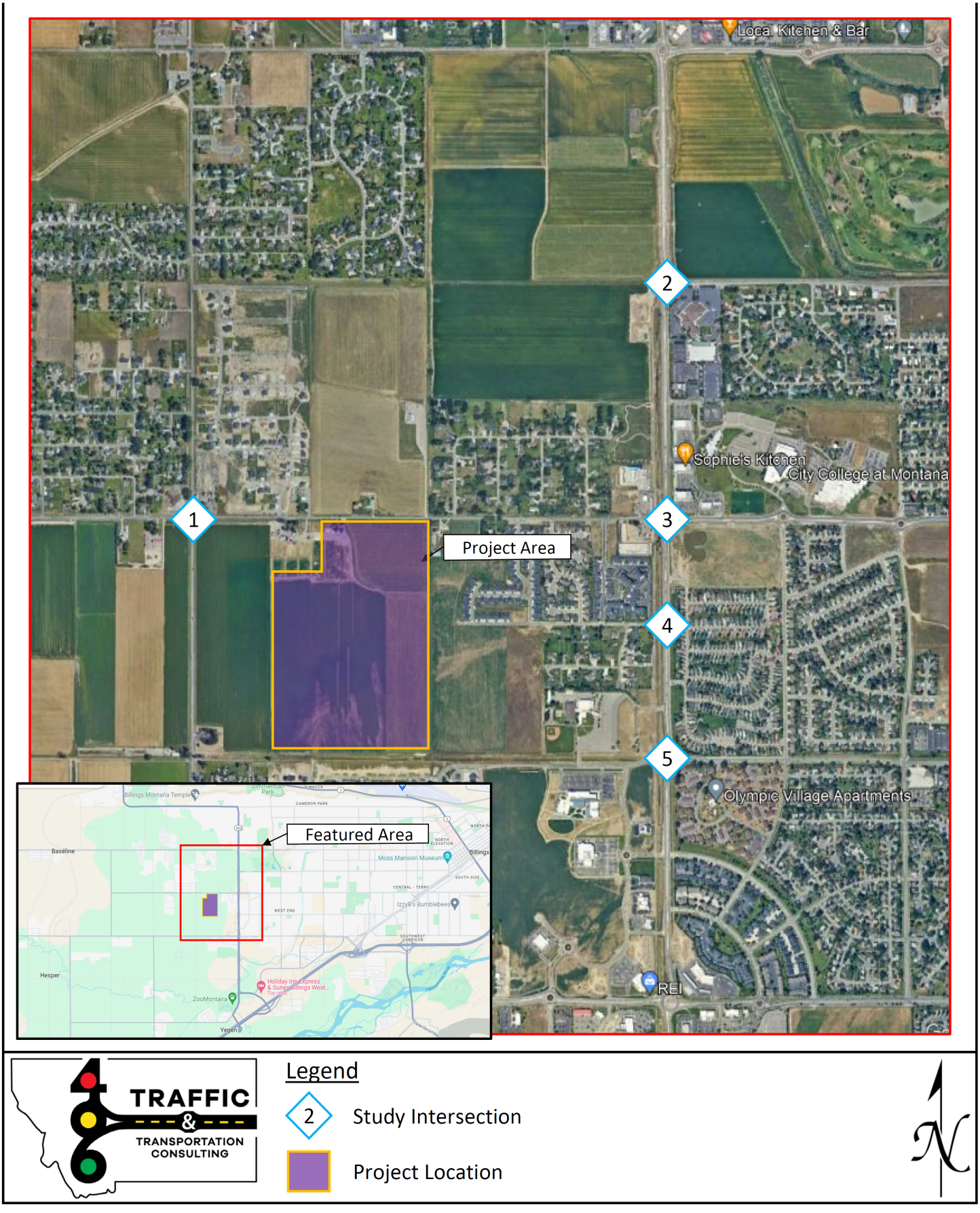
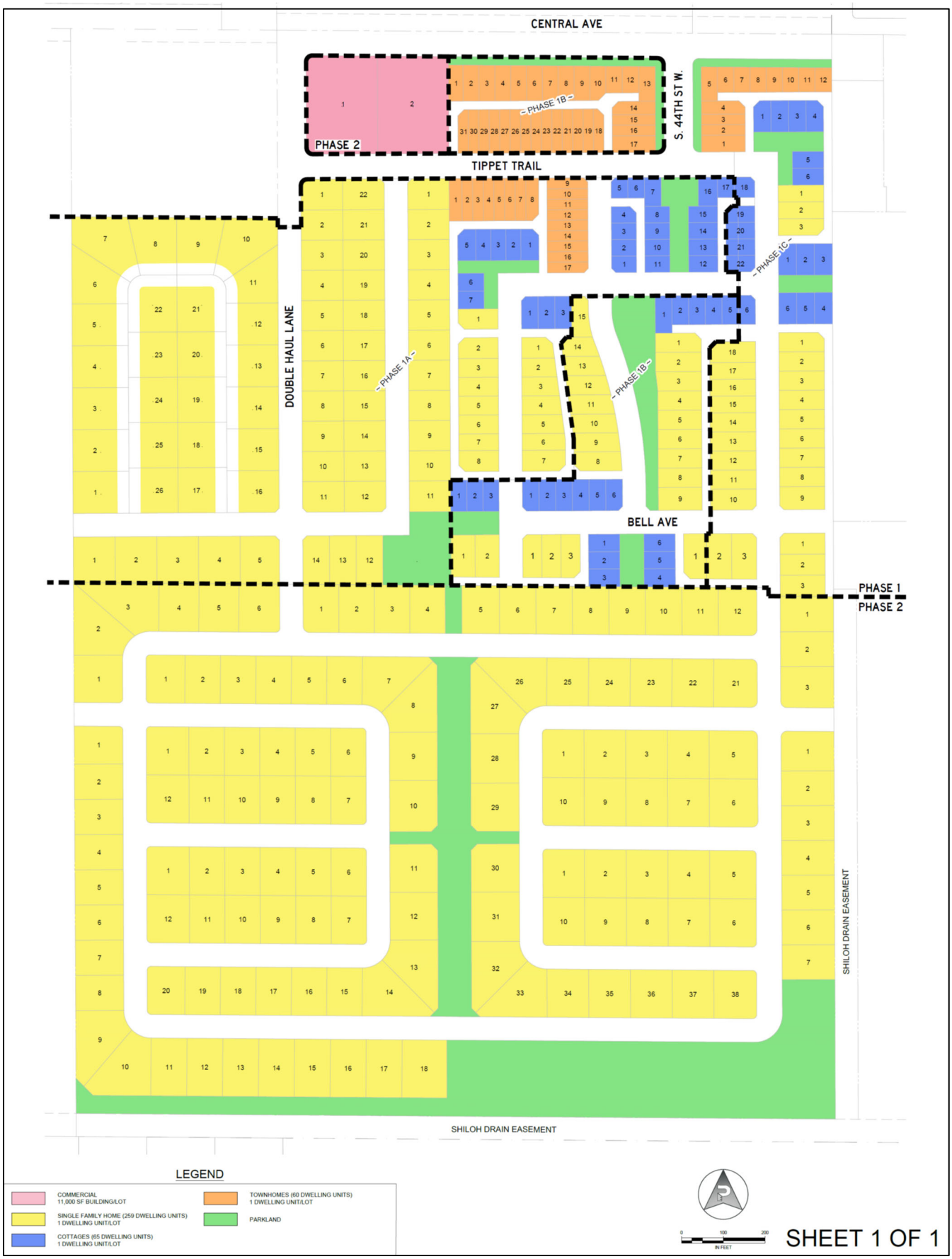


Exhibit 2. Site Plan and Phasing



Excerpted from: Performance Engineering concept site plan provided 7/17/2025

For analysis purposes, both Double Haul Lane and S. 44th Street West are assumed to have one northbound lane and one southbound lane at their intersections with Central, such that vehicles leaving the site waits in a single shared lane whether they are turning right or left.

1.3 ANALYSIS METHODS AND REFERENCES

Raw field traffic counts were gathered from other recent traffic study work in the area by Sanbell and provided to this project's applicant team. These raw counts were then adjusted slightly for this TIS based on both (a) recent traffic growth and (b) 2024 City of Billings annualization factors prior to their use in impact analysis.

Trip generation rates, or equations as applicable, are from the Institute of Transportation Engineers (ITE) Trip Generation suite's 11th edition, which was the most current available at the onset of this study. ITE trip generation data, when aggregated across enough varied sites, produce both simple average rates and best-fit equations, either linear or logarithmic, to help the analyst derive proper estimates for their situation. Equations are generally preferred over rates, especially for larger sites where trip generation per unit of land use can diminish with increasing project size. General ITE guidance calls for the use of the fitted curve equation when the data set for the land use type in question is comprised of studies from 20 or more separate sites and when the equation produces a correlation coefficient (R^2) of 0.75 or higher, with 1.0 being the best possible fit.

Operational performance was analyzed at the study intersections through the use of the industry-standard methods presented in the USDOT's Highway Capacity Manual (HCM), published in its modern form as Transportation Research Board Special Report 209. Synchro Studio 12 was employed as both a data repository and a capacity analysis tool, with reports for each intersection generated using Synchro's application of the assumptions of the HCM's 7th edition, the most recent available at the time of this study.

The HCM methodology for intersection capacity analysis produces delay estimates for each turning movement (or "lane group", when multiple turning movements operate from the same lane). These delay estimates are assigned Level of Service (LOS) grades that range from A (best) to F (worst), as indicated in **Exhibit 3**. It's also important to note that for unsignalized intersections with only side-street Stop sign control, LOS for the intersection is represented by the LOS for the worst lane group. "T" intersections with side-street stop control also fall under this category. All stop-controlled intersections in this study area, including the two new proposed accesses to Central, are "T" intersections, where the approach on the stem of the T, rather than a main street turning movement, contains the worst lane group.

Exhibit 3. LOS Definitions

LOS	Delay, seconds per vehicle
A	0 - 10.0
B	10.1 - 15.0
C	15.1 - 25.0
D	25.1 - 35.0
E	35.1 - 50.0
F	50.1 or more

Source: HCM 7th Edition

Operations impacts are determined by how peak hour LOS relates to acceptability standards. Billings employs a LOS standard of C or better. When LOS without the project is D or worse, an operations impact is usually defined when the project would increase delay.

In addition to intersection operations analysis, the need for auxiliary left- and right-turn lanes was examined as part of this study effort. These movements on arterial roadways at stop-controlled site access points with volumes that meet MDT criteria with respect to the department's guidelines indicated in Chapter 28 of its Traffic Engineering Manual. These auxiliary lanes would serve traffic entering the project site. Only locations with free-flowing traffic on the primary street are considered in this auxiliary lane analysis.

Potential mitigation of traffic impacts at the Central/44th intersection included the examination of traffic signal warrants according to the guidance in the Manual on Uniform Traffic Control Devices (MUTCD).

2 EXISTING AND BACKGROUND CONDITIONS

2.1 STREETS AND INTERSECTIONS

Shiloh Road, which also carries the designation of MT-302, is a north-south urban principal arterial according to the MDT (Montana Department of Transportation, and a principal arterial according to the 2023 Billings LRTP (Long Range Transportation Plan). It has two travel lanes in each direction and a speed limit of 45 mph in the study area. Shiloh Road has been a key facilitator of the city's westward expansion, with substantial residential and commercial growth having occurred adjacent to it in recent years. It is characterized by a series of roundabouts at intersections with several of western Billings's east-west arterials and collectors. It also provides access to Interstate 90 via Zoo Drive to the south. A raised median prevents left turns at many two-way stop-controlled intersections, including the one at Bell Avenue. Exclusive left-turn lanes exist at a few select site accesses and local streets. A sidewalk runs along the east side of the road, and a shared-use path called Shiloh Road Trail runs along the west side, much of it separated from the road by a large ditch. There are also two MET Transit bus stops on its east side between the Broadwater and Central roundabouts. These are not considered to be close enough to the project to site to provide meaningful transit access.

Central Avenue is an east-west road that is classified by the MDT as an urban collector to the west of Shiloh Road and as an urban principal arterial to the east of it. Accordingly, it has one travel lane in each direction to the west of Shiloh, and two travel lanes in each direction to the east of it. Its entire length from 64th St W to Montana Avenue is classified as a principal arterial in the 2023 Billings LRTP. It has a speed limit of 45 mph on both sides of Shiloh Road, but it becomes 50 mph to the west of 48th St W. It connects residential neighborhoods to many of western Billings' commercial centers. Central currently has no exclusive turning lanes or multimodal facilities to the west of Shiloh Road. However, the 2023 Billings LRTP shows that a shared-use path and/or trail are planned to be installed on Central Avenue to the west of Shiloh Road. There are also plans to expand Central Avenue to a three-lane cross-section to the west of Shiloh Road: one travel lane in each direction and a center left-turn lane.

48th Street W is a north-south local road according to the MDT, and a principal arterial according to the 2023 Billings LRTP. It has one travel lane in each direction, and its speed limit is 45 mph to the north of Central Avenue and 50 mph to the south of it. It links residences and agricultural properties on the western edges of Billings to the east-west routes that lead into the city, such as Central Avenue and King Avenue. No exclusive turning lanes or multimodal facilities currently exist on 48th in the study area.

Bell Avenue is an east-west local street according to both the MDT and the 2023 Billings LRTP. It has one travel lane in each direction and no posted speed limit. Currently, it provides access to Shiloh Road for a private senior living community and a few other residences. Its eastern terminus is at its intersection with Shiloh Road, where left turns are prohibited. Its western terminus is at a dead-end approximately 2300 feet to the west of this intersection, just past Big Pine Court. While three other streets that intersect Bell Avenue also lead to Central Avenue, these streets traverse private property. As such, Bell Avenue has no outlet for non-residents. The street has no exclusive turning lanes or bike infrastructure, but there is a sidewalk along most of its northern side, starting from the Shiloh Road Trail.

Monad Road is an east-west road that is classified by the MDT as an urban major collector to the east of Shiloh Road and as a local street to the west of it. The 2023 Billings LRTP classifies it as a minor arterial to the east of Shiloh Road, and it was planned to be a collector to the west of Shiloh Road at the time of the LRTP's publishing. West of Shiloh, it has one travel lane in each direction, as well as a center left-turn lane. East of Shiloh Road, it has one travel lane in each direction, but no center left-turn lane. Its speed limit is 35 mph to the east of Shiloh, but it does not have a speed limit posted on the west side. Monad Road connects many of western Billings' residential neighborhoods to the industrial areas near the railroad tracks and to north-south routes such as 32nd Street W and 24th Street W that lead to large commercial centers. It has exclusive right-turn lanes on the east and west legs of the roundabout at Shiloh Road, as well as an exclusive left-turn lane at

Henry Chapple Street. To the east of Shiloh Road, there are sidewalks, designated on-street parking, and unprotected bike lanes on both sides of the road. To the west of Shiloh, there is a shared-use path on much of the north side and a sidewalk on much of the south side of the street. There are also two nearby MET Transit bus stops on the south side of the road: one at Henry Chapple Street and the other at Hurdle Circle.

Broadwater Avenue is an east-west urban principal arterial according to the MDT, and a principal arterial according to the 2023 Billings LRTP. It has one travel lane in each direction and a speed limit of 35 mph in the study area. It serves as a link between residential neighborhoods in western Billings, some small commercial centers, and downtown Billings. Its eastern terminus is at its intersection with Division Street, 1st Ave N, and N 36th Street near downtown. Its western terminus is currently at a roundabout intersection with Shiloh Road. Currently, the roundabout's west leg only connects to two agricultural lots in active use, but the roundabout's infrastructure here has been built out in preparation for a potential westward extension of the road. 48th St W also intersects a road called Broadwater Avenue, but this local road segment is currently disconnected from the rest of the arterial network and is only accessible via 48th Street W. The arterial Broadwater Avenue has an exclusive westbound right-turn lane at the Shiloh roundabout. There is a shared-use path on the road's north side, and there is a sidewalk on the road's south side extending east.

Intersection traffic control currently comes in only three forms at the five existing study intersections: two-way stop control (TWSC), all-way stop control (AWSC), and roundabouts. Each leg of the three roundabouts has a crosswalk with a pedestrian refuge in the splitter island. Most of these crosswalks have solar-powered rectangular rapid flashing beacons. The intersection of Shiloh Road and Bell Avenue is considered two-way stop-controlled even though only one direction of traffic is stop-controlled. Only four movements are permitted at this intersection: northbound and southbound through movements and southbound and eastbound rights. Shiloh Road's center median prevents all left turns. The intersection of 48th Street and Central Avenue is all-way stop-controlled and is augmented with flashing red beacons facing all four directions, but it is projected to be upgraded to signalized control in 2026. **Exhibit 4** shows schematically the existing traffic control and lane arrangements at each existing intersection as well as posted speed limits on selected road segments as of the start of this study effort.

2.2 EXISTING TRAFFIC VOLUMES

Existing (2024) annualized volumes were estimated from raw field counts as described earlier in subsection 1.3 and are shown in **Exhibit 5**. These raw counts are provided in Appendix A.

2.3 HISTORIC GROWTH AND BACKGROUND CONDITION TRAFFIC

The "Background Condition" described here is represented by the volumes and intersection performance after multiple years of traffic growth assumed to occur during the permitting, construction, sales, and occupancy of the project. These steps are expected to be complete for Phase 1A in 2027. The resulting volumes and operating conditions form the basis for evaluating marginal intersection delay effects of traffic generated by this first phase of the Clearwater/44 West subdivision. Each new phase is projected to be completed two years before the last; Phase 1B in 2029, Phase 1C in 2031, and full buildout (Phase 2) in 2033. In order to estimate traffic growth without the project, average daily traffic volumes were gathered from selected MDT periodic data collection locations in the study area. The best and most logical data set available was represented by the four legs of the Shiloh intersection at Central. Data were recorded or estimated by MDT annually on each leg dating back at least 20 years. This historical traffic information is shown in the graph in **Exhibit 6**.

Counts from the most recent ten of these years were used to calculate the average annual growth rate in daily traffic for these four locations in aggregate, which was approximately 3.8% per year. This rate was then applied to the annualized peak hour intersection counts for each study year. Because the four phases of this project will be constructed sequentially and were not considered independent 'all-or-nothing' conditions at each two-year interval, each phase's traffic builds on that of the previous phase and each phase's traffic impacts were analyzed incrementally.

Exhibit 4. Existing Road and Intersection Basics

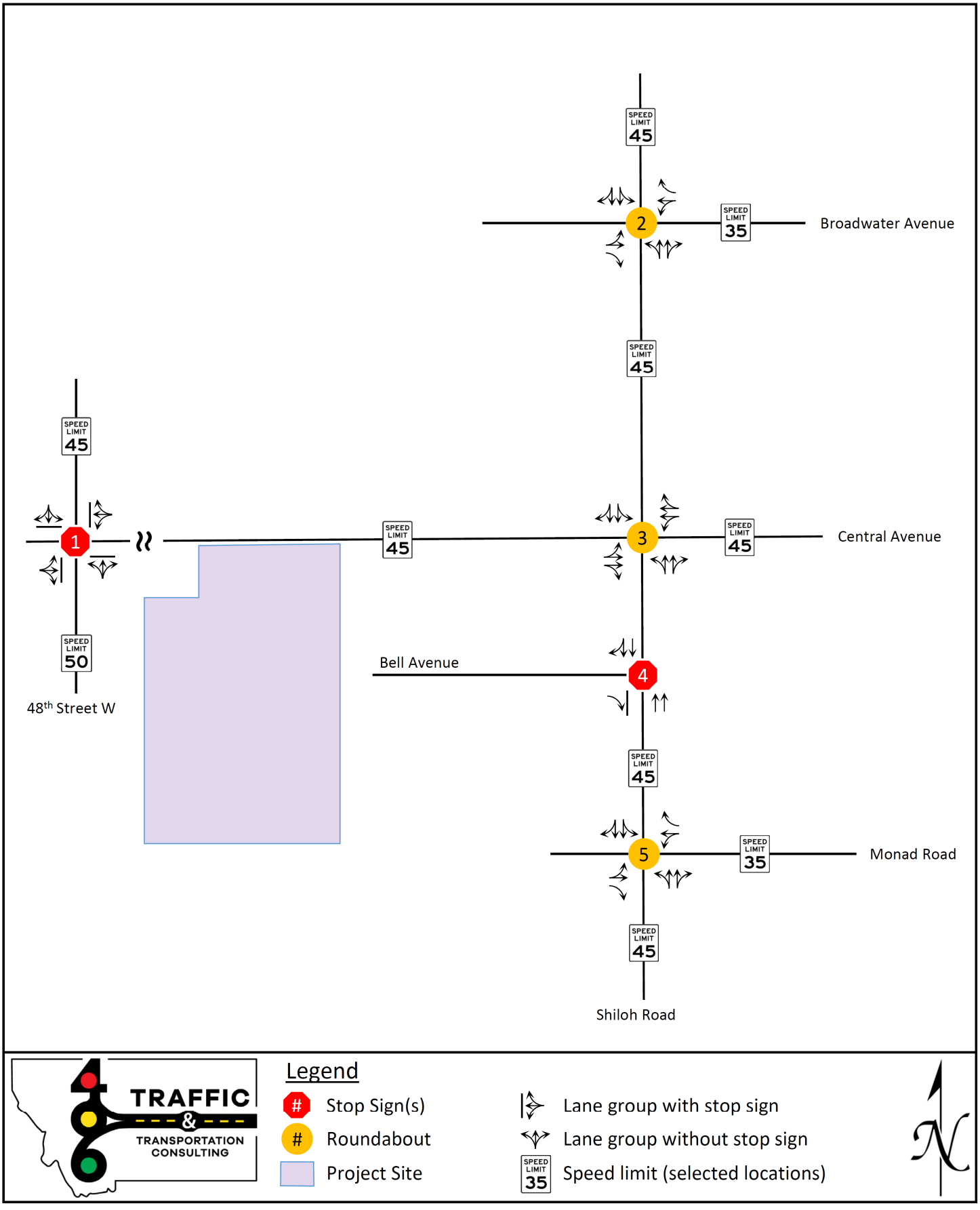


Exhibit 5. Existing Traffic Volumes

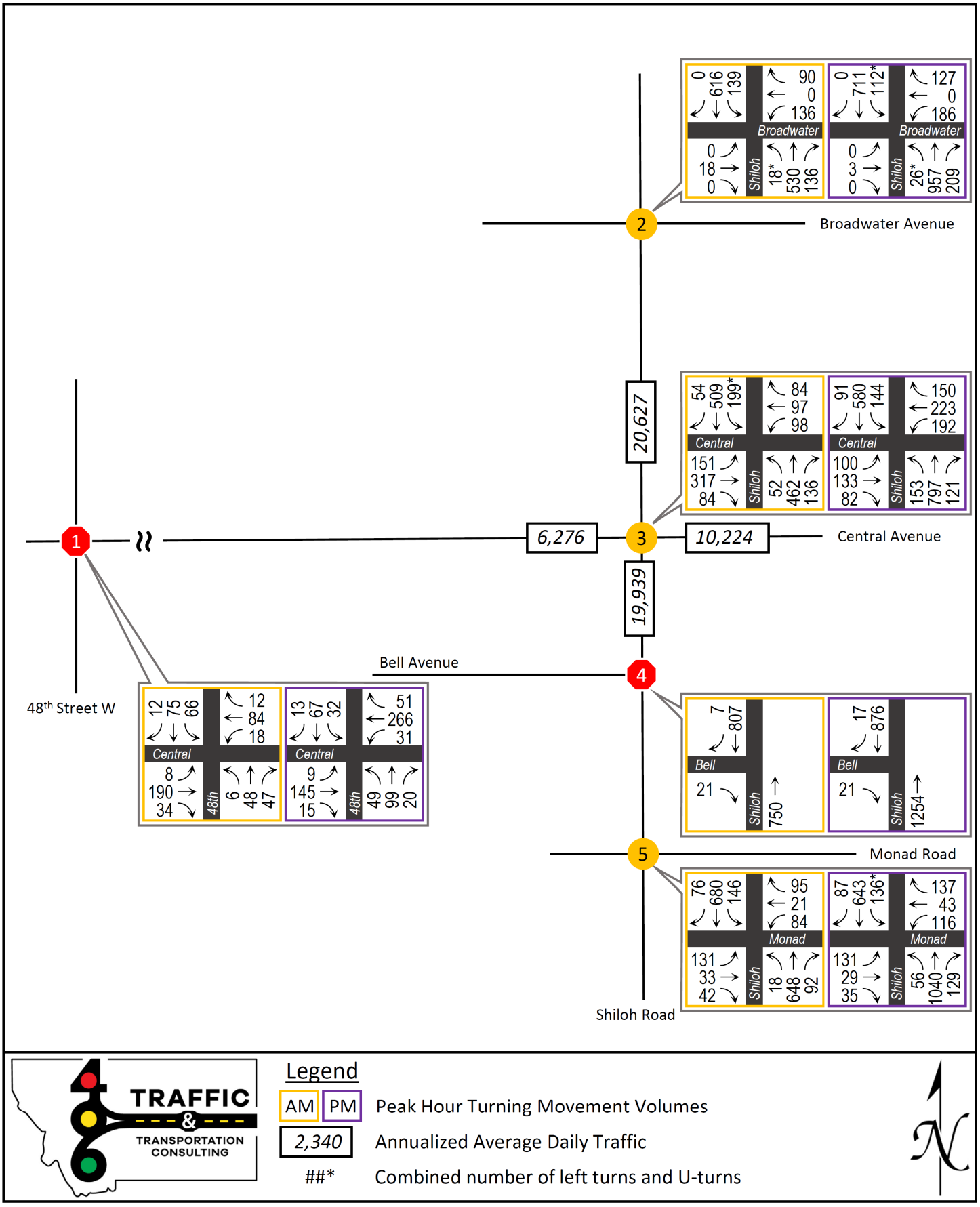
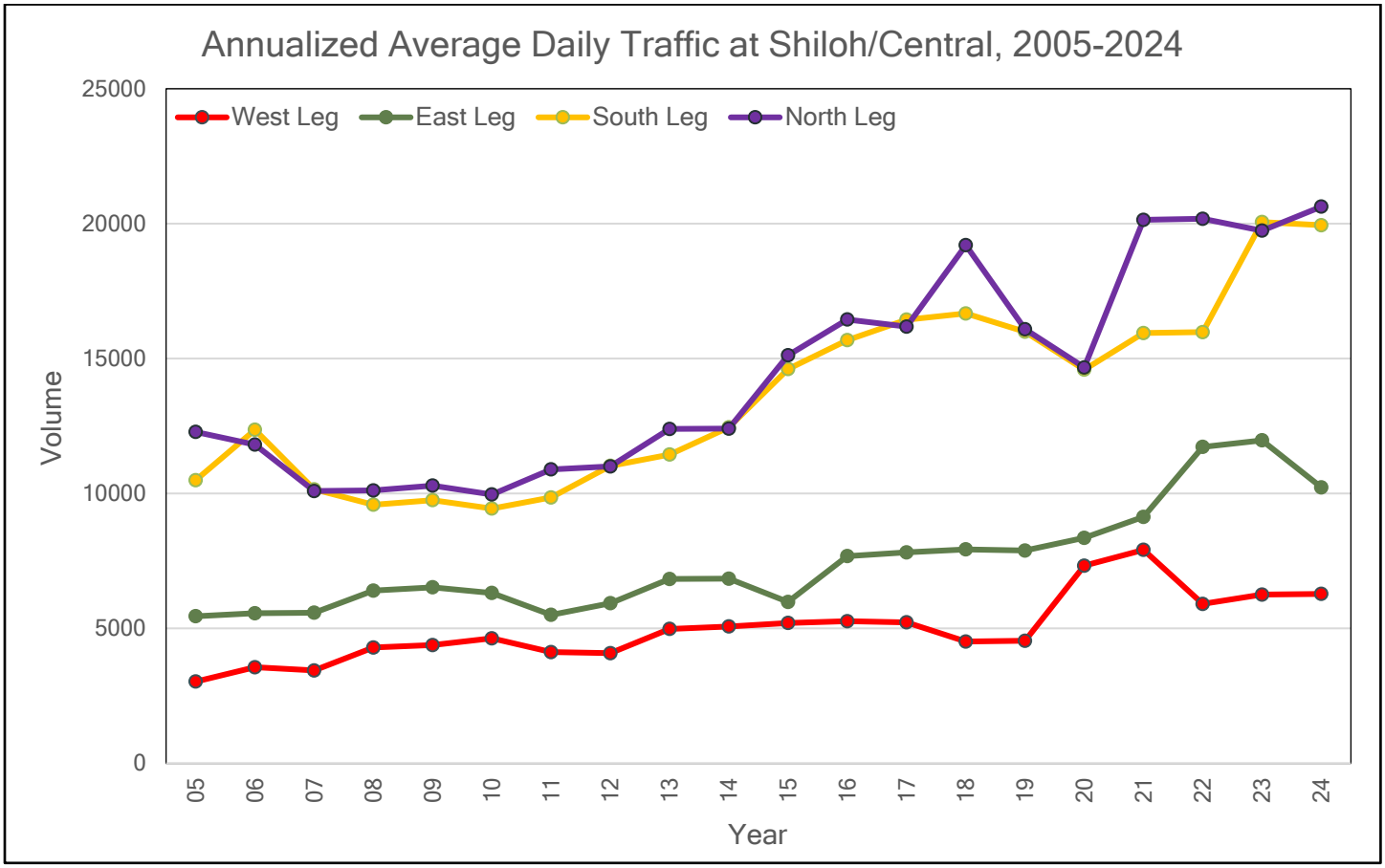


Exhibit 6. Historical Daily Traffic Volumes



2.4 Intersection Traffic Operations Without the Project

The existing and background peak hour intersection Level of Service (LOS) and delay results are shown in **Exhibit 7**. Analysis software results are provided in Appendix B.

Exhibit 7. Existing and Future Background Intersection LOS and Delay

	Intersection	Traffic Control	Peak Hour LOS (delay, in seconds/vehicle)
AM Peak Hour	1. 48th at Central	AWSC	A (9.6)
	2. Shiloh at Broadwater	Roundabout	A (6.0)
	3. Shiloh at Central	Roundabout	B (11.2)
	4. Shiloh at Bell	TWSC*	B (11.9)
	5. Shiloh at Monad	Roundabout	A (9.0)
PM Peak Hour	1. 48th at Central	AWSC	B (12.5)
	2. Shiloh at Broadwater	Roundabout	A (9.1)
	3. Shiloh at Central	Roundabout	B (13.6)
	4. Shiloh at Bell	TWSC*	B (12.2)
	5. Shiloh at Monad	Roundabout	B (10.0)

* *At Intersection 4, the worst lane group, which determines LOS, is Eastbound in both peak hours.*

The results in the table indicate that with 2024 annualized average traffic volume, all intersections operate at LOS B or better. Each roundabout has at least one approach that operates at LOS C in one or both peaks, but no approaches at LOS D or worse. Note that the only movement that must yield at Intersection 4 is eastbound Bell Avenue and that northbound traffic is not considered part of the intersection, due to the median present on Shiloh Road. At Intersection 5 in the PM peak, the delay estimate appears consistent with LOS A, but it is a rounded value that is actually just over 10.0 seconds so the software returns a LOS B result.

3 PROJECT TRIP GENERATION AND DISTRIBUTION

3.1 TRIP GENERATION

Trip generation rates, or equations as applicable, are from the Institute of Transportation Engineers (ITE) Trip Generation package's 11th edition. ITE trip generation data, when aggregated across enough varied sites, produce both simple average rates and best-fit equations, either linear or logarithmic, to help the analyst derive proper estimates for their situation. Equations are generally preferred over rates, especially for larger sites where trip generation per unit of land use can diminish with increasing project size.

Clearwater/44 West will consist almost entirely of residential land uses. Small parkland areas within the subdivision are designed and intended for use by residents and their guests, and will be similar to park spaces located in other residential areas around Billings. For that reason, they will not generate external traffic. The strip retail space in Phase 2, programmed for 22,000 square feet, has not had specific tenants or any sub-type(s) of retail use identified, but no drive-through activity is expected.

Three types of adjustments to trip generation were evaluated for this project. First, a discount is sometimes taken to reflect internal capture where multiple uses are present in a single project site. Second, a modal adjustment can be taken if a facility is clearly served by robust high-capacity transit and serves a clientele inclined to use transit to get there, or if the potential land use mix and walk/bike network are likely to lead to nonmotorized trips, either internal or external. Finally, some land uses such as gas stations or coffee shops attract trips that were already using the adjacent or nearby road network by virtue of improved convenience over a similar site that could have been used before. These are called "pass-by" and "diverted-linked" trips. Pass-by trips are those on streets bordering the site, while diverted-linked trips are those that might go slightly out of their way to stop at the establishment on their way to their destination.

The Phase 2 retail element is the only part of the site considered for these discounts. Due to the retail site's location, small size, and expected similarity to other sites along the Central Avenue corridor, only a small aggregate discount of the first two types was assumed here; it is not expected to support a use special enough or large enough to generate offsite multimodal or pass-by/diverted-linked trip activity. The estimated reduction in vehicle trip use for the on-site retail due to residents' use applied here is 10%. This reduction in retail vehicle trip use could take the form of subdivision residents (a) residents stopping at the on-site retail on their way to/from home, (b) choosing to drive to and from the on-site retail rather than a site farther away due to its proximity and convenience, or (c) choosing to walk or bike to and from the on-site retail for the same reason.

To arrive at phase-specific residential trip generation totals, the land use totals for the entire project (259 single family lots and 125 townhome or cottage lots) were first estimated, then the resulting trip totals were proportioned according to the amount of each home type in each phase. **Exhibit 8** shows trip generation details for each phase of the project.

Exhibit 8. Clearwater/44 West Trip Generation

		Daily	AM Peak Hour	PM Peak Hour
Full Project	ITE Land Use 210 – Single Family Detached Housing: X = 259 dwelling units			
	Equation	Ln(T) = 0.92(X) + 2.68	Ln(T) = 0.91(X) + 0.12	T = 0.60(X) - 3.93
	Peak hour in/out split		*25% / 75%*	*63% / 37%*
	Trips	2,422	177 (44 in / 133 out)	243 (153 in / 90 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 125 dwelling units (townhomes and "cottage" homes)			
	Equation	T = 7.62(X) - 50.48	T=0.52(X) - 5.70	T = 0.60(X) - 3.93
	Peak hour in/out split		*25% / 75%*	*59% / 41%*
	Trips	902	59 (15 in / 44 out)	71 (42 in / 29 out)
	ITE Land Use 822 – Strip Retail Plaza: X = 22 ksf (thousands of square feet)			
	Equation	T = 42.2(X) + 229.68	T = 2.36(X)	T = 6.59(X)
	Peak hour in/out split		*60% / 40%*	*50% / 50%*
	Gross retail trips	1,158	52 (31 in / 21 out)	145 (72 in / 73 out)
	Less 10% internal	-116	-5 (-3 in / -2 out)	-14 (-7 in / -7 out)
	Trips [net]	1,042	47 (28 in / 19 out)	131 (65 in, 66 out)
	Combined net trips, all uses:	**4,366**	**283 (87 in / 196 out)**	**445 (260 in / 185 out)**
by Phase		**Daily**	**AM Peak Hour**	**PM Peak Hour**
1A	ITE Land Use 210 – Single Family Detached Housing: X = 82 dwelling units			
	Trips	767	56 (14 in / 42 out)	77 (48 in / 29 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 44 dwelling units			
	Trips	317	21 (5 in / 16 out)	25 (15 in / 10 out)
	Phase 1A Total Trips	1,084	77 (19 in / 58 out)	102 (63 in / 39 out)
1B	ITE Land Use 210 – Single Family Detached Housing: X = 23 dwelling units			
	Trips	215	16 (4 in / 12 out)	22 (14 in / 8 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 51 dwelling units (townhomes and cottages)			
	Trips	368	24 (6 in / 18 out)	29 (17 in / 12 out)
	Phase 1B Total Trips	583	40 (10 in / 30 out)	51 (31 in / 20 out)
1C	ITE Land Use 210 – Single Family Detached Housing: X = 26 dwelling units			
	Trips	243	17 (4 in / 13 out)	24 (15 in / 9 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 30 dwelling units (townhomes and "cottage" homes)			
	Trips	216	15 (4 in / 11 out)	17 (10 in / 7 out)
	Phase 1C Total Trips	459	32 (8 in / 24 out)	41 (25 in / 16 out)
2	Phase 2 – Single Family Detached Housing: X = 128 dwelling units			
	Trips	1,197	88 (22 in / 66 out)	120 (76 in / 44 out)
	ITE Land Use 822 – Strip Retail Plaza: X = 22 ksf (thousands of square feet)			
	Trips [net]	1,042	47 (28 in / 19 out)	131 (65 in, 66 out)
	Phase 2 Total Trips	2,239	135 (50 in / 85 out)	251 (141 in, 110 out)
	Combined net trips, all phases:	**4,366**	**283 (87 in / 196 out)**	**445 (260 in / 185 out)**

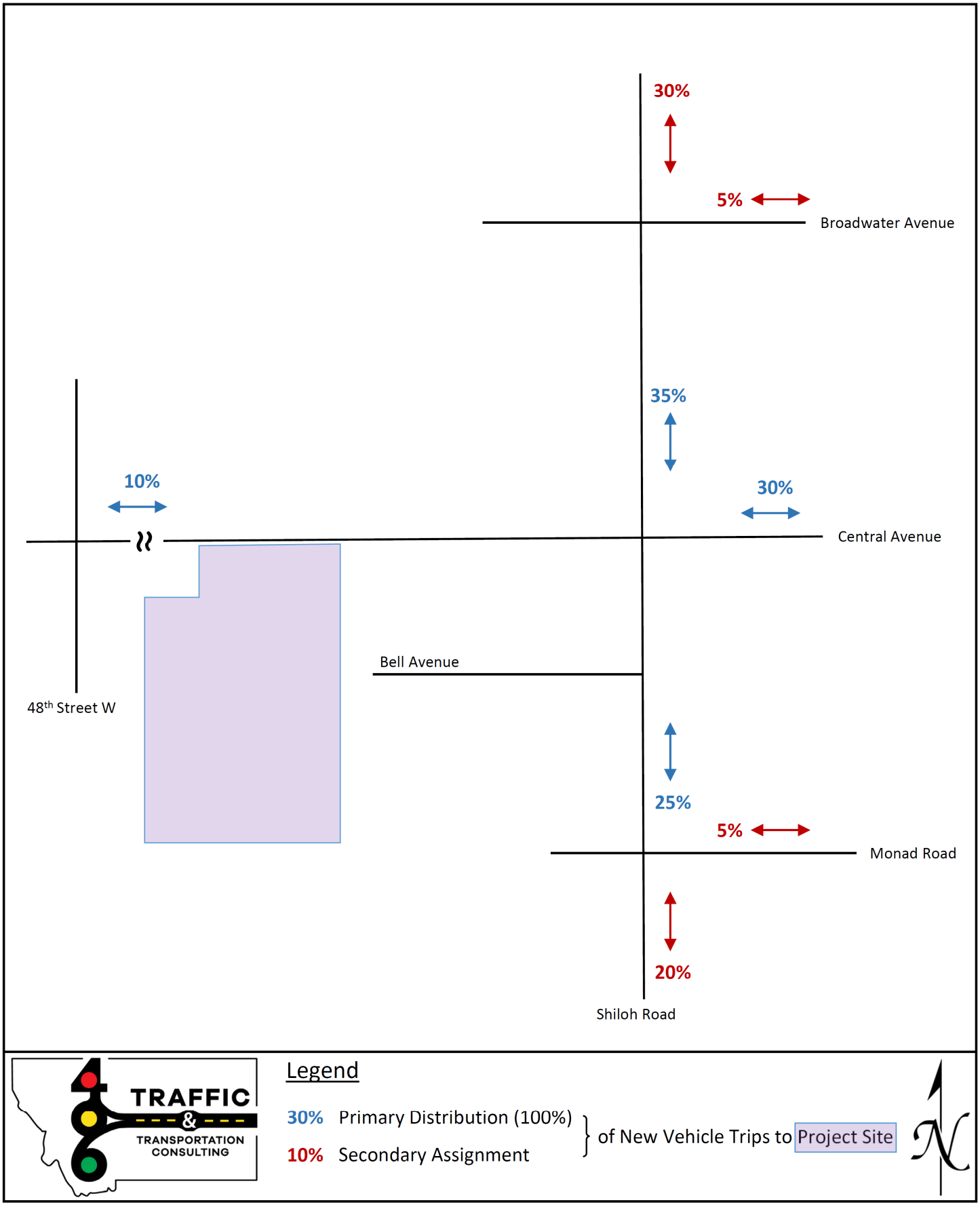
Source: Equations from ITE Trip Generation, 11th Edition.

3.2 TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution has been estimated for the streets surrounding the project site in percentages that add to 100%. Farther from the site, traffic eventually disperses in smaller percentages to/from other routes. Because there is no new information regarding a future developer's plan to connect Bell Avenue and/or the similar connection in Phase 2 to the neighborhood to the west, no Clearwater traffic was assumed to use either such connection. Trip distribution and large-scale assignment percentages are shown in **Exhibit 9**.

Note that the Shiloh median that blocks all left turns results in some differences in routing of in-out pairs once Bell becomes available for Phase 2 access to this site. For example, many residents leaving the site bound for the Shiloh/Monad intersection can turn right at the Shiloh/Bell intersection, but when they return to this site they must go north on Shiloh past Bell, then make a u-turn or left turn at the Shiloh/Central roundabout.

Exhibit 9. Trip Distribution Percentages for New Trips



Background traffic, project trips and total traffic reflected as peak hour intersection turning movement volumes and selected daily link volumes are shown in exhibits for each future phase-specific study year. Only the future traffic for the first phase (1A) is a true "without the project" estimate. Each subsequent phase's impact is assessed with the previous phase assumed to be open. As such, "Phase 2" conditions represent full project buildout. For the sake of report continuity, all 'future traffic volume' exhibits are provided in Appendix C.

4 CAPACITY ANALYSIS

The analysis results described in this section are organized by project phase order. Note again that project traffic by phase is additive such that, for example, Phase 1B also includes Phase 1A. Summaries of intersection capacity and auxiliary turn lane analysis results are provided for each phase in the study area when it's projected to be fully open. As with the existing condition, intersection capacity analysis software output results for the future conditions analyzed are provided in Appendix B. Turn lane warrant summaries for applicable situations are provided in Appendix D and summaries of MUTCD signal warrant analysis for Intersection 7 are provided by phase in Appendix E.

4.1 PHASE 1A

The peak hour intersection Level of Service (LOS) and delay results in 2027 with and without Clearwater/ 44 West subdivision Phase 1A traffic are shown in **Exhibit 10**.

Exhibit 10. Projected 2027 Intersection LOS and Delay: Phase 1A

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle)	
			Background (Without Phase 1A)	With Phase 1A
AM Peak Hour	1. 48th at Central	Signal	A (6.2)	A (6.2)
	2. Shiloh at Broadwater	Roundabout	A (6.5)	A (6.6)
	3. Shiloh at Central	Roundabout	B (14.5)	C (15.9)
	4. Shiloh at Bell	TWSC*	B (12.6)	B (12.7)
	5. Shiloh at Monad	Roundabout	B (10.8)	B (10.9)
	6. Double Haul at Central	TWSC*	-	B (12.5)
	7. 44th at Central	TWSC*	-	B (12.6)
PM Peak Hour	1. 48th at Central	Signal	A (7.0)	A (7.0)
	2. Shiloh at Broadwater	Roundabout	B (11.0)	B (11.2)
	3. Shiloh at Central	Roundabout	C (18.9)	C (21.8)
	4. Shiloh at Bell	TWSC*	B (12.9)	B (13.0)
	5. Shiloh at Monad	Roundabout	B (12.5)	B (12.7)
	6. Double Haul at Central	TWSC*	-	B (11.3)
	7. 44th at Central	TWSC*	-	B (10.7)

* *Worst lane group is Eastbound at Intersection 4 and Northbound at Intersections 6 and 7.*

Both of the site accesses on Central would operate at LOS B in both 2027 peak hours. All intersections and both new site accesses would operate within the City's LOS standard of C or better in both peak hours. As a result of this finding, no additional control beyond a side-street (northbound) stop sign is considered necessary.

A simple look at 2027 Phase 1 turning volumes on Central made it clear that the potential need for auxiliary left turn lanes was worth examining, in accord with the MDT procedures described earlier in this report, in subsection 1.3. Right turn lane volumes at Intersections 6 and 7 would be too low (under 40 vph) for potential auxiliary turn lane consideration. Although left-turning volumes into the site will be higher in the PM peak due to the project's residential nature, conditions on the appropriate MDT left turn chart have been plotted for both peaks. While a westbound left turn auxiliary lane at Double Haul is not justified by Phase 1A traffic under the assumptions in this study, the potential case for such a lane at 44th appears to be inconclusive.

At Intersection 7, no signal warrants would be met under Phase 1A conditions.

4.2 PHASE 1B

The peak hour intersection Level of Service (LOS) and delay results in 2029 with and without Clearwater/44 West subdivision Phase 1B traffic are shown in **Exhibit 11**.

Exhibit 11. Projected 2029 Intersection LOS and Delay: Phase 1B

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle) Without Phase 1B	With Phase 1B
AM Peak Hour	1. 48th at Central	Signal	A (6.4)	A (6.4)
	2. Shiloh at Broadwater	Roundabout	A (7.2)	A (7.2)
	3. Shiloh at Central	Roundabout	C (20.9)	C (22.4)
	4. Shiloh at Bell	TWSC*	B (13.2)	B (13.3)
	5. Shiloh at Monad	Roundabout	B (12.8)	B (13.0)
	6. Double Haul at Central	TWSC*	B (13.0)	B (13.1)
	7. 44th at Central	TWSC*	B (13.0)	B (13.6)
PM Peak Hour	1. 48th at Central	Signal	A (7.3)	A (7.3)
	2. Shiloh at Broadwater	Roundabout	B (13.1)	B (13.3)
	3. Shiloh at Central	Roundabout	D (31.1)	D (33.7)
	4. Shiloh at Bell	TWSC*	B (13.6)	B (13.6)
	5. Shiloh at Monad	Roundabout	C (15.5)	C (15.7)
	6. Double Haul at Central	TWSC*	B (11.7)	B (12.1)
	7. 44th at Central	TWSC*	B (11.0)	B (11.3)

* *Worst lane group is Eastbound at Intersection 4 and Northbound at Intersections 6 and 7.*

Both of the site accesses on Central would operate at LOS B in both 2029 peak hours. The 2029 study year marks the first time an intersection's peak LOS would exceed the City's standard (C or better), with the Shiloh intersection at Central projected operate at LOS D with or without Phase 1B traffic. In addition, each of the four approaches to the intersection would operate at the same LOS with or without Phase 1B traffic. The discussion of mitigating the LOS impact at this location is deferred to the next subsection, on Phase 1C.

With respect to auxiliary turn lanes at Intersections 6 and 7, as with 2027, the 2029 right turn lane volumes would remain too low for potential consideration. Although left-turning volumes into the site will be higher in the PM peak due to the project's residential nature, conditions on the appropriate MDT chart have been plotted for both peaks. A westbound left turn auxiliary lane at 44th would be justified by Phase 1B traffic, but the potential case for such a lane at Double Haul Lane appears to be inconclusive.

Note that the LOS results shown in Exhibit 11 above for the 44th intersection do not reflect the addition of a westbound left turn auxiliary lane, but that lane addition could be expected to result in a slight improvement in overall operations.

At Intersection 7, no signal warrants would be met under Phase 1B conditions.

4.2 PHASE 1C

The peak hour intersection Level of Service (LOS) and delay results in 2031 with and without Clearwater/44 West subdivision Phase 1C traffic are shown in **Exhibit 12**.

Exhibit 12. Projected 2031 Intersection LOS and Delay: Phase 1C

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle) Without Phase 1C	With Phase 1C
AM Peak Hour	1. 48th at Central	Signal	A (6.6)	A (6.6)
	2. Shiloh at Broadwater	Roundabout	A (7.8)	A (7.8)
	3. Shiloh at Central	Roundabout	D (32.8)	E (35.3)
	4. Shiloh at Bell	TWSC*	B (13.9)	B (14.0)
	5. Shiloh at Monad	Roundabout	C (15.8)	C (15.9)
	6. Double Haul at Central	TWSC*	B (13.7)	B (13.7)
	7. 44th at Central	TWSC*	B (14.2)	B (15.0)
PM Peak Hour	1. 48th at Central	Signal	A (7.7)	A (7.7)
	2. Shiloh at Broadwater	Roundabout	C (16.5)	C (16.7)
	3. Shiloh at Central	Roundabout	F (54.2)	F (58.6)
	4. Shiloh at Bell	TWSC*	B (14.3)	B (14.4)
	5. Shiloh at Monad	Roundabout	C (20.6)	C (20.9)
	6. Double Haul at Central	TWSC*	B (12.5)	B (12.5)
	7. 44th at Central	TWSC*	B (11.6)	B (12.0)

* *Worst lane group is Eastbound at Intersection 4 and Northbound at Intersections 6 and 7.*

Both of the site accesses on Central would operate at LOS B in both 2031 peak hours. The Shiloh intersection at Central would remain the only intersection projected operate at LOS D or worse, and it would do so in both peaks with or without Phase 1C traffic. PM peak hour traffic would be expected to experience considerably higher delay than AM peak hour traffic, so the PM case is the one subject to the examination of potential mitigation to reduce projected delay.

To address future capacity deficiencies, a primary tool at roundabouts is the addition of a channelized right turn bypass lane on the approach(es) with the highest right-turning volumes. Such a bypass lane requires widening and would lengthen pedestrian crossings, as with the addition of a turn lane at any intersection. The westbound approach to Shiloh/Central would exhibit the longest delays and queues in the 2031 PM peak hour scenario, so it was the one examined for potential benefit. It also has the highest right-turn volume of the four approaches. Simple testing shows that addition of a bypass lane would reduce westbound delay by about 67%, which would be enough of an improvement to improve the overall intersection PM peak LOS (and delay) from the F (58.6) shown in Exhibit 12 above to E (40.0). Synchro's estimate of the 95th percentile westbound queue would be reduced by about half, from 17 vehicles in each lane to 9 in one lane and 8 in the other. While no site-oriented movements would benefit directly from the bypass lane because it carries no such trips, the secondary benefit makes it worth exploring further as an intersection delay impact mitigation action.

The projection of substandard operations at Shiloh/Central, even without Phase 1C traffic, echoes similar findings for other major Shiloh roundabouts from recent studies. Some of this congestion stems from the scarcity of east-west street network connections other than the major arterials that are generally a mile apart. To that end, a secondary, "bigger-picture" part of the overall solution could involve the westward extension of the east-west streets a half-mile north/south of Central (Broadwater and/or Monad) to help relieve the traffic burden on Grand, Central, and King. Examination of the complex and detailed effects of such extensions are well outside the scope of this project's mitigation analysis but still bear mentioning for general interest. The applicant team encourages the City to consider prioritizing, to the extent practicable, additional east-west connectivity between Shiloh and 48th with eventual functional extensions of Broadwater and/or Monad as additional land use changes occur along those alignments.

With respect to auxiliary turn lanes at Intersections 6 and 7, as with 2027 and 2029 the 2031 right turn lane volumes would remain too low for potential consideration. Although left-turning volumes into the site will be higher in the PM peak due to the project's residential nature, conditions on the appropriate MDT chart have been plotted for both peaks. Westbound left turn auxiliary lanes would be justified by Phase 1C traffic at both Double Haul Lane and 44th.

Note that the LOS results shown in Exhibit 12 above for the Double Haul and 44th intersections do not reflect the addition of westbound left turn auxiliary lanes, but that lane addition could be expected to result in a slight improvement in overall operations.

At Intersection 7, only the Four-Hour signal warrant would be met under Phase 1C conditions.

4.2 PHASE 2

The peak hour intersection Level of Service (LOS) and delay results in 2033 with and without Clearwater/44 West subdivision Phase 2 traffic are shown in **Exhibit 13**.

Exhibit 13. Projected 2033 Intersection LOS and Delay: Phase 2

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle) Without Phase 2	With Phase 2
AM Peak Hour	1. 48th at Central	Signal	A (6.9)	A (6.9)
	2. Shiloh at Broadwater	Roundabout	A (8.5)	A (8.7)
	3. Shiloh at Central	Roundabout	F (58.5)	F (74.9)
	4. Shiloh at Bell	TWSC*	B (14.8)	C (15.6)
	5. Shiloh at Monad	Roundabout	C (21.1)	C (22.3)
	6. Double Haul at Central	TWSC*	B (14.4)	C (16.3)
	7. 44th at Central	TWSC*	C (15.8)	C (18.0)
PM Peak Hour	1. 48th at Central	Signal	A (8.2)	A (8.3)
	2. Shiloh at Broadwater	Roundabout	C (22.3)	C (24.6)
	3. Shiloh at Central	Roundabout	F (96.1)	F (144.6)
	4. Shiloh at Bell	TWSC*	C (15.2)	C (16.2)
	5. Shiloh at Monad	Roundabout	D (30.4)	D (33.5)
	6. Double Haul at Central	TWSC*	B (13.1)	B (14.8)
	7. 44th at Central	TWSC*	B (12.5)	B (14.8)

* *Worst lane group is Eastbound at Intersection 4 and Northbound at Intersections 6 and 7.*

In 2033, both of the site accesses on Central would operate at LOS B in the PM peak hour and at LOS C in the AM peak hour with or without the addition of Phase 2 traffic. The Shiloh intersection at Central would operate at LOS F in both peaks with or without Phase 2 traffic. Increasing background traffic also results in a projection that the Shiloh intersection at Monad would operate beyond the City's standard under the 2033 conditions examined, at LOS D, with or without Phase 2 traffic. At all roundabout intersections, PM peak hour traffic would be expected to experience considerably higher delay than AM peak hour traffic.

Mitigation of the Shiloh/Central condition would take the same form described for Phase 1C impacts, at least in concept: the eventual addition of a westbound right turn bypass lane. Testing with 2033 Phase 2 PM volumes indicates that addition of a bypass lane would reduce westbound delay by about 59%, which would be enough of an improvement to improve the overall intersection PM peak LOS (and delay) from the F (144.6) shown in Exhibit 13 above to F (105.9). Synchro's estimate of the 95th percentile westbound queue would be reduced by about 43%, from 29 vehicles per lane to 17. If additional delay mitigation is needed to reduce overall delay to pre-Phase 2 level [F (96.0)], a northbound right turn lane could also be considered.

No mitigations were tested for the LOS D condition at the Monad intersection.

With respect to auxiliary turn lanes at Intersections 6 and 7, as with previous phases the 2033 right turn lane volumes would remain too low for potential consideration. Because left turn lanes were justified by traffic from the previous phase, no new analysis of those lanes was conducted with the addition of Phase 2 traffic. The potential need for a right turn auxiliary lane was examined for the intersection of Shiloh at Bell, and this analysis indicated that PM peak hour traffic in Phase 2 would help to justify the addition of such a lane. As with previous phases, the LOS results shown in Exhibit 13 above do not reflect the addition of any auxiliary lanes.

At Intersection 7, the Four-Hour signal warrant would be met by a considerable margin under Phase 2 conditions, and the Eight-Hour warrant would be within the margin of estimating/forecasting uncertainty, with minor street volume slightly over the minimum threshold. With these two warrants technically met, a signal could be considered under 2033 conditions at this location. The project team recommends further monitoring of traffic volume conditions and consideration of future traffic to and from the property directly across Central to the north. That development project would create a new fourth leg (a southbound approach) to this intersection and was only in the early stages of planning/permitting at the time this TIS report was completed.

5 COST PARTICIPATION

The net new trips identified in this report were subject to examination under the City's arterial intersection cost participation program to the extent that they would travel through studied intersections. City staff also requested that the two project access intersections on Central be included even though they are effectively local streets (low-speed with parking and driveways, not connected to other major routes) rather than arterials. Critical traffic shares that drive intersection cost participation can be excluded if they fall below 2%, but project trips from all phases are considered together when evaluating such a possibility. Right turns are not considered in cost participation, so intersection 4 (Bell) was omitted here with the permission of City staff because the Shiloh Road median dictates that the intersection's only conflicting critical pairs involve right turns. Phase-specific project trips used in this calculation are documented in the traffic volume graphics provided in Appendix C.

The retail part of the site is scheduled to be developed in Phase 2 but it's located in the area covered by Phase 1A. Because that area is subject to a Subdivision Improvement Agreement that directly benefits the two future retail lots on the Phase 1 property, cost participation associated with retail trips was pulled forward from Phase 2 to Phase 1A.

Exhibit 14 shows the incremental intersection cost participation for the new trips associated and the cost share calculation with each project phase. As shown in the table, no intersections qualify for the "sub-2%" waiver when all phases are considered.

Exhibit 14. Intersection Cost Participation by Phase

	Phase				Project
Intersection	**1A**	**1B**	**1C**	**2**	**Total**
1. 48th at Central	1.1%	0.3%	0.2%	0.6%	2.2%
2. Shiloh at Broadwater	1.9%	0.5%	0.4%	1.2%	4.0%
3. Shiloh at Central	7.4%	1.7%	1.4%	3.3%	13.8%
5. Shiloh at Monad	1.8%	0.4%	0.3%	1.0%	3.5%
Arterial Intersection Subtotal:	**12.2%**	**2.9%**	**2.3%**	**6.1%**	**23.5%**
6. Double Haul at Central (Local)	8.6%	0.3%	0.2%	2.0%	11.1%
7. 44th at Central (Local)	9.2%	2.5%	2.1%	2.8%	16.6%
Total Participation:	**30.0%**	**5.7%**	**4.6%**	**10.9%**	**51.2%**

Note: each % represents the highest project critical-volume share of the two peak hours (AM or PM)

For all six intersections evaluated for cost participation in all phases, the PM peak hour critical-pair traffic volume would be equal to or greater than in the AM peak hour. It's important to note that more than half of the critical traffic shares indicated would occur at the two local intersections (6 and 7), both of which would operate within the City's LOS C standard in both peaks in all project phases. The details of these cost participation calculations are provided in Appendix F.

This concludes the Clearwater/44 West Subdivision TIS.

Appendix A: Original Raw Traffic Count Data for Intersections

Study Name **Central and 48th**
Start Date **8/8/2023**
Start Time **7:30 AM**
Type **Road**
Classification **Totals**

	48th Street Southbound				Central Avenue Westbound				48th Street Northbound				Central Avenue Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM																
7:15 AM																
7:30 AM	3	13	19	0	3	27	2	0	18	9	2	0	5	62	1	0
7:45 AM	3	26	21	0	3	24	5	0	9	10	1	0	12	48	1	0
8:00 AM	4	19	12	0	3	17	5	0	10	13	3	0	10	44	2	0
8:15 AM	2	15	13	0	3	14	5	0	8	14	0	0	6	31	4	0
8:30 AM																
8:45 AM																
4:00 PM																
4:15 PM																
4:30 PM																
4:45 PM																
5:00 PM	1	15	6	0	14	70	7	0	7	23	9	0	5	38	1	0
5:15 PM	3	19	12	0	17	60	12	0	5	30	19	0	5	40	2	0
5:30 PM	4	18	5	0	8	69	6	0	6	20	10	0	2	32	4	0
5:45 PM	5	14	8	0	10	60	5	0	1	23	9	0	2	31	2	0

Study Name **Shiloh & Broadwater**
Start Date **3/7/2024**
Start Time **7:00 AM**
Type **Road**
Classification **Totals**

	Shiloh Road Southbound				Broadwater Avenue Westbound				Shiloh Road Northbound				Eastbound Approach Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	0	111	22	0	17	0	8	0	23	52	0	0	0	1	0	0
7:15 AM	0	147	52	0	21	0	25	0	35	102	0	6	0	3	0	0
7:30 AM	0	182	63	0	18	0	33	0	28	122	0	2	0	4	0	0
7:45 AM	0	170	34	0	23	0	39	0	38	140	0	4	0	4	0	0
8:00 AM	0	131	22	0	26	0	29	0	39	143	0	6	0	6	0	0
8:15 AM	0	139	21	0	24	0	36	0	32	130	0	6	0	4	0	0
8:30 AM	0	133	23	0	18	0	28	0	42	137	0	5	0	3	0	0
8:45 AM	0	150	49	0	18	0	28	0	34	124	0	3	0	4	0	0
4:00 PM	0	143	17	0	33	0	42	0	27	244	0	5	0	2	0	0
4:15 PM	0	151	25	0	20	0	46	0	36	226	0	2	0	0	1	0
4:30 PM	0	151	31	0	21	0	38	0	50	238	2	2	0	0	0	0
4:45 PM	0	177	21	0	24	0	37	0	35	201	1	3	0	0	0	0
5:00 PM	0	169	23	0	40	0	56	0	56	281	0	8	0	3	0	0
5:15 PM	0	193	32	1	44	0	52	0	63	283	4	8	0	0	0	0
5:30 PM	0	179	35	1	20	0	43	0	57	202	1	1	0	0	0	0
5:45 PM	0	160	33	2	20	1	35	0	43	200	0	0	0	0	0	0

Study Name **Shiloh & Central**
Start Date **3/21/2024**
Start Time **7:00 AM**
Type **Road**
Classification **Totals**

	Shiloh Road Southbound				Central Avenue Westbound				Shiloh Road Northbound				Central Avenue Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	6	74	22	0	7	13	15	0	19	66	9	1	19	51	15	0
7:15 AM	8	118	48	0	7	18	28	0	32	84	14	0	25	90	17	0
7:30 AM	16	128	69	1	18	25	29	0	41	96	15	0	22	112	36	0
7:45 AM	17	135	67	0	26	19	34	0	36	130	19	0	20	91	42	0
8:00 AM	7	116	32	0	29	25	17	0	33	114	10	0	21	76	37	0
8:15 AM	15	135	31	1	12	29	19	0	27	127	9	0	22	41	38	0
8:30 AM	9	98	29	0	15	30	21	0	26	146	10	0	16	30	31	0
8:45 AM	10	102	31	1	20	22	24	0	17	119	20	0	22	40	30	0
4:00 PM	19	127	37	0	23	51	45	0	35	168	24	0	21	29	27	0
4:15 PM	20	100	34	0	35	41	58	0	26	156	45	0	20	39	25	0
4:30 PM	23	127	35	0	38	50	62	0	30	163	47	0	21	26	27	0
4:45 PM	19	153	33	0	41	45	49	0	26	174	41	0	15	36	23	0
5:00 PM	26	152	34	0	38	63	48	0	31	235	32	0	21	46	23	0
5:15 PM	24	154	43	0	35	67	35	0	35	233	35	0	26	26	28	0
5:30 PM	17	142	35	0	40	74	46	0	32	148	35	0	14	32	27	0
5:45 PM	21	148	30	0	31	46	41	0	32	162	26	0	24	22	30	0

Study Name Shiloh & Bell
Start Date 5/18/2023
Start Time 7:00 AM
Type Road
Classification Totals

	Shiloh Road Southbound				n/a Westbound				Shiloh Road Northbound				Bell Avenue Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	1	126		0						103	0	0	1		0	0
7:15 AM	0	186		0						111	0	0	2		0	0
7:30 AM	2	181		0						228	0	0	7		0	0
7:45 AM	2	239		0						213	0	0	7		0	0
8:00 AM	1	184		0						169	0	0	7		0	0
8:15 AM	3	233		0						167	0	0	1		0	0
8:30 AM	2	163		0						180	0	0	3		0	0
8:45 AM	6	174		0						169	0	0	5		0	0
4:00 PM	2	225		0						272	0	0	6		0	0
4:15 PM	4	224		0						262	0	0	3		0	0
4:30 PM	3	212		0						311	0	0	2		0	0
4:45 PM	5	212		0						307	0	0	7		0	0
5:00 PM	4	241		0						357	0	0	8		0	0
5:15 PM	5	243		0						324	0	0	4		0	0
5:30 PM	6	213		0						263	0	0	7		0	0
5:45 PM	6	219		0						254	0	0	2		0	0

Study Name Shiloh & Monad
Start Date 10/24/2023
Start Time 7:00 AM
Type Road
Classification Totals

	Shiloh Road Southbound				Monad Road Westbound				Shiloh Road Northbound				Monad Road Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	6	126	12	0	8	7	12	0	16	67	5	0	10	5	12	0
7:15 AM	12	129	36	0	11	9	15	0	22	113	1	0	13	3	25	0
7:30 AM	9	138	32	0	24	3	22	0	29	175	5	0	17	14	33	0
7:45 AM	16	215	49	0	29	8	21	0	21	190	8	0	12	7	36	0
8:00 AM	23	181	23	0	18	2	22	0	23	142	1	0	9	10	24	0
8:15 AM	26	128	38	0	22	7	17	0	17	123	3	0	2	1	34	0
8:30 AM	12	150	42	5	17	1	15	0	16	111	2	1	5	2	24	0
8:45 AM	10	135	20	0	20	5	9	0	14	109	1	0	10	3	16	0
4:00 PM	16	166	26	0	30	6	21	0	33	210	10	0	12	8	23	0
4:15 PM	15	162	23	0	25	10	20	0	30	203	7	0	6	15	23	0
4:30 PM	21	174	35	0	37	12	29	0	22	233	9	0	8	9	41	0
4:45 PM	18	154	27	1	29	8	32	0	28	236	18	0	6	0	35	0
5:00 PM	16	138	44	0	29	15	27	0	35	277	12	0	9	10	31	0
5:15 PM	30	160	25	0	38	6	25	0	40	266	16	0	11	9	20	0
5:30 PM	19	180	23	0	37	8	34	0	34	183	13	0	9	7	31	0
5:45 PM	24	156	28	0	37	10	16	0	25	176	13	0	11	12	21	0

Appendix B: Intersection Analysis Software Output

Scenario sequence:

Existing

2027 Background

2027 Phase 1A

2029 Without Phase 1B

2029 Phase 1B

2031 Without Phase 1C

2031 Phase 1C

2033 Without Phase 2

2033 Phase 2 (Full project buildout)

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	188	33	18	83	12	6	47	46	66	75	12
Future Vol, veh/h	8	188	33	18	83	12	6	47	46	66	75	12
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	1	1	1
Mvmt Flow	9	211	37	20	93	13	7	53	52	74	84	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	10.2	9.1	8.8	9.7
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	6%	3%	16%	43%
Vol Thru, %	47%	82%	73%	49%
Vol Right, %	46%	14%	11%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	99	229	113	153
LT Vol	6	8	18	66
Through Vol	47	188	83	75
RT Vol	46	33	12	12
Lane Flow Rate	111	257	127	172
Geometry Grp	1	1	1	1
Degree of Util (X)	0.151	0.337	0.175	0.24
Departure Headway (Hd)	4.871	4.715	4.972	5.018
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	730	756	716	710
Service Time	2.946	2.777	3.045	3.088
HCM Lane V/C Ratio	0.152	0.34	0.177	0.242
HCM Control Delay, s/veh	8.8	10.2	9.1	9.7
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.5	1.5	0.6	0.9

Intersection	
Intersection Delay, s/veh	6.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	241	728	803
Demand Flow Rate, veh/h	0	243	742	811
Vehicles Circulating, veh/h	957	594	149	165
Vehicles Exiting, veh/h	19	297	808	672
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	6.1	5.7	6.1
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.601	0.399	0.470	0.530	0.470	0.530
Follow-Up Headway, s	1.000	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	3600	1420	1350	1420	1420	1420	1420	1420
B (Slope)	1.151e-3	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	146	97	349	393	381	430
Cap Entry Lane, veh/h	1196	629	782	857	1240	1240	1222	1222
Entry HV Adj Factor	1.000	1.000	0.993	0.990	0.980	0.981	0.991	0.990
Flow Entry, veh/h	0	0	145	96	342	386	378	426
Cap Entry, veh/h	1196	629	776	848	1215	1217	1211	1210
V/C Ratio	0.000	0.000	0.187	0.113	0.281	0.317	0.312	0.352
Control Delay, s/veh	3.0	5.7	6.6	5.4	5.5	5.9	5.9	6.3
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	0	1	1	1	2

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	620	313	730	857
Demand Flow Rate, veh/h	632	322	753	866
Vehicles Circulating, veh/h	917	768	762	285
Vehicles Exiting, veh/h	234	747	787	805
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.6	8.0	13.7	7.6
Approach LOS	B	A	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.469	0.531	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	297	335	151	171	354	399	407	459
Cap Entry Lane, veh/h	581	651	666	739	670	743	1039	1115
Entry HV Adj Factor	0.981	0.981	0.973	0.969	0.970	0.970	0.990	0.990
Flow Entry, veh/h	291	329	147	166	343	387	403	454
Cap Entry, veh/h	570	639	648	717	649	721	1028	1103
V/C Ratio	0.511	0.514	0.227	0.231	0.529	0.537	0.392	0.412
Control Delay, s/veh	15.3	14.0	8.3	7.7	14.2	13.3	7.7	7.6
LOS	C	B	A	A	B	B	A	A
95th %tile Queue, veh	3	3	1	1	3	3	2	2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	22	0	766	825	8
Future Vol, veh/h	0	22	0	766	825	8
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	25	0	861	927	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	468	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	547	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	547	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	11.89	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	547	-	-
HCM Lane V/C Ratio	-	0.045	-	-
HCM Ctrl Dly (s/v)	-	11.9	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-

Intersection	
Intersection Delay, s/veh	9.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	251	244	924	1100
Demand Flow Rate, veh/h	259	251	933	1111
Vehicles Circulating, veh/h	1122	985	386	154
Vehicles Exiting, veh/h	143	334	995	1082
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.0	9.3	9.2	7.6
Approach LOS	B	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.795	0.205	0.526	0.474	0.471	0.529	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	206	53	132	119	439	494	522	589
Cap Entry Lane, veh/h	481	547	545	615	999	999	1234	1234
Entry HV Adj Factor	0.970	0.962	0.971	0.975	0.989	0.991	0.990	0.990
Flow Entry, veh/h	200	51	128	116	434	490	517	583
Cap Entry, veh/h	466	526	530	599	989	991	1222	1221
V/C Ratio	0.428	0.097	0.242	0.194	0.439	0.494	0.423	0.477
Control Delay, s/veh	15.5	8.1	10.2	8.4	8.7	9.6	7.2	8.0
LOS	C	A	B	A	A	A	A	A
95th %tile Queue, veh	2	0	1	1	2	3	2	3

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	143	15	30	264	50	48	98	20	31	67	13
Future Vol, veh/h	9	143	15	30	264	50	48	98	20	31	67	13
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	10	166	17	35	307	58	56	114	23	36	78	15
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	10.7	14.6	11.2	10.4
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	29%	5%	9%	28%
Vol Thru, %	59%	86%	77%	60%
Vol Right, %	12%	9%	15%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	166	167	344	111
LT Vol	48	9	30	31
Through Vol	98	143	264	67
RT Vol	20	15	50	13
Lane Flow Rate	193	194	400	129
Geometry Grp	1	1	1	1
Degree of Util (X)	0.305	0.293	0.567	0.209
Departure Headway (Hd)	5.692	5.44	5.099	5.82
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	629	658	708	614
Service Time	3.742	3.488	3.138	3.873
HCM Lane V/C Ratio	0.307	0.295	0.565	0.21
HCM Control Delay, s/veh	11.2	10.7	14.6	10.4
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.3	1.2	3.6	0.8

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	360	1370	946
Demand Flow Rate, veh/h	0	360	1370	955
Vehicles Circulating, veh/h	1169	1130	130	244
Vehicles Exiting, veh/h	30	370	1039	1246
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	13.6	9.0	7.6
Approach LOS	-	B	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.594	0.406	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	214	146	644	726	449	506
Cap Entry Lane, veh/h	461	526	477	543	1262	1262	1137	1137
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	0	0	214	146	644	726	445	501
Cap Entry, veh/h	461	526	477	543	1261	1262	1126	1127
V/C Ratio	0.000	0.000	0.448	0.269	0.510	0.575	0.395	0.445
Control Delay, s/veh	7.8	6.8	15.8	10.4	8.3	9.5	7.2	8.0
LOS	A	A	C	B	A	A	A	A
95th %tile Queue, veh	0	0	2	1	3	4	2	2

Intersection	
Intersection Delay, s/veh	13.6
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	339	607	1152	877
Demand Flow Rate, veh/h	339	607	1152	886
Vehicles Circulating, veh/h	993	1130	408	611
Vehicles Exiting, veh/h	504	430	924	1126
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.3	19.9	12.1	12.6
Approach LOS	B	C	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.469	0.531	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	159	180	285	322	541	611	416	470
Cap Entry Lane, veh/h	541	611	477	543	927	1004	769	845
Entry HV Adj Factor	1.002	0.998	1.001	0.999	1.001	0.999	0.991	0.989
Flow Entry, veh/h	159	180	285	322	541	611	412	465
Cap Entry, veh/h	543	609	478	543	928	1003	762	835
V/C Ratio	0.294	0.295	0.597	0.593	0.583	0.609	0.541	0.556
Control Delay, s/veh	10.8	9.8	21.1	18.8	12.1	12.0	12.8	12.4
LOS	B	A	C	C	B	B	B	B
95th %tile Queue, veh	1	1	4	4	4	4	3	3

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	21	0	1280	896	17
Future Vol, veh/h	0	21	0	1280	896	17
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	23	0	1391	974	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	496	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	525	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	525	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

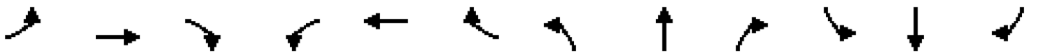
Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.18	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	525	-	-
HCM Lane V/C Ratio	-	0.044	-	-
HCM Ctrl Dly (s/v)	-	12.2	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-

Intersection	
Intersection Delay, s/veh	10.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	201	305	1263	893
Demand Flow Rate, veh/h	206	305	1263	902
Vehicles Circulating, veh/h	931	1268	310	222
Vehicles Exiting, veh/h	193	305	827	1351
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.8	14.1	11.1	7.1
Approach LOS	A	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.820	0.180	0.538	0.462	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	169	37	164	141	594	669	424	478
Cap Entry Lane, veh/h	573	644	420	483	1071	1071	1160	1160
Entry HV Adj Factor	0.979	0.973	1.000	1.000	0.999	1.001	0.990	0.991
Flow Entry, veh/h	165	36	164	141	594	669	420	473
Cap Entry, veh/h	561	626	420	483	1070	1072	1149	1149
V/C Ratio	0.295	0.057	0.390	0.292	0.555	0.625	0.365	0.412
Control Delay, s/veh	10.6	6.4	15.9	11.9	10.2	11.9	6.8	7.4
LOS	B	A	C	B	B	B	A	A
95th %tile Queue, veh	1	0	2	1	4	5	2	2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	210	37	20	93	13	7	53	51	74	84	13
Future Volume (veh/h)	9	210	37	20	93	13	7	53	51	74	84	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	10	236	42	22	104	15	8	60	57	83	94	15
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	197	404	70	250	371	49	207	200	178	395	228	31
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	28	1398	243	133	1285	169	50	787	702	526	899	121
Grp Volume(v), veh/h	288	0	0	141	0	0	125	0	0	192	0	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1587	0	0	1538	0	0	1546	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	1.3	0.0	0.0	1.3	0.0	0.0	2.0	0.0	0.0
Prop In Lane	0.03		0.15	0.16		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	671	0	0	670	0	0	585	0	0	654	0	0
V/C Ratio(X)	0.43	0.00	0.00	0.21	0.00	0.00	0.21	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	2341	0	0	2198	0	0	2171	0	0	2205	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	6.0	0.0	0.0	5.4	0.0	0.0	6.0	0.0	0.0	6.2	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.2	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	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.4	0.0	0.0	5.6	0.0	0.0	6.1	0.0	0.0	6.4	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		288			141			125			192	
Approach Delay, s/veh		6.4			5.6			6.1			6.4	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.5	10.2	9.5	10.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.3	4.9	4.0	3.3
Green Ext Time (p_c), s	0.5	1.4	0.9	0.6

Intersection Summary	
HCM 7th Control Delay, s/veh	6.2
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	6.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	269	813	862
Demand Flow Rate, veh/h	0	272	829	871
Vehicles Circulating, veh/h	1035	664	167	185
Vehicles Exiting, veh/h	21	332	868	751
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	6.9	6.3	6.6
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.603	0.397	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	164	108	390	439	409	462
Cap Entry Lane, veh/h	521	589	733	808	1220	1220	1200	1200
Entry HV Adj Factor	1.000	1.000	0.988	0.991	0.980	0.982	0.991	0.989
Flow Entry, veh/h	0	0	162	107	382	431	405	457
Cap Entry, veh/h	521	589	724	800	1196	1198	1189	1187
V/C Ratio	0.000	0.000	0.224	0.134	0.320	0.360	0.341	0.385
Control Delay, s/veh	6.9	6.1	7.5	5.9	6.0	6.5	6.3	6.8
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	0	1	2	2	2

Intersection	
Intersection Delay, s/veh	14.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	694	349	816	955
Demand Flow Rate, veh/h	708	360	840	964
Vehicles Circulating, veh/h	1022	858	851	318
Vehicles Exiting, veh/h	260	833	879	900
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	20.2	9.3	18.5	8.7
Approach LOS	C	A	C	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.469	0.531	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	333	375	169	191	395	445	453	511
Cap Entry Lane, veh/h	527	596	613	685	617	689	1007	1084
Entry HV Adj Factor	0.980	0.981	0.972	0.969	0.970	0.971	0.990	0.990
Flow Entry, veh/h	326	368	164	185	383	432	449	506
Cap Entry, veh/h	516	584	596	664	599	669	998	1073
V/C Ratio	0.632	0.630	0.276	0.279	0.640	0.646	0.450	0.472
Control Delay, s/veh	21.3	19.2	9.7	8.9	19.3	17.9	8.8	8.7
LOS	C	C	A	A	C	C	A	A
95th %tile Queue, veh	4	4	1	1	5	5	2	3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	25	0	856	922	9
Future Vol, veh/h	0	25	0	856	922	9
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	28	0	962	1036	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	523	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	504	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	504	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.57	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	504	-	-
HCM Lane V/C Ratio	-	0.056	-	-
HCM Ctrl Dly (s/v)	-	12.6	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	10.8
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	280	272	1033	1230
Demand Flow Rate, veh/h	288	280	1043	1242
Vehicles Circulating, veh/h	1255	1099	430	171
Vehicles Exiting, veh/h	158	374	1113	1208
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	18.7	11.1	11.0	8.7
Approach LOS	C	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.795	0.205	0.525	0.475	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	229	59	147	133	490	553	584	658
Cap Entry Lane, veh/h	426	489	491	558	960	960	1215	1215
Entry HV Adj Factor	0.972	0.966	0.974	0.970	0.991	0.990	0.990	0.991
Flow Entry, veh/h	223	57	143	129	486	548	578	652
Cap Entry, veh/h	414	472	478	541	952	951	1203	1204
V/C Ratio	0.538	0.121	0.299	0.238	0.510	0.576	0.480	0.541
Control Delay, s/veh	21.1	9.3	12.2	9.9	10.2	11.7	8.1	9.2
LOS	C	A	B	A	B	B	A	A
95th %tile Queue, veh	3	0	1	1	3	4	3	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	160	17	34	295	56	54	109	22	35	75	15
Future Volume (veh/h)	10	160	17	34	295	56	54	109	22	35	75	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	12	186	20	40	343	65	63	127	26	41	87	17
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	168	587	61	190	530	95	270	255	46	259	270	45
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	33	1484	153	76	1341	241	340	1075	194	298	1139	191
Grp Volume(v), veh/h	218	0	0	448	0	0	216	0	0	145	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1658	0	0	1608	0	0	1628	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.7	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.2	0.0	0.0	5.4	0.0	0.0	2.8	0.0	0.0	1.7	0.0	0.0
Prop In Lane	0.06		0.09	0.09		0.15	0.29		0.12	0.28		0.12
Lane Grp Cap(c), veh/h	815	0	0	816	0	0	571	0	0	574	0	0
V/C Ratio(X)	0.27	0.00	0.00	0.55	0.00	0.00	0.38	0.00	0.00	0.25	0.00	0.00
Avail Cap(c_a), veh/h	1867	0	0	1866	0	0	1828	0	0	1817	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	5.1	0.0	0.0	6.1	0.0	0.0	8.2	0.0	0.0	7.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.6	0.0	0.0	0.4	0.0	0.0	0.2	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	0.1	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.3	0.0	0.0	6.7	0.0	0.0	8.6	0.0	0.0	8.0	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		218			448			216			145	
Approach Delay, s/veh		5.3			6.7			8.6			8.0	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.3		14.2		10.3		14.2				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		4.8		4.2		3.7		7.4				
Green Ext Time (p_c), s		1.0		1.0		0.7		2.4				

Intersection Summary												
HCM 7th Control Delay, s/veh			7.0									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	11.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	402	1531	1057
Demand Flow Rate, veh/h	0	402	1531	1067
Vehicles Circulating, veh/h	1306	1262	145	272
Vehicles Exiting, veh/h	33	414	1161	1392
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	18.2	10.6	8.7
Approach LOS	-	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.595	0.405	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	239	163	720	811	501	566
Cap Entry Lane, veh/h	406	468	423	486	1245	1245	1109	1109
Entry HV Adj Factor	1.000	1.000	1.000	1.000	0.999	1.001	0.991	0.990
Flow Entry, veh/h	0	0	239	163	720	811	497	560
Cap Entry, veh/h	406	468	423	486	1244	1245	1099	1097
V/C Ratio	0.000	0.000	0.565	0.336	0.579	0.652	0.452	0.511
Control Delay, s/veh	8.9	7.7	21.8	12.8	9.7	11.4	8.2	9.2
LOS	A	A	C	B	A	B	A	A
95th %tile Queue, veh	0	0	3	1	4	5	2	3

Intersection	
Intersection Delay, s/veh	18.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	379	680	1287	980
Demand Flow Rate, veh/h	379	680	1287	990
Vehicles Circulating, veh/h	1110	1262	455	683
Vehicles Exiting, veh/h	563	480	1034	1259
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	12.7	31.8	15.7	16.6
Approach LOS	B	D	C	C

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	178	201	320	360	605	682	465	525
Cap Entry Lane, veh/h	486	553	423	486	888	965	720	795
Entry HV Adj Factor	1.001	0.999	0.999	1.001	1.000	1.000	0.991	0.989
Flow Entry, veh/h	178	201	320	360	605	682	461	519
Cap Entry, veh/h	487	552	422	486	888	965	713	786
V/C Ratio	0.366	0.364	0.757	0.741	0.681	0.707	0.646	0.661
Control Delay, s/veh	13.4	12.0	34.4	29.4	15.7	15.7	17.0	16.3
LOS	B	B	D	D	C	C	C	C
95th %tile Queue, veh	2	2	6	6	6	6	5	5

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	23	0	1430	1001	19
Future Vol, veh/h	0	23	0	1430	1001	19
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	25	0	1554	1088	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	554	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	481	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	481	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

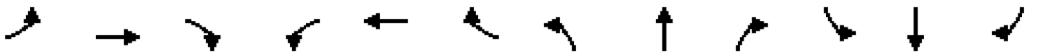
Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	481	-	-
HCM Lane V/C Ratio	-	0.052	-	-
HCM Ctrl Dly (s/v)	-	12.9	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	224	341	1411	997
Demand Flow Rate, veh/h	229	341	1411	1007
Vehicles Circulating, veh/h	1040	1417	347	248
Vehicles Exiting, veh/h	215	341	922	1510
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.8	18.7	14.2	8.0
Approach LOS	B	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.821	0.179	0.537	0.463	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	188	41	183	158	663	748	473	534
Cap Entry Lane, veh/h	519	587	367	426	1036	1036	1133	1133
Entry HV Adj Factor	0.980	0.976	1.000	1.000	1.000	1.000	0.990	0.989
Flow Entry, veh/h	184	40	183	158	663	748	468	528
Cap Entry, veh/h	508	572	367	426	1036	1035	1122	1121
V/C Ratio	0.363	0.070	0.499	0.371	0.640	0.722	0.417	0.471
Control Delay, s/veh	12.9	7.1	21.7	15.2	12.6	15.6	7.6	8.4
LOS	B	A	C	C	B	C	A	A
95th %tile Queue, veh	2	0	3	2	5	7	2	3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	211	37	21	97	14	7	53	51	74	84	13
Future Volume (veh/h)	9	211	37	21	97	14	7	53	51	74	84	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	10	237	42	24	109	16	8	60	57	83	94	15
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	197	407	71	252	371	49	207	199	178	395	228	31
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	27	1399	243	139	1275	170	50	787	702	526	899	121
Grp Volume(v), veh/h	289	0	0	149	0	0	125	0	0	192	0	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1584	0	0	1538	0	0	1546	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	1.4	0.0	0.0	1.3	0.0	0.0	2.0	0.0	0.0
Prop In Lane	0.03		0.15	0.16		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	674	0	0	672	0	0	584	0	0	653	0	0
V/C Ratio(X)	0.43	0.00	0.00	0.22	0.00	0.00	0.21	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	2335	0	0	2189	0	0	2166	0	0	2200	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	6.0	0.0	0.0	5.5	0.0	0.0	6.0	0.0	0.0	6.2	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.2	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	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.4	0.0	0.0	5.6	0.0	0.0	6.2	0.0	0.0	6.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		289			149			125			192	
Approach Delay, s/veh		6.4			5.6			6.2			6.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.5	10.2	9.5	10.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.3	4.9	4.0	3.4
Green Ext Time (p_c), s	0.5	1.4	0.9	0.7

Intersection Summary	
HCM 7th Control Delay, s/veh	6.2
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	6.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	270	831	902
Demand Flow Rate, veh/h	0	273	847	911
Vehicles Circulating, veh/h	1076	679	167	186
Vehicles Exiting, veh/h	21	335	909	766
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	7.0	6.4	6.8
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.604	0.396	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	165	108	398	449	428	483
Cap Entry Lane, veh/h	502	569	723	797	1220	1220	1199	1199
Entry HV Adj Factor	1.000	1.000	0.988	0.991	0.981	0.981	0.990	0.989
Flow Entry, veh/h	0	0	163	107	391	440	424	478
Cap Entry, veh/h	502	569	714	790	1197	1197	1187	1186
V/C Ratio	0.000	0.000	0.228	0.135	0.326	0.368	0.357	0.403
Control Delay, s/veh	7.2	6.3	7.7	5.9	6.1	6.6	6.5	7.1
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	0	1	2	2	2

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	751	356	823	962
Demand Flow Rate, veh/h	766	367	847	971
Vehicles Circulating, veh/h	1022	884	889	332
Vehicles Exiting, veh/h	281	852	899	919
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	22.8	9.7	20.3	8.9
Approach LOS	C	A	C	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.469	0.531	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	360	406	172	195	398	449	456	515
Cap Entry Lane, veh/h	527	596	599	670	596	667	995	1071
Entry HV Adj Factor	0.980	0.980	0.973	0.968	0.971	0.971	0.991	0.990
Flow Entry, veh/h	353	398	167	189	387	436	452	510
Cap Entry, veh/h	517	584	583	648	579	648	986	1060
V/C Ratio	0.683	0.682	0.287	0.291	0.668	0.673	0.458	0.481
Control Delay, s/veh	24.1	21.7	10.1	9.3	21.2	19.6	9.0	8.9
LOS	C	C	B	A	C	C	A	A
95th %tile Queue, veh	5	5	1	1	5	5	2	3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	25	0	862	939	9
Future Vol, veh/h	0	25	0	862	939	9
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	28	0	969	1055	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	533	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	497	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	497	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.68	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	497	-	-
HCM Lane V/C Ratio	-	0.057	-	-
HCM Ctrl Dly (s/v)	-	12.7	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	280	273	1039	1250
Demand Flow Rate, veh/h	288	281	1049	1262
Vehicles Circulating, veh/h	1275	1105	433	171
Vehicles Exiting, veh/h	158	377	1130	1215
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	19.3	11.2	11.1	8.8
Approach LOS	C	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.795	0.205	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	229	59	147	134	493	556	593	669
Cap Entry Lane, veh/h	418	480	488	555	958	958	1215	1215
Entry HV Adj Factor	0.972	0.966	0.974	0.970	0.991	0.991	0.990	0.990
Flow Entry, veh/h	223	57	143	130	488	551	587	662
Cap Entry, veh/h	406	464	476	538	949	948	1204	1203
V/C Ratio	0.548	0.123	0.301	0.241	0.515	0.581	0.488	0.550
Control Delay, s/veh	21.8	9.5	12.3	10.0	10.3	11.8	8.2	9.3
LOS	C	A	B	B	B	B	A	A
95th %tile Queue, veh	3	0	1	1	3	4	3	3

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	477	1	9	178	4	26
Future Vol, veh/h	477	1	9	178	4	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	536	1	10	200	4	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	537	0	757	537
Stage 1	-	-	-	-	537	-
Stage 2	-	-	-	-	220	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1031	-	376	544
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	816	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1031	-	371	544
Mov Cap-2 Maneuver	-	-	-	-	371	-
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	807	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.41	12.52
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	512	-	-	87	-
HCM Lane V/C Ratio	0.066	-	-	0.01	-
HCM Ctrl Dly (s/v)	12.5	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	502	1	9	185	2	26
Future Vol, veh/h	502	1	9	185	2	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	564	1	10	208	2	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	565	0	793	565
Stage 1	-	-	-	-	565	-
Stage 2	-	-	-	-	228	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1007	-	358	525
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	810	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1007	-	354	525
Mov Cap-2 Maneuver	-	-	-	-	354	-
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	801	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.4	12.57
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	507	-	-	84	-
HCM Lane V/C Ratio	0.062	-	-	0.01	-
HCM Ctrl Dly (s/v)	12.6	-	-	8.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	165	17	34	298	57	54	109	23	36	75	15
Future Volume (veh/h)	10	165	17	34	298	57	54	109	23	36	75	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	12	192	20	40	347	66	63	127	27	42	87	17
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	167	593	59	189	534	96	268	254	47	260	269	45
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	32	1490	149	75	1341	241	338	1070	200	304	1134	189
Grp Volume(v), veh/h	224	0	0	453	0	0	217	0	0	146	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1658	0	0	1608	0	0	1627	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.8	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.3	0.0	0.0	5.5	0.0	0.0	2.8	0.0	0.0	1.8	0.0	0.0
Prop In Lane	0.05		0.09	0.09		0.15	0.29		0.12	0.29		0.12
Lane Grp Cap(c), veh/h	819	0	0	819	0	0	569	0	0	574	0	0
V/C Ratio(X)	0.27	0.00	0.00	0.55	0.00	0.00	0.38	0.00	0.00	0.25	0.00	0.00
Avail Cap(c_a), veh/h	1855	0	0	1852	0	0	1814	0	0	1802	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	5.1	0.0	0.0	6.1	0.0	0.0	8.2	0.0	0.0	7.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.6	0.0	0.0	0.4	0.0	0.0	0.2	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	0.1	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.3	0.0	0.0	6.7	0.0	0.0	8.7	0.0	0.0	8.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		224			453			217			146	
Approach Delay, s/veh		5.3			6.7			8.7			8.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.3		14.3		10.3		14.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		4.8		4.3		3.8		7.5				
Green Ext Time (p_c), s		1.0		1.1		0.7		2.4				

Intersection Summary												
HCM 7th Control Delay, s/veh			7.0									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	406	1544	1075
Demand Flow Rate, veh/h	0	406	1544	1085
Vehicles Circulating, veh/h	1328	1273	145	276
Vehicles Exiting, veh/h	33	416	1183	1403
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	18.8	10.7	8.9
Approach LOS	-	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.599	0.401	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	243	163	726	818	510	575
Cap Entry Lane, veh/h	398	459	419	481	1245	1245	1105	1105
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	0	0	243	163	726	818	505	570
Cap Entry, veh/h	398	459	419	481	1244	1245	1094	1094
V/C Ratio	0.000	0.000	0.581	0.339	0.583	0.657	0.462	0.521
Control Delay, s/veh	9.0	7.8	22.7	13.0	9.8	11.5	8.4	9.4
LOS	A	A	C	B	A	B	A	A
95th %tile Queue, veh	0	0	4	1	4	5	2	3

Intersection	
Intersection Delay, s/veh	21.8
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	418	713	1307	1000
Demand Flow Rate, veh/h	418	713	1307	1010
Vehicles Circulating, veh/h	1110	1295	481	736
Vehicles Exiting, veh/h	636	493	1047	1272
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	13.5	38.6	17.2	19.3
Approach LOS	B	E	C	C

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.469	0.531	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	196	222	335	378	614	693	475	535
Cap Entry Lane, veh/h	486	553	410	472	867	943	686	760
Entry HV Adj Factor	1.002	0.998	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	196	222	335	378	614	693	470	530
Cap Entry, veh/h	487	552	410	472	868	943	679	753
V/C Ratio	0.403	0.402	0.817	0.800	0.708	0.735	0.693	0.704
Control Delay, s/veh	14.3	12.8	41.8	35.7	17.1	17.3	19.8	18.9
LOS	B	B	E	E	C	C	C	C
95th %tile Queue, veh	2	2	7	7	6	7	6	6

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	23	0	1449	1013	19
Future Vol, veh/h	0	23	0	1449	1013	19
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	25	0	1575	1101	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	561	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	476	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	476	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.98	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	476	-	-
HCM Lane V/C Ratio	-	0.052	-	-
HCM Ctrl Dly (s/v)	-	13	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	224	344	1427	1010
Demand Flow Rate, veh/h	229	344	1427	1021
Vehicles Circulating, veh/h	1054	1433	349	248
Vehicles Exiting, veh/h	215	343	934	1529
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	12.1	19.2	14.5	8.1
Approach LOS	B	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.821	0.179	0.532	0.468	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	188	41	183	161	671	756	480	541
Cap Entry Lane, veh/h	512	580	361	420	1034	1034	1133	1133
Entry HV Adj Factor	0.980	0.976	1.000	1.000	1.000	1.000	0.989	0.990
Flow Entry, veh/h	184	40	183	161	671	756	475	536
Cap Entry, veh/h	502	566	361	420	1033	1034	1121	1122
V/C Ratio	0.367	0.071	0.507	0.383	0.649	0.731	0.424	0.477
Control Delay, s/veh	13.1	7.2	22.3	15.7	12.9	16.0	7.7	8.5
LOS	B	A	C	C	B	C	A	A
95th %tile Queue, veh	2	0	3	2	5	7	2	3

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	287	4	28	455	3	17
Future Vol, veh/h	287	4	28	455	3	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	322	4	31	511	3	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	327	0	899	325
Stage 1	-	-	-	-	325	-
Stage 2	-	-	-	-	574	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1233	-	310	716
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	563	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1233	-	298	716
Mov Cap-2 Maneuver	-	-	-	-	298	-
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	543	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.46	11.32
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	592	-	-	104	-
HCM Lane V/C Ratio	0.038	-	-	0.026	-
HCM Ctrl Dly (s/v)	11.3	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

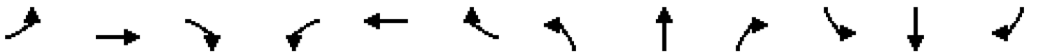
Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	302	2	28	482	1	17
Future Vol, veh/h	302	2	28	482	1	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	339	2	31	542	1	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	342	0	945	340
Stage 1	-	-	-	-	340	-
Stage 2	-	-	-	-	604	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1217	-	291	702
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	545	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1217	-	280	702
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	525	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.44	10.74
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	648	-	-	99	-
HCM Lane V/C Ratio	0.031	-	-	0.026	-
HCM Ctrl Dly (s/v)	10.7	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	227	40	23	104	15	7	57	55	79	90	14
Future Volume (veh/h)	10	227	40	23	104	15	7	57	55	79	90	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	11	255	45	26	117	17	8	64	62	89	101	16
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	190	430	74	245	392	52	197	199	181	386	228	31
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	27	1401	242	135	1278	168	45	781	711	529	897	120
Grp Volume(v), veh/h	311	0	0	160	0	0	134	0	0	206	0	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1582	0	0	1538	0	0	1546	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Cycle Q Clear(g_c), s	3.2	0.0	0.0	1.5	0.0	0.0	1.4	0.0	0.0	2.2	0.0	0.0
Prop In Lane	0.04		0.14	0.16		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	694	0	0	689	0	0	577	0	0	645	0	0
V/C Ratio(X)	0.45	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	2245	0	0	2100	0	0	2083	0	0	2111	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	6.1	0.0	0.0	5.5	0.0	0.0	6.2	0.0	0.0	6.5	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	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	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.5	0.0	0.0	5.6	0.0	0.0	6.4	0.0	0.0	6.8	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		311			160			134			206	
Approach Delay, s/veh		6.5			5.6			6.4			6.8	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.7	10.8	9.7	10.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.4	5.2	4.2	3.5
Green Ext Time (p_c), s	0.6	1.5	1.0	0.8

Intersection Summary	
HCM 7th Control Delay, s/veh	6.4
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	291	895	972
Demand Flow Rate, veh/h	0	294	913	982
Vehicles Circulating, veh/h	1160	731	180	201
Vehicles Exiting, veh/h	23	362	980	824
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	7.6	6.8	7.3
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.605	0.395	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	178	116	429	484	462	520
Cap Entry Lane, veh/h	464	530	689	763	1206	1206	1183	1183
Entry HV Adj Factor	1.000	1.000	0.989	0.991	0.981	0.980	0.989	0.991
Flow Entry, veh/h	0	0	176	115	421	474	457	515
Cap Entry, veh/h	464	530	681	756	1182	1182	1170	1172
V/C Ratio	0.000	0.000	0.258	0.152	0.356	0.401	0.391	0.440
Control Delay, s/veh	7.8	6.8	8.4	6.4	6.5	7.1	7.0	7.7
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	2	2	2

Intersection	
Intersection Delay, s/veh	20.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	804	384	887	1037
Demand Flow Rate, veh/h	820	395	914	1048
Vehicles Circulating, veh/h	1104	952	956	359
Vehicles Exiting, veh/h	303	918	968	988
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	32.0	10.9	27.7	10.0
Approach LOS	D	B	D	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	385	435	186	209	430	484	493	555
Cap Entry Lane, veh/h	489	556	562	632	560	630	970	1047
Entry HV Adj Factor	0.982	0.980	0.970	0.973	0.970	0.972	0.989	0.990
Flow Entry, veh/h	378	426	180	203	417	470	487	550
Cap Entry, veh/h	480	544	545	615	543	612	959	1037
V/C Ratio	0.787	0.783	0.331	0.331	0.768	0.768	0.508	0.530
Control Delay, s/veh	33.9	30.4	11.5	10.4	29.0	26.5	10.1	10.0
LOS	D	D	B	B	D	D	B	A
95th %tile Queue, veh	7	7	1	1	7	7	3	3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	26	0	928	1010	10
Future Vol, veh/h	0	26	0	928	1010	10
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	29	0	1043	1135	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	573	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	468	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	468	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.21	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	468	-	-
HCM Lane V/C Ratio	-	0.062	-	-
HCM Ctrl Dly (s/v)	-	13.2	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	12.8
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	304	293	1119	1344
Demand Flow Rate, veh/h	313	302	1130	1357
Vehicles Circulating, veh/h	1372	1193	469	185
Vehicles Exiting, veh/h	170	406	1216	1310
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	25.6	12.9	13.0	9.8
Approach LOS	D	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.796	0.204	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	249	64	158	144	531	599	638	719
Cap Entry Lane, veh/h	382	442	450	515	927	927	1200	1200
Entry HV Adj Factor	0.970	0.969	0.969	0.972	0.991	0.990	0.990	0.991
Flow Entry, veh/h	242	62	153	140	526	593	632	712
Cap Entry, veh/h	371	429	437	501	918	918	1188	1189
V/C Ratio	0.652	0.145	0.351	0.280	0.573	0.646	0.532	0.599
Control Delay, s/veh	29.4	10.5	14.4	11.4	11.9	14.0	9.1	10.4
LOS	D	B	B	B	B	B	A	B
95th %tile Queue, veh	4	1	2	1	4	5	3	4

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	514	1	9	192	4	26
Future Vol, veh/h	514	1	9	192	4	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	578	1	10	216	4	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	579	0	814	578
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	236	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	995	-	347	515
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	803	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	995	-	343	515
Mov Cap-2 Maneuver	-	-	-	-	343	-
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	794	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.39	13.01
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	483	-	-	81	-
HCM Lane V/C Ratio	0.07	-	-	0.01	-
HCM Ctrl Dly (s/v)	13	-	-	8.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

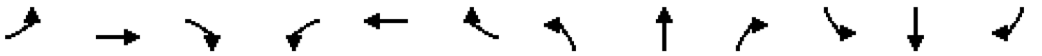
Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	539	1	9	199	2	26
Future Vol, veh/h	539	1	9	199	2	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	606	1	10	224	2	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	607	0	850	606
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	244	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	971	-	331	497
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	797	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	971	-	327	497
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	787	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.38	13.04
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	479	-	-	78	-
HCM Lane V/C Ratio	0.066	-	-	0.01	-
HCM Ctrl Dly (s/v)	13	-	-	8.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	177	18	36	321	61	58	118	25	38	81	16
Future Volume (veh/h)	11	177	18	36	321	61	58	118	25	38	81	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	13	206	21	42	373	71	67	137	29	44	94	19
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	158	617	60	180	555	100	258	261	49	247	276	48
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	32	1492	146	73	1342	242	333	1075	200	293	1140	197
Grp Volume(v), veh/h	240	0	0	486	0	0	233	0	0	157	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1657	0	0	1608	0	0	1630	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.5	0.0	0.0	6.2	0.0	0.0	3.2	0.0	0.0	2.0	0.0	0.0
Prop In Lane	0.05		0.09	0.09		0.15	0.29		0.12	0.28		0.12
Lane Grp Cap(c), veh/h	836	0	0	835	0	0	567	0	0	571	0	0
V/C Ratio(X)	0.29	0.00	0.00	0.58	0.00	0.00	0.41	0.00	0.00	0.27	0.00	0.00
Avail Cap(c_a), veh/h	1747	0	0	1746	0	0	1709	0	0	1698	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	5.2	0.0	0.0	6.3	0.0	0.0	8.7	0.0	0.0	8.3	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.3	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	0.2	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.4	0.0	0.0	7.0	0.0	0.0	9.2	0.0	0.0	8.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		240			486			233			157	
Approach Delay, s/veh		5.4			7.0			9.2			8.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.8		15.3		10.8		15.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		5.2		4.5		4.0		8.2				
Green Ext Time (p_c), s		1.1		1.1		0.7		2.6				

Intersection Summary												
HCM 7th Control Delay, s/veh			7.3									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	13.1
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	437	1661	1155
Demand Flow Rate, veh/h	0	437	1661	1167
Vehicles Circulating, veh/h	1428	1370	156	297
Vehicles Exiting, veh/h	36	447	1272	1510
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	24.5	12.3	10.0
Approach LOS	-	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.597	0.403	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	261	176	781	880	548	619
Cap Entry Lane, veh/h	363	422	383	443	1232	1232	1084	1084
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.991	0.989
Flow Entry, veh/h	0	0	261	176	781	880	543	612
Cap Entry, veh/h	363	422	383	443	1232	1233	1074	1072
V/C Ratio	0.000	0.000	0.682	0.397	0.634	0.714	0.506	0.571
Control Delay, s/veh	9.9	8.5	30.7	15.4	11.0	13.4	9.3	10.6
LOS	A	A	D	C	B	B	A	B
95th %tile Queue, veh	0	0	5	2	5	7	3	4

Intersection	
Intersection Delay, s/veh	31.1
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	446	764	1406	1075
Demand Flow Rate, veh/h	446	764	1406	1086
Vehicles Circulating, veh/h	1195	1391	515	788
Vehicles Exiting, veh/h	679	530	1126	1367
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	16.1	63.5	22.3	25.7
Approach LOS	C	F	C	D

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	210	236	359	405	661	745	510	576
Cap Entry Lane, veh/h	450	514	375	435	841	917	654	727
Entry HV Adj Factor	0.998	1.002	1.000	1.000	1.000	1.000	0.991	0.990
Flow Entry, veh/h	210	236	359	405	661	745	505	570
Cap Entry, veh/h	449	515	376	435	840	917	648	719
V/C Ratio	0.467	0.459	0.956	0.930	0.786	0.813	0.780	0.793
Control Delay, s/veh	17.2	15.1	69.5	58.2	22.0	22.5	26.3	25.3
LOS	C	C	F	F	C	C	D	D
95th %tile Queue, veh	2	2	11	11	8	9	7	8

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	25	0	1559	1090	20
Future Vol, veh/h	0	25	0	1559	1090	20
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	27	0	1695	1185	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	603	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	447	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	447	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.58	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	447	-	-
HCM Lane V/C Ratio	-	0.061	-	-
HCM Ctrl Dly (s/v)	-	13.6	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	242	371	1535	1086
Demand Flow Rate, veh/h	247	371	1535	1097
Vehicles Circulating, veh/h	1132	1541	375	267
Vehicles Exiting, veh/h	232	369	1004	1645
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.1	24.7	18.2	8.9
Approach LOS	B	C	C	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.822	0.178	0.534	0.466	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	203	44	198	173	721	814	516	581
Cap Entry Lane, veh/h	476	542	327	383	1009	1009	1114	1114
Entry HV Adj Factor	0.982	0.977	1.000	1.000	1.001	0.999	0.989	0.991
Flow Entry, veh/h	199	43	198	173	721	814	510	576
Cap Entry, veh/h	468	530	327	383	1010	1009	1102	1103
V/C Ratio	0.426	0.081	0.605	0.452	0.714	0.806	0.463	0.522
Control Delay, s/veh	15.4	7.8	29.6	19.2	15.5	20.5	8.4	9.4
LOS	C	A	D	C	C	C	A	A
95th %tile Queue, veh	2	0	4	2	6	9	3	3

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	309	4	28	489	3	17
Future Vol, veh/h	309	4	28	489	3	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	347	4	31	549	3	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	352	0	962	349
Stage 1	-	-	-	-	349	-
Stage 2	-	-	-	-	612	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1207	-	284	694
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	541	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1207	-	273	694
Mov Cap-2 Maneuver	-	-	-	-	273	-
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	521	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.44	11.65
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	564	-	-	97	-
HCM Lane V/C Ratio	0.04	-	-	0.026	-
HCM Ctrl Dly (s/v)	11.7	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	324	2	28	516	1	17
Future Vol, veh/h	324	2	28	516	1	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	364	2	31	580	1	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	366	0	1008	365
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	643	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1192	-	267	680
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	524	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1192	-	256	680
Mov Cap-2 Maneuver	-	-	-	-	256	-
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	503	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.42	10.98
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	623	-	-	93	-
HCM Lane V/C Ratio	0.032	-	-	0.026	-
HCM Ctrl Dly (s/v)	11	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	228	40	23	106	16	7	57	55	79	90	14
Future Volume (veh/h)	10	228	40	23	106	16	7	57	55	79	90	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	11	256	45	26	119	18	8	64	62	89	101	16
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	190	431	74	244	392	54	197	199	181	385	228	31
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	27	1402	241	132	1274	175	45	781	712	529	897	120
Grp Volume(v), veh/h	312	0	0	163	0	0	134	0	0	206	0	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1582	0	0	1538	0	0	1546	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Cycle Q Clear(g_c), s	3.2	0.0	0.0	1.6	0.0	0.0	1.4	0.0	0.0	2.2	0.0	0.0
Prop In Lane	0.04		0.14	0.16		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	695	0	0	690	0	0	577	0	0	644	0	0
V/C Ratio(X)	0.45	0.00	0.00	0.24	0.00	0.00	0.23	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	2242	0	0	2097	0	0	2079	0	0	2107	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	6.0	0.0	0.0	5.5	0.0	0.0	6.3	0.0	0.0	6.5	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	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	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.5	0.0	0.0	5.6	0.0	0.0	6.5	0.0	0.0	6.8	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		312			163			134			206	
Approach Delay, s/veh		6.5			5.6			6.5			6.8	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.7	10.8	9.7	10.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.4	5.2	4.2	3.6
Green Ext Time (p_c), s	0.6	1.5	1.0	0.8

Intersection Summary	
HCM 7th Control Delay, s/veh	6.4
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	291	903	974
Demand Flow Rate, veh/h	0	294	921	984
Vehicles Circulating, veh/h	1162	738	180	201
Vehicles Exiting, veh/h	23	363	982	831
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	7.7	6.8	7.4
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.605	0.395	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	178	116	433	488	462	522
Cap Entry Lane, veh/h	464	529	685	758	1206	1206	1183	1183
Entry HV Adj Factor	1.000	1.000	0.989	0.991	0.980	0.981	0.991	0.989
Flow Entry, veh/h	0	0	176	115	424	479	458	516
Cap Entry, veh/h	464	529	677	752	1182	1182	1172	1170
V/C Ratio	0.000	0.000	0.260	0.153	0.359	0.405	0.391	0.441
Control Delay, s/veh	7.8	6.8	8.5	6.4	6.5	7.1	7.0	7.7
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	2	2	2

Intersection	
Intersection Delay, s/veh	22.4
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	834	388	890	1040
Demand Flow Rate, veh/h	851	399	917	1051
Vehicles Circulating, veh/h	1104	966	977	366
Vehicles Exiting, veh/h	313	928	978	999
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	35.1	11.1	29.6	10.2
Approach LOS	E	B	D	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	400	451	188	211	431	486	494	557
Cap Entry Lane, veh/h	489	556	555	625	550	619	964	1040
Entry HV Adj Factor	0.980	0.980	0.969	0.974	0.971	0.971	0.990	0.990
Flow Entry, veh/h	392	442	182	206	418	472	489	551
Cap Entry, veh/h	479	544	538	608	533	601	954	1030
V/C Ratio	0.818	0.812	0.339	0.338	0.784	0.785	0.512	0.535
Control Delay, s/veh	37.3	33.2	11.8	10.6	31.0	28.3	10.2	10.1
LOS	E	D	B	B	D	D	B	B
95th %tile Queue, veh	8	8	1	1	7	7	3	3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	26	0	931	1019	10
Future Vol, veh/h	0	26	0	931	1019	10
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	29	0	1046	1145	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	578	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	464	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	464	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.28	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	464	-	-
HCM Lane V/C Ratio	-	0.063	-	-
HCM Ctrl Dly (s/v)	-	13.3	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	13.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	304	293	1122	1354
Demand Flow Rate, veh/h	313	302	1133	1367
Vehicles Circulating, veh/h	1382	1196	471	185
Vehicles Exiting, veh/h	170	408	1224	1313
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	26.1	13.0	13.1	9.9
Approach LOS	D	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.796	0.204	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	249	64	158	144	533	600	642	725
Cap Entry Lane, veh/h	379	439	449	514	925	925	1200	1200
Entry HV Adj Factor	0.970	0.969	0.969	0.972	0.990	0.991	0.991	0.990
Flow Entry, veh/h	242	62	153	140	528	595	636	717
Cap Entry, veh/h	367	425	435	499	916	917	1189	1188
V/C Ratio	0.658	0.146	0.352	0.280	0.576	0.649	0.535	0.604
Control Delay, s/veh	30.1	10.6	14.4	11.4	12.0	14.1	9.1	10.6
LOS	D	B	B	B	B	B	A	B
95th %tile Queue, veh	4	1	2	1	4	5	3	4

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	514	1	9	193	5	26
Future Vol, veh/h	514	1	9	193	5	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	578	1	10	217	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	579	0	815	578
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	237	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	995	-	347	515
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	802	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	995	-	343	515
Mov Cap-2 Maneuver	-	-	-	-	343	-
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	793	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.39	13.14
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	477	-	-	80	-
HCM Lane V/C Ratio	0.073	-	-	0.01	-
HCM Ctrl Dly (s/v)	13.1	-	-	8.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	539	1	18	199	3	53
Future Vol, veh/h	539	1	18	199	3	53
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	606	1	20	224	3	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	607	0	870	606
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	264	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	971	-	322	497
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	780	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	971	-	314	497
Mov Cap-2 Maneuver	-	-	-	-	314	-
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	762	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.73	13.59
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	482	-	-	149	-
HCM Lane V/C Ratio	0.131	-	-	0.021	-
HCM Ctrl Dly (s/v)	13.6	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	179	18	36	322	61	58	118	25	39	81	16
Future Volume (veh/h)	11	179	18	36	322	61	58	118	25	39	81	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	13	208	21	42	374	71	67	137	29	45	94	19
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	158	619	60	179	556	100	258	261	49	249	275	47
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	32	1494	145	73	1342	242	333	1076	200	299	1134	196
Grp Volume(v), veh/h	242	0	0	487	0	0	233	0	0	158	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1657	0	0	1609	0	0	1629	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.6	0.0	0.0	6.3	0.0	0.0	3.3	0.0	0.0	2.0	0.0	0.0
Prop In Lane	0.05		0.09	0.09		0.15	0.29		0.12	0.28		0.12
Lane Grp Cap(c), veh/h	837	0	0	835	0	0	567	0	0	571	0	0
V/C Ratio(X)	0.29	0.00	0.00	0.58	0.00	0.00	0.41	0.00	0.00	0.28	0.00	0.00
Avail Cap(c_a), veh/h	1746	0	0	1744	0	0	1707	0	0	1694	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	5.2	0.0	0.0	6.3	0.0	0.0	8.7	0.0	0.0	8.3	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.3	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	0.2	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.4	0.0	0.0	7.0	0.0	0.0	9.2	0.0	0.0	8.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		242			487			233			158	
Approach Delay, s/veh		5.4			7.0			9.2			8.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.8		15.4		10.8		15.4				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		5.3		4.6		4.0		8.3				
Green Ext Time (p_c), s		1.1		1.2		0.7		2.6				

Intersection Summary												
HCM 7th Control Delay, s/veh			7.3									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	13.3
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	439	1668	1164
Demand Flow Rate, veh/h	0	439	1668	1176
Vehicles Circulating, veh/h	1439	1376	156	299
Vehicles Exiting, veh/h	36	448	1283	1516
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	25.1	12.4	10.1
Approach LOS	-	D	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.599	0.401	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	263	176	784	884	553	623
Cap Entry Lane, veh/h	359	418	381	441	1232	1232	1082	1082
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.989	0.990
Flow Entry, veh/h	0	0	263	176	784	884	547	617
Cap Entry, veh/h	359	418	381	441	1232	1232	1070	1071
V/C Ratio	0.000	0.000	0.691	0.399	0.636	0.717	0.511	0.576
Control Delay, s/veh	10.0	8.6	31.5	15.5	11.1	13.5	9.4	10.7
LOS	B	A	D	C	B	B	A	B
95th %tile Queue, veh	0	0	5	2	5	7	3	4

Intersection	
Intersection Delay, s/veh	33.7
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	465	775	1416	1084
Demand Flow Rate, veh/h	465	775	1416	1095
Vehicles Circulating, veh/h	1195	1407	527	809
Vehicles Exiting, veh/h	709	536	1133	1373
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	16.7	70.2	23.6	28.0
Approach LOS	C	F	C	D

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	219	246	364	411	666	750	515	580
Cap Entry Lane, veh/h	450	514	370	429	831	907	641	714
Entry HV Adj Factor	0.998	1.002	1.001	0.999	0.999	1.001	0.990	0.991
Flow Entry, veh/h	219	246	364	411	666	750	510	575
Cap Entry, veh/h	449	515	370	429	831	908	635	707
V/C Ratio	0.487	0.478	0.984	0.957	0.801	0.827	0.803	0.812
Control Delay, s/veh	17.8	15.6	76.7	64.4	23.3	23.8	28.7	27.3
LOS	C	C	F	F	C	C	D	D
95th %tile Queue, veh	3	3	11	11	9	10	8	9

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	25	0	1568	1096	20
Future Vol, veh/h	0	25	0	1568	1096	20
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	27	0	1704	1191	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	607	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	445	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	445	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.62	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	445	-	-
HCM Lane V/C Ratio	-	0.061	-	-
HCM Ctrl Dly (s/v)	-	13.6	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	15.7
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	242	373	1543	1092
Demand Flow Rate, veh/h	247	373	1543	1103
Vehicles Circulating, veh/h	1138	1549	376	267
Vehicles Exiting, veh/h	232	370	1009	1655
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.2	25.1	18.5	9.0
Approach LOS	B	D	C	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.822	0.178	0.531	0.469	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	203	44	198	175	725	818	518	585
Cap Entry Lane, veh/h	474	540	325	381	1009	1009	1114	1114
Entry HV Adj Factor	0.982	0.977	1.000	1.000	1.000	1.000	0.991	0.989
Flow Entry, veh/h	199	43	198	175	725	818	513	579
Cap Entry, veh/h	465	527	325	381	1009	1008	1103	1102
V/C Ratio	0.428	0.082	0.610	0.460	0.719	0.811	0.465	0.525
Control Delay, s/veh	15.6	7.8	30.0	19.6	15.7	20.9	8.4	9.4
LOS	C	A	D	C	C	C	A	A
95th %tile Queue, veh	2	0	4	2	6	9	3	3

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	311	6	28	490	4	17
Future Vol, veh/h	311	6	28	490	4	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	349	7	31	551	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	356	0	966	353
Stage 1	-	-	-	-	353	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1203	-	282	691
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	540	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1203	-	272	691
Mov Cap-2 Maneuver	-	-	-	-	272	-
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	520	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.44	12.05
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	534	-	-	97	-
HCM Lane V/C Ratio	0.044	-	-	0.026	-
HCM Ctrl Dly (s/v)	12.1	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

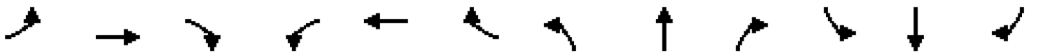
Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	324	4	56	516	2	35
Future Vol, veh/h	324	4	56	516	2	35
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	364	4	63	580	2	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	369	0	1072	366
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	706	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1190	-	244	679
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	490	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1190	-	225	679
Mov Cap-2 Maneuver	-	-	-	-	225	-
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	451	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.8	11.31
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	612	-	-	176	-
HCM Lane V/C Ratio	0.068	-	-	0.053	-
HCM Ctrl Dly (s/v)	11.3	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	246	43	24	114	18	8	61	60	86	97	16
Future Volume (veh/h)	10	246	43	24	114	18	8	61	60	86	97	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	11	276	48	27	128	20	9	69	67	97	109	18
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	179	453	77	232	411	58	189	205	186	377	234	32
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	23	1408	239	124	1276	181	45	782	710	528	891	124
Grp Volume(v), veh/h	335	0	0	175	0	0	145	0	0	224	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1581	0	0	1537	0	0	1543	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
Cycle Q Clear(g_c), s	3.7	0.0	0.0	1.7	0.0	0.0	1.6	0.0	0.0	2.6	0.0	0.0
Prop In Lane	0.03		0.14	0.15		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	710	0	0	701	0	0	580	0	0	643	0	0
V/C Ratio(X)	0.47	0.00	0.00	0.25	0.00	0.00	0.25	0.00	0.00	0.35	0.00	0.00
Avail Cap(c_a), veh/h	2130	0	0	1989	0	0	1973	0	0	1995	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	6.2	0.0	0.0	5.6	0.0	0.0	6.5	0.0	0.0	6.8	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	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	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.7	0.0	0.0	5.7	0.0	0.0	6.7	0.0	0.0	7.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		335			175			145			224	
Approach Delay, s/veh		6.7			5.7			6.7			7.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	10.2	11.5	10.2	11.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.6	5.7	4.6	3.7
Green Ext Time (p_c), s	0.7	1.7	1.1	0.8

Intersection Summary	
HCM 7th Control Delay, s/veh	6.6
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	312	968	1047
Demand Flow Rate, veh/h	0	315	987	1058
Vehicles Circulating, veh/h	1248	792	193	214
Vehicles Exiting, veh/h	24	388	1055	893
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	8.4	7.3	8.0
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.603	0.397	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	190	125	464	523	497	561
Cap Entry Lane, veh/h	428	492	651	724	1191	1191	1169	1169
Entry HV Adj Factor	1.000	1.000	0.989	0.992	0.980	0.981	0.991	0.990
Flow Entry, veh/h	0	0	188	124	455	513	492	555
Cap Entry, veh/h	428	492	645	718	1168	1169	1158	1157
V/C Ratio	0.000	0.000	0.292	0.173	0.389	0.439	0.425	0.480
Control Delay, s/veh	8.4	7.3	9.3	6.9	7.0	7.7	7.5	8.4
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	2	2	3

Intersection	
Intersection Delay, s/veh	32.8
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	892	417	956	1116
Demand Flow Rate, veh/h	910	430	985	1127
Vehicles Circulating, veh/h	1184	1035	1045	392
Vehicles Exiting, veh/h	335	995	1049	1073
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	55.8	12.8	44.8	11.5
Approach LOS	F	B	E	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	428	482	202	228	463	522	530	597
Cap Entry Lane, veh/h	454	519	521	589	516	584	941	1018
Entry HV Adj Factor	0.980	0.981	0.971	0.970	0.970	0.970	0.989	0.990
Flow Entry, veh/h	419	473	196	221	449	507	524	591
Cap Entry, veh/h	445	509	506	572	501	567	931	1008
V/C Ratio	0.942	0.929	0.388	0.387	0.897	0.894	0.563	0.587
Control Delay, s/veh	59.8	52.3	13.5	12.2	47.1	42.8	11.5	11.4
LOS	F	F	B	B	E	E	B	B
95th %tile Queue, veh	11	11	2	2	10	11	4	4

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	29	0	1001	1095	10
Future Vol, veh/h	0	29	0	1001	1095	10
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	33	0	1125	1230	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	621	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	435	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	435	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.94	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	435	-	-
HCM Lane V/C Ratio	-	0.075	-	-
HCM Ctrl Dly (s/v)	-	13.9	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	15.8
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	325	317	1205	1455
Demand Flow Rate, veh/h	335	327	1216	1469
Vehicles Circulating, veh/h	1485	1283	504	199
Vehicles Exiting, veh/h	183	437	1316	1411
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	37.1	15.2	15.7	11.2
Approach LOS	E	C	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.797	0.203	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	267	68	171	156	572	644	690	779
Cap Entry Lane, veh/h	344	402	415	477	898	898	1185	1185
Entry HV Adj Factor	0.972	0.971	0.971	0.968	0.990	0.991	0.991	0.990
Flow Entry, veh/h	259	66	166	151	566	638	684	771
Cap Entry, veh/h	335	390	403	462	889	890	1174	1173
V/C Ratio	0.775	0.169	0.412	0.327	0.637	0.717	0.582	0.657
Control Delay, s/veh	43.5	11.9	17.1	13.2	14.1	17.2	10.2	12.0
LOS	E	B	C	B	B	C	B	B
95th %tile Queue, veh	6	1	2	1	5	6	4	5

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	553	1	9	208	5	26
Future Vol, veh/h	553	1	9	208	5	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	621	1	10	234	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	622	0	876	622
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	254	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	958	-	319	487
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	958	-	316	487
Mov Cap-2 Maneuver	-	-	-	-	316	-
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	779	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.36	13.72
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	448	-	-	75	-
HCM Lane V/C Ratio	0.078	-	-	0.011	-
HCM Ctrl Dly (s/v)	13.7	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

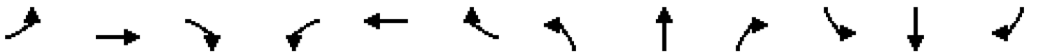
Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	578	1	18	214	3	53
Future Vol, veh/h	578	1	18	214	3	53
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	649	1	20	240	3	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	651	0	931	650
Stage 1	-	-	-	-	650	-
Stage 2	-	-	-	-	281	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	936	-	296	469
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	767	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	936	-	289	469
Mov Cap-2 Maneuver	-	-	-	-	289	-
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	748	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.69	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	454	-	-	140	-
HCM Lane V/C Ratio	0.139	-	-	0.022	-
HCM Ctrl Dly (s/v)	14.2	-	-	8.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	192	19	39	346	66	62	127	27	42	87	17
Future Volume (veh/h)	12	192	19	39	346	66	62	127	27	42	87	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	14	223	22	45	402	77	72	148	31	49	101	20
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	149	644	61	171	576	105	248	268	49	241	282	48
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	31	1496	142	73	1339	243	333	1078	199	303	1136	192
Grp Volume(v), veh/h	259	0	0	524	0	0	251	0	0	170	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1655	0	0	1609	0	0	1631	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.5	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	7.3	0.0	0.0	3.8	0.0	0.0	2.3	0.0	0.0
Prop In Lane	0.05		0.08	0.09		0.15	0.29		0.12	0.29		0.12
Lane Grp Cap(c), veh/h	854	0	0	852	0	0	565	0	0	571	0	0
V/C Ratio(X)	0.30	0.00	0.00	0.62	0.00	0.00	0.44	0.00	0.00	0.30	0.00	0.00
Avail Cap(c_a), veh/h	1631	0	0	1629	0	0	1595	0	0	1582	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	5.4	0.0	0.0	6.6	0.0	0.0	9.3	0.0	0.0	8.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.7	0.0	0.0	0.5	0.0	0.0	0.3	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	0.2	0.0	0.0	0.8	0.0	0.0	0.7	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.6	0.0	0.0	7.3	0.0	0.0	9.8	0.0	0.0	9.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		259			524			251			170	
Approach Delay, s/veh		5.6			7.3			9.8			9.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.5		16.6		11.5		16.6				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		5.8		4.9		4.3		9.3				
Green Ext Time (p_c), s		1.2		1.2		0.8		2.8				

Intersection Summary	
HCM 7th Control Delay, s/veh	7.7
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	16.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	473	1797	1254
Demand Flow Rate, veh/h	0	473	1797	1267
Vehicles Circulating, veh/h	1550	1482	170	322
Vehicles Exiting, veh/h	39	485	1380	1633
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	36.4	14.8	11.5
Approach LOS	-	E	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.598	0.402	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	283	190	845	952	595	672
Cap Entry Lane, veh/h	324	380	345	403	1217	1217	1059	1059
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.991	0.989
Flow Entry, veh/h	0	0	283	190	845	952	589	665
Cap Entry, veh/h	324	380	345	403	1216	1217	1049	1048
V/C Ratio	0.000	0.000	0.820	0.472	0.695	0.783	0.562	0.634
Control Delay, s/veh	11.1	9.5	48.0	19.0	12.9	16.6	10.5	12.4
LOS	B	A	E	C	B	C	B	B
95th %tile Queue, veh	0	0	7	2	6	9	4	5

Intersection	
Intersection Delay, s/veh	54.2
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	496	833	1522	1166
Demand Flow Rate, veh/h	496	833	1522	1178
Vehicles Circulating, veh/h	1287	1512	566	867
Vehicles Exiting, veh/h	758	576	1217	1478
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	20.7	125.6	34.6	42.9
Approach LOS	C	F	D	E

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	233	263	392	441	715	807	554	624
Cap Entry Lane, veh/h	413	475	336	393	802	878	608	680
Entry HV Adj Factor	1.001	1.000	0.999	1.001	1.000	1.000	0.989	0.990
Flow Entry, veh/h	233	263	392	441	715	807	548	618
Cap Entry, veh/h	413	475	336	393	802	877	601	673
V/C Ratio	0.564	0.553	1.167	1.123	0.892	0.919	0.911	0.918
Control Delay, s/veh	22.2	19.3	137.2	115.3	33.5	35.6	44.0	42.0
LOS	C	C	F	F	D	E	E	E
95th %tile Queue, veh	3	3	16	16	12	14	11	12

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	27	0	1686	1179	22
Future Vol, veh/h	0	27	0	1686	1179	22
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	29	0	1833	1282	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	653	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	415	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	415	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14.34	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	415	-	-
HCM Lane V/C Ratio	-	0.071	-	-
HCM Ctrl Dly (s/v)	-	14.3	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	20.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	260	401	1660	1175
Demand Flow Rate, veh/h	266	401	1660	1187
Vehicles Circulating, veh/h	1225	1666	405	288
Vehicles Exiting, veh/h	250	399	1085	1780
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	17.2	34.8	25.2	10.0
Approach LOS	C	D	D	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.823	0.177	0.531	0.469	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	219	47	213	188	780	880	558	629
Cap Entry Lane, veh/h	437	501	292	345	982	982	1093	1093
Entry HV Adj Factor	0.978	0.979	1.000	1.000	1.000	1.000	0.990	0.990
Flow Entry, veh/h	214	46	213	188	780	880	552	623
Cap Entry, veh/h	428	491	292	345	983	982	1082	1082
V/C Ratio	0.501	0.094	0.731	0.546	0.794	0.896	0.511	0.576
Control Delay, s/veh	19.1	8.6	43.3	25.0	20.1	29.7	9.3	10.6
LOS	C	A	E	D	C	D	A	B
95th %tile Queue, veh	3	0	5	3	9	13	3	4

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	334	6	28	528	4	17
Future Vol, veh/h	334	6	28	528	4	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	375	7	31	593	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	382	0	1035	379
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	656	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1176	-	257	668
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1176	-	247	668
Mov Cap-2 Maneuver	-	-	-	-	247	-
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	496	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.41	12.49
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	504	-	-	91	-
HCM Lane V/C Ratio	0.047	-	-	0.027	-
HCM Ctrl Dly (s/v)	12.5	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

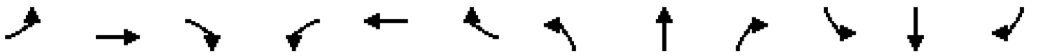
Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	347	4	56	554	2	35
Future Vol, veh/h	347	4	56	554	2	35
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	390	4	63	622	2	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	394	0	1140	392
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	748	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1164	-	222	657
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	468	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1164	-	204	657
Mov Cap-2 Maneuver	-	-	-	-	204	-
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	429	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.76	11.61
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	586	-	-	165	-
HCM Lane V/C Ratio	0.071	-	-	0.054	-
HCM Ctrl Dly (s/v)	11.6	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	247	43	24	116	18	8	61	60	86	97	16
Future Volume (veh/h)	10	247	43	24	116	18	8	61	60	86	97	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	11	278	48	27	130	20	9	69	67	97	109	18
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	179	456	77	231	414	58	188	205	186	376	233	32
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	23	1410	238	122	1281	179	45	782	710	528	891	124
Grp Volume(v), veh/h	337	0	0	177	0	0	145	0	0	224	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1581	0	0	1537	0	0	1543	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
Cycle Q Clear(g_c), s	3.7	0.0	0.0	1.8	0.0	0.0	1.7	0.0	0.0	2.6	0.0	0.0
Prop In Lane	0.03		0.14	0.15		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	712	0	0	703	0	0	579	0	0	642	0	0
V/C Ratio(X)	0.47	0.00	0.00	0.25	0.00	0.00	0.25	0.00	0.00	0.35	0.00	0.00
Avail Cap(c_a), veh/h	2125	0	0	1985	0	0	1968	0	0	1990	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	6.2	0.0	0.0	5.6	0.0	0.0	6.5	0.0	0.0	6.8	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	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	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.7	0.0	0.0	5.7	0.0	0.0	6.7	0.0	0.0	7.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		337			177			145			224	
Approach Delay, s/veh		6.7			5.7			6.7			7.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	10.2	11.5	10.2	11.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.7	5.7	4.6	3.8
Green Ext Time (p_c), s	0.7	1.7	1.1	0.9

Intersection Summary	
HCM 7th Control Delay, s/veh	6.6
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	312	977	1050
Demand Flow Rate, veh/h	0	315	996	1061
Vehicles Circulating, veh/h	1251	799	193	214
Vehicles Exiting, veh/h	24	390	1058	900
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	8.4	7.4	8.0
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.603	0.397	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	190	125	468	528	499	562
Cap Entry Lane, veh/h	427	490	647	720	1191	1191	1169	1169
Entry HV Adj Factor	1.000	1.000	0.989	0.992	0.981	0.981	0.989	0.991
Flow Entry, veh/h	0	0	188	124	459	518	494	557
Cap Entry, veh/h	427	490	640	714	1169	1168	1156	1158
V/C Ratio	0.000	0.000	0.294	0.174	0.393	0.443	0.427	0.481
Control Delay, s/veh	8.4	7.3	9.4	7.0	7.0	7.7	7.5	8.4
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	2	2	3

Intersection	
Intersection Delay, s/veh	35.3
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	916	419	959	1118
Demand Flow Rate, veh/h	934	432	988	1129
Vehicles Circulating, veh/h	1184	1046	1061	397
Vehicles Exiting, veh/h	342	1003	1057	1081
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	61.1	13.0	47.9	11.6
Approach LOS	F	B	E	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	439	495	203	229	464	524	531	598
Cap Entry Lane, veh/h	454	519	516	584	509	576	937	1013
Entry HV Adj Factor	0.981	0.981	0.971	0.971	0.971	0.970	0.989	0.991
Flow Entry, veh/h	431	485	197	222	451	508	525	592
Cap Entry, veh/h	445	509	501	566	494	559	927	1004
V/C Ratio	0.966	0.954	0.394	0.392	0.912	0.909	0.567	0.590
Control Delay, s/veh	65.1	57.5	13.7	12.4	50.2	45.8	11.7	11.6
LOS	F	F	B	B	F	E	B	B
95th %tile Queue, veh	12	12	2	2	11	11	4	4

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	29	0	1003	1102	10
Future Vol, veh/h	0	29	0	1003	1102	10
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	33	0	1127	1238	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	625	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	433	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	433	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	433	-	-
HCM Lane V/C Ratio	-	0.075	-	-
HCM Ctrl Dly (s/v)	-	14	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	325	317	1207	1464
Demand Flow Rate, veh/h	335	327	1218	1478
Vehicles Circulating, veh/h	1494	1285	506	199
Vehicles Exiting, veh/h	183	439	1323	1413
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	38.0	15.3	15.9	11.2
Approach LOS	E	C	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.797	0.203	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	267	68	171	156	572	646	695	783
Cap Entry Lane, veh/h	342	399	414	476	896	896	1185	1185
Entry HV Adj Factor	0.972	0.971	0.971	0.968	0.991	0.990	0.990	0.991
Flow Entry, veh/h	259	66	166	151	567	640	688	776
Cap Entry, veh/h	332	387	402	461	888	887	1173	1174
V/C Ratio	0.782	0.171	0.413	0.328	0.638	0.721	0.587	0.661
Control Delay, s/veh	44.6	12.1	17.2	13.2	14.1	17.4	10.3	12.1
LOS	E	B	C	B	B	C	B	B
95th %tile Queue, veh	6	1	2	1	5	6	4	5

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	554	1	9	210	5	26
Future Vol, veh/h	554	1	9	210	5	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	622	1	10	236	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	624	0	879	623
Stage 1	-	-	-	-	623	-
Stage 2	-	-	-	-	256	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	958	-	318	486
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	787	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	958	-	314	486
Mov Cap-2 Maneuver	-	-	-	-	314	-
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	777	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.36	13.74
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	447	-	-	74	-
HCM Lane V/C Ratio	0.078	-	-	0.011	-
HCM Ctrl Dly (s/v)	13.7	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	578	2	25	214	5	75
Future Vol, veh/h	578	2	25	214	5	75
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	649	2	28	240	6	84

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	652	0	947	651
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	297	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	935	-	290	469
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	754	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	935	-	280	469
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	728	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.94	14.99
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	450	-	-	188	-
HCM Lane V/C Ratio	0.2	-	-	0.03	-
HCM Ctrl Dly (s/v)	15	-	-	9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	194	19	39	347	66	62	127	27	42	87	17
Future Volume (veh/h)	12	194	19	39	347	66	62	127	27	42	87	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	14	226	22	45	403	77	72	148	31	49	101	20
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	149	646	60	171	577	105	248	268	49	241	282	48
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	31	1499	140	73	1339	243	333	1078	199	303	1136	192
Grp Volume(v), veh/h	262	0	0	525	0	0	251	0	0	170	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1655	0	0	1609	0	0	1631	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	7.3	0.0	0.0	3.8	0.0	0.0	2.3	0.0	0.0
Prop In Lane	0.05		0.08	0.09		0.15	0.29		0.12	0.29		0.12
Lane Grp Cap(c), veh/h	855	0	0	853	0	0	565	0	0	570	0	0
V/C Ratio(X)	0.31	0.00	0.00	0.62	0.00	0.00	0.44	0.00	0.00	0.30	0.00	0.00
Avail Cap(c_a), veh/h	1630	0	0	1627	0	0	1593	0	0	1580	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	5.4	0.0	0.0	6.6	0.0	0.0	9.3	0.0	0.0	8.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0	0.3	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	0.2	0.0	0.0	0.8	0.0	0.0	0.7	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.6	0.0	0.0	7.3	0.0	0.0	9.9	0.0	0.0	9.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		262			525			251			170	
Approach Delay, s/veh		5.6			7.3			9.9			9.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	11.5	16.6	11.5	16.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	5.8	4.9	4.3	9.3
Green Ext Time (p_c), s	1.2	1.3	0.8	2.8

Intersection Summary	
HCM 7th Control Delay, s/veh	7.7
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	474	1802	1261
Demand Flow Rate, veh/h	0	474	1802	1274
Vehicles Circulating, veh/h	1558	1486	170	323
Vehicles Exiting, veh/h	39	486	1388	1637
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	37.0	14.9	11.6
Approach LOS	-	E	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.599	0.401	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	284	190	847	955	599	675
Cap Entry Lane, veh/h	322	378	344	401	1217	1217	1058	1058
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.989	0.990
Flow Entry, veh/h	0	0	284	190	847	955	593	668
Cap Entry, veh/h	322	378	344	401	1216	1217	1047	1048
V/C Ratio	0.000	0.000	0.825	0.473	0.696	0.785	0.566	0.638
Control Delay, s/veh	11.2	9.5	49.0	19.1	12.9	16.7	10.7	12.5
LOS	B	A	E	C	B	C	B	B
95th %tile Queue, veh	0	0	7	2	6	9	4	5

Intersection	
Intersection Delay, s/veh	58.6
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	514	842	1531	1175
Demand Flow Rate, veh/h	514	842	1531	1187
Vehicles Circulating, veh/h	1287	1527	578	885
Vehicles Exiting, veh/h	785	582	1223	1484
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	21.6	135.9	37.2	47.4
Approach LOS	C	F	E	E

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	242	272	396	446	720	811	558	629
Cap Entry Lane, veh/h	413	475	331	388	793	869	598	669
Entry HV Adj Factor	0.998	1.002	0.999	1.001	0.999	1.001	0.990	0.990
Flow Entry, veh/h	242	272	396	446	720	811	552	623
Cap Entry, veh/h	412	476	331	388	793	869	592	663
V/C Ratio	0.586	0.572	1.195	1.150	0.908	0.933	0.933	0.940
Control Delay, s/veh	23.3	20.0	148.0	125.2	36.1	38.2	48.4	46.4
LOS	C	C	F	F	E	E	E	E
95th %tile Queue, veh	4	4	17	17	12	14	12	13

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	27	0	1694	1184	22
Future Vol, veh/h	0	27	0	1694	1184	22
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	29	0	1841	1287	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	655	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	413	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	413	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14.38	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	413	-	-
HCM Lane V/C Ratio	-	0.071	-	-
HCM Ctrl Dly (s/v)	-	14.4	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	20.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	260	402	1667	1180
Demand Flow Rate, veh/h	266	402	1667	1192
Vehicles Circulating, veh/h	1230	1673	406	288
Vehicles Exiting, veh/h	250	400	1089	1788
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	17.3	35.3	25.7	10.0
Approach LOS	C	E	D	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.823	0.177	0.530	0.470	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	219	47	213	189	783	884	560	632
Cap Entry Lane, veh/h	435	499	290	342	981	981	1093	1093
Entry HV Adj Factor	0.978	0.979	1.000	1.000	1.001	0.999	0.991	0.990
Flow Entry, veh/h	214	46	213	189	783	884	555	626
Cap Entry, veh/h	426	488	290	342	982	981	1082	1081
V/C Ratio	0.503	0.094	0.735	0.552	0.798	0.901	0.513	0.578
Control Delay, s/veh	19.2	8.6	44.1	25.5	20.4	30.4	9.3	10.7
LOS	C	A	E	D	C	D	A	B
95th %tile Queue, veh	3	0	5	3	9	13	3	4

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	336	7	28	529	4	17
Future Vol, veh/h	336	7	28	529	4	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	378	8	31	594	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	385	0	1039	381
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	657	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1173	-	256	666
Stage 1	-	-	-	-	690	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1173	-	245	666
Mov Cap-2 Maneuver	-	-	-	-	245	-
Stage 1	-	-	-	-	690	-
Stage 2	-	-	-	-	495	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.41	12.53
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	502	-	-	90	-
HCM Lane V/C Ratio	0.047	-	-	0.027	-
HCM Ctrl Dly (s/v)	12.5	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	347	6	79	554	3	49
Future Vol, veh/h	347	6	79	554	3	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	390	7	89	622	3	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	397	0	1193	393
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	800	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1162	-	206	656
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	442	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1162	-	182	656
Mov Cap-2 Maneuver	-	-	-	-	182	-
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	391	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.04	12.03
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	570	-	-	225	-
HCM Lane V/C Ratio	0.102	-	-	0.076	-
HCM Ctrl Dly (s/v)	12	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.2	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	11	265	46	26	124	19	8	66	64	92	105	17
Future Volume (veh/h)	11	265	46	26	124	19	8	66	64	92	105	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	12	298	52	29	139	21	9	74	72	103	118	19
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	171	476	81	222	434	59	178	210	191	365	241	33
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	23	1408	240	120	1285	176	41	783	714	522	899	122
Grp Volume(v), veh/h	362	0	0	189	0	0	155	0	0	240	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1580	0	0	1538	0	0	1543	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Cycle Q Clear(g_c), s	4.2	0.0	0.0	2.0	0.0	0.0	1.9	0.0	0.0	2.9	0.0	0.0
Prop In Lane	0.03		0.14	0.15		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	727	0	0	716	0	0	579	0	0	639	0	0
V/C Ratio(X)	0.50	0.00	0.00	0.26	0.00	0.00	0.27	0.00	0.00	0.38	0.00	0.00
Avail Cap(c_a), veh/h	2018	0	0	1882	0	0	1870	0	0	1887	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	6.4	0.0	0.0	5.7	0.0	0.0	6.8	0.0	0.0	7.1	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4	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	0.3	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.9	0.0	0.0	5.8	0.0	0.0	7.0	0.0	0.0	7.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		362			189			155			240	
Approach Delay, s/veh		6.9			5.8			7.0			7.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.6		12.2		10.6		12.2				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		3.9		6.2		4.9		4.0				
Green Ext Time (p_c), s		0.7		1.8		1.2		0.9				

Intersection Summary												
HCM 7th Control Delay, s/veh			6.9									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	337	1049	1129
Demand Flow Rate, veh/h	0	340	1070	1140
Vehicles Circulating, veh/h	1345	859	208	233
Vehicles Exiting, veh/h	28	419	1137	966
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	9.4	8.0	8.8
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.603	0.397	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	205	135	503	567	536	604
Cap Entry Lane, veh/h	392	453	613	684	1175	1175	1149	1149
Entry HV Adj Factor	1.000	1.000	0.990	0.993	0.980	0.980	0.990	0.990
Flow Entry, veh/h	0	0	203	134	493	556	531	598
Cap Entry, veh/h	392	453	607	679	1152	1152	1137	1138
V/C Ratio	0.000	0.000	0.335	0.197	0.428	0.482	0.467	0.526
Control Delay, s/veh	9.2	8.0	10.6	7.6	7.6	8.4	8.2	9.2
LOS	A	A	B	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	3	3	3

Intersection	
Intersection Delay, s/veh	58.5
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	977	449	1031	1207
Demand Flow Rate, veh/h	996	463	1062	1219
Vehicles Circulating, veh/h	1280	1122	1139	425
Vehicles Exiting, veh/h	364	1079	1137	1160
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	107.9	15.3	83.1	13.6
Approach LOS	F	C	F	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	468	528	218	245	499	563	573	646
Cap Entry Lane, veh/h	416	478	481	547	473	539	913	989
Entry HV Adj Factor	0.981	0.981	0.968	0.971	0.971	0.971	0.990	0.990
Flow Entry, veh/h	459	518	211	238	485	547	567	640
Cap Entry, veh/h	408	469	466	531	460	524	904	980
V/C Ratio	1.125	1.104	0.453	0.448	1.054	1.044	0.628	0.653
Control Delay, s/veh	114.6	102.0	16.3	14.4	87.1	79.5	13.6	13.6
LOS	F	F	C	B	F	F	B	B
95th %tile Queue, veh	17	17	2	2	15	16	5	5

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	31	0	1080	1184	11
Future Vol, veh/h	0	31	0	1080	1184	11
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	35	0	1213	1330	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	671	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	403	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	403	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14.77	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	403	-	-
HCM Lane V/C Ratio	-	0.086	-	-
HCM Ctrl Dly (s/v)	-	14.8	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-

Intersection	
Intersection Delay, s/veh	21.1
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	351	341	1299	1574
Demand Flow Rate, veh/h	362	351	1312	1590
Vehicles Circulating, veh/h	1607	1384	546	213
Vehicles Exiting, veh/h	196	474	1423	1522
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	62.4	18.4	20.5	13.0
Approach LOS	F	C	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.796	0.204	0.521	0.479	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	288	74	183	168	617	695	747	843
Cap Entry Lane, veh/h	308	362	378	438	864	864	1170	1170
Entry HV Adj Factor	0.970	0.973	0.972	0.970	0.989	0.991	0.990	0.990
Flow Entry, veh/h	279	72	178	163	610	688	740	834
Cap Entry, veh/h	299	352	367	425	855	856	1159	1158
V/C Ratio	0.936	0.204	0.484	0.384	0.714	0.804	0.639	0.721
Control Delay, s/veh	75.0	13.8	21.1	15.6	17.6	23.0	11.6	14.3
LOS	F	B	C	C	C	C	B	B
95th %tile Queue, veh	9	1	3	2	6	9	5	7

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	596	1	9	225	5	26
Future Vol, veh/h	596	1	9	225	5	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	670	1	10	253	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	671	0	943	670
Stage 1	-	-	-	-	670	-
Stage 2	-	-	-	-	273	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	920	-	291	457
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	773	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	920	-	288	457
Mov Cap-2 Maneuver	-	-	-	-	288	-
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	763	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.34	14.41
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	417	-	-	69	-
HCM Lane V/C Ratio	0.083	-	-	0.011	-
HCM Ctrl Dly (s/v)	14.4	-	-	9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	620	2	25	229	5	75
Future Vol, veh/h	620	2	25	229	5	75
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	697	2	28	257	6	84

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	699	0	1011	698
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	313	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	898	-	265	441
Stage 1	-	-	-	-	494	-
Stage 2	-	-	-	-	741	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	898	-	256	441
Mov Cap-2 Maneuver	-	-	-	-	256	-
Stage 1	-	-	-	-	494	-
Stage 2	-	-	-	-	714	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.9	15.84
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	422	-	-	177	-
HCM Lane V/C Ratio	0.213	-	-	0.031	-
HCM Ctrl Dly (s/v)	15.8	-	-	9.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	13	208	21	42	373	71	67	137	29	45	93	18
Future Volume (veh/h)	13	208	21	42	373	71	67	137	29	45	93	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	15	242	24	49	434	83	78	159	34	52	108	21
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	139	670	64	163	598	109	239	273	51	230	292	48
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	31	1495	142	75	1334	242	336	1070	202	302	1144	190
Grp Volume(v), veh/h	281	0	0	566	0	0	271	0	0	181	0	0
Grp Sat Flow(s),veh/h/ln	1668	0	0	1652	0	0	1608	0	0	1635	0	0
Q Serve(g_s), s	0.0	0.0	0.0	2.3	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.3	0.0	0.0	8.6	0.0	0.0	4.4	0.0	0.0	2.7	0.0	0.0
Prop In Lane	0.05		0.09	0.09		0.15	0.29		0.13	0.29		0.12
Lane Grp Cap(c), veh/h	872	0	0	869	0	0	563	0	0	570	0	0
V/C Ratio(X)	0.32	0.00	0.00	0.65	0.00	0.00	0.48	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	1507	0	0	1504	0	0	1472	0	0	1462	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	5.5	0.0	0.0	7.0	0.0	0.0	10.0	0.0	0.0	9.4	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.8	0.0	0.0	0.6	0.0	0.0	0.3	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	0.3	0.0	0.0	1.1	0.0	0.0	0.9	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.7	0.0	0.0	7.8	0.0	0.0	10.7	0.0	0.0	9.7	0.0	0.0
LnGrp LOS	A			A			B			A		
Approach Vol, veh/h		281			566			271			181	
Approach Delay, s/veh		5.7			7.8			10.7			9.7	
Approach LOS		A			A			B			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.2		18.1		12.2		18.1				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		6.4		5.3		4.7		10.6				
Green Ext Time (p_c), s		1.3		1.4		0.9		3.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			8.2									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	22.3
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	508	1937	1354
Demand Flow Rate, veh/h	0	508	1937	1368
Vehicles Circulating, veh/h	1673	1597	181	346
Vehicles Exiting, veh/h	41	521	1492	1759
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	60.2	18.6	13.5
Approach LOS	-	F	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.600	0.400	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	305	203	910	1027	643	725
Cap Entry Lane, veh/h	290	342	311	365	1204	1204	1036	1036
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.990	0.990
Flow Entry, veh/h	0	0	305	203	910	1027	636	718
Cap Entry, veh/h	290	342	311	365	1205	1204	1026	1026
V/C Ratio	0.000	0.000	0.982	0.556	0.756	0.853	0.620	0.699
Control Delay, s/veh	12.4	10.5	84.1	24.3	15.3	21.5	12.2	14.7
LOS	B	B	F	C	C	C	B	B
95th %tile Queue, veh	0	0	10	3	8	11	4	6

Intersection	
Intersection Delay, s/veh	96.1
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	546	903	1646	1261
Demand Flow Rate, veh/h	546	903	1646	1274
Vehicles Circulating, veh/h	1385	1638	617	946
Vehicles Exiting, veh/h	835	625	1314	1595
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	28.4	222.9	61.1	80.2
Approach LOS	D	F	F	F

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	257	289	424	479	774	872	599	675
Cap Entry Lane, veh/h	378	437	299	353	765	840	565	635
Entry HV Adj Factor	0.999	1.001	1.001	0.999	1.000	1.000	0.990	0.990
Flow Entry, veh/h	257	289	424	479	774	872	593	668
Cap Entry, veh/h	377	438	299	353	765	841	560	629
V/C Ratio	0.681	0.661	1.417	1.358	1.011	1.038	1.059	1.062
Control Delay, s/veh	31.0	26.1	239.3	208.4	58.6	63.2	81.8	78.9
LOS	D	D	F	F	F	F	F	F
95th %tile Queue, veh	5	5	23	23	18	20	17	18

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	29	0	1821	1273	24
Future Vol, veh/h	0	29	0	1821	1273	24
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	32	0	1979	1384	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	705	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	384	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	384	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	15.22	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	384	-	-
HCM Lane V/C Ratio	-	0.082	-	-
HCM Ctrl Dly (s/v)	-	15.2	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-

Intersection	
Intersection Delay, s/veh	30.4
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	281	432	1793	1268
Demand Flow Rate, veh/h	287	432	1793	1280
Vehicles Circulating, veh/h	1321	1800	436	309
Vehicles Exiting, veh/h	268	429	1172	1923
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	21.7	54.7	39.3	11.4
Approach LOS	C	F	E	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.819	0.181	0.530	0.470	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	235	52	229	203	843	950	602	678
Cap Entry Lane, veh/h	400	462	258	307	955	955	1072	1072
Entry HV Adj Factor	0.979	0.981	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	230	51	229	203	843	950	596	672
Cap Entry, veh/h	392	453	258	307	955	955	1061	1062
V/C Ratio	0.587	0.113	0.888	0.660	0.883	0.995	0.562	0.632
Control Delay, s/veh	24.3	9.5	72.1	35.1	28.6	48.7	10.5	12.2
LOS	C	A	F	E	D	E	B	B
95th %tile Queue, veh	4	0	8	4	12	19	4	5

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	362	7	28	569	4	17
Future Vol, veh/h	362	7	28	569	4	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	407	8	31	639	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	415	0	1113	411
Stage 1	-	-	-	-	411	-
Stage 2	-	-	-	-	702	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1144	-	231	641
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	491	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1144	-	221	641
Mov Cap-2 Maneuver	-	-	-	-	221	-
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.39	13.05
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	471	-	-	84	-
HCM Lane V/C Ratio	0.05	-	-	0.027	-
HCM Ctrl Dly (s/v)	13.1	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

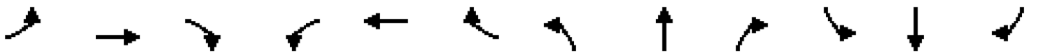
Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	373	6	79	594	3	49
Future Vol, veh/h	373	6	79	594	3	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	419	7	89	667	3	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	426	0	1267	422
Stage 1	-	-	-	-	422	-
Stage 2	-	-	-	-	845	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1133	-	186	631
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	421	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1133	-	163	631
Mov Cap-2 Maneuver	-	-	-	-	163	-
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	369	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.99	12.45
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	542	-	-	211	-
HCM Lane V/C Ratio	0.108	-	-	0.078	-
HCM Ctrl Dly (s/v)	12.5	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.3	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	268	46	27	130	20	8	66	65	93	105	17
Future Volume (veh/h)	11	268	46	27	130	20	8	66	65	93	105	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	12	301	52	30	146	22	9	74	73	104	118	19
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	170	479	81	221	437	60	177	208	193	365	240	33
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	23	1410	238	119	1286	176	40	778	719	525	895	122
Grp Volume(v), veh/h	365	0	0	198	0	0	156	0	0	241	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1581	0	0	1537	0	0	1542	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0
Cycle Q Clear(g_c), s	4.2	0.0	0.0	2.1	0.0	0.0	1.9	0.0	0.0	2.9	0.0	0.0
Prop In Lane	0.03		0.14	0.15		0.11	0.06		0.47	0.43		0.08
Lane Grp Cap(c), veh/h	730	0	0	718	0	0	578	0	0	638	0	0
V/C Ratio(X)	0.50	0.00	0.00	0.28	0.00	0.00	0.27	0.00	0.00	0.38	0.00	0.00
Avail Cap(c_a), veh/h	2007	0	0	1872	0	0	1859	0	0	1876	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	6.4	0.0	0.0	5.7	0.0	0.0	6.8	0.0	0.0	7.2	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4	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	0.3	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.9	0.0	0.0	5.9	0.0	0.0	7.1	0.0	0.0	7.6	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		365			198			156			241	
Approach Delay, s/veh		6.9			5.9			7.1			7.6	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.7		12.3		10.7		12.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		3.9		6.2		4.9		4.1				
Green Ext Time (p_c), s		0.7		1.8		1.2		1.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			6.9									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	340	1078	1143
Demand Flow Rate, veh/h	0	343	1100	1154
Vehicles Circulating, veh/h	1362	883	208	236
Vehicles Exiting, veh/h	28	425	1154	990
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	9.7	8.2	8.9
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.606	0.394	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	208	135	517	583	542	612
Cap Entry Lane, veh/h	386	446	599	670	1175	1175	1146	1146
Entry HV Adj Factor	1.000	1.000	0.990	0.993	0.980	0.980	0.991	0.990
Flow Entry, veh/h	0	0	206	134	507	571	537	606
Cap Entry, veh/h	386	446	593	665	1152	1152	1135	1134
V/C Ratio	0.000	0.000	0.347	0.201	0.440	0.496	0.473	0.534
Control Delay, s/veh	9.3	8.1	11.0	7.8	7.8	8.6	8.4	9.4
LOS	A	A	B	A	A	A	A	A
95th %tile Queue, veh	0	0	2	1	2	3	3	3

Intersection	
Intersection Delay, s/veh	74.9
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1041	466	1049	1223
Demand Flow Rate, veh/h	1062	480	1080	1235
Vehicles Circulating, veh/h	1287	1170	1198	460
Vehicles Exiting, veh/h	408	1108	1151	1190
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	137.0	16.9	108.8	14.9
Approach LOS	F	C	F	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	499	563	226	254	508	572	580	655
Cap Entry Lane, veh/h	413	475	460	525	448	513	884	960
Entry HV Adj Factor	0.980	0.980	0.968	0.972	0.971	0.972	0.991	0.990
Flow Entry, veh/h	489	552	219	247	493	556	575	648
Cap Entry, veh/h	405	466	446	510	435	499	876	950
V/C Ratio	1.208	1.184	0.491	0.484	1.133	1.115	0.656	0.682
Control Delay, s/veh	144.4	130.5	18.1	15.9	114.6	103.7	14.9	14.9
LOS	F	F	C	C	F	F	B	B
95th %tile Queue, veh	20	21	3	3	18	18	5	6

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	51	0	1095	1190	21
Future Vol, veh/h	0	51	0	1095	1190	21
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	57	0	1230	1337	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	680	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	398	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	398	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	15.56	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	398	-	-
HCM Lane V/C Ratio	-	0.144	-	-
HCM Ctrl Dly (s/v)	-	15.6	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.5	-	-

Intersection	
Intersection Delay, s/veh	22.3
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	351	345	1315	1607
Demand Flow Rate, veh/h	362	355	1328	1623
Vehicles Circulating, veh/h	1640	1400	552	213
Vehicles Exiting, veh/h	196	480	1450	1542
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	69.0	19.0	21.5	13.5
Approach LOS	F	C	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.796	0.204	0.515	0.485	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	288	74	183	172	624	704	763	860
Cap Entry Lane, veh/h	299	352	372	432	859	859	1170	1170
Entry HV Adj Factor	0.970	0.973	0.972	0.971	0.990	0.990	0.990	0.990
Flow Entry, veh/h	279	72	178	167	618	697	755	852
Cap Entry, veh/h	290	343	362	419	851	850	1158	1158
V/C Ratio	0.964	0.210	0.491	0.398	0.726	0.819	0.652	0.735
Control Delay, s/veh	83.1	14.3	21.6	16.1	18.2	24.4	12.0	14.9
LOS	F	B	C	C	C	C	B	B
95th %tile Queue, veh	10	1	3	2	7	9	5	7

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	597	6	39	228	12	62
Future Vol, veh/h	597	6	39	228	12	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	671	7	44	256	13	70

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	678	0	1018	674
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	344	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	914	-	263	454
Stage 1	-	-	-	-	506	-
Stage 2	-	-	-	-	718	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	914	-	248	454
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	506	-
Stage 2	-	-	-	-	678	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.33	16.33
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	401	-	-	263	-
HCM Lane V/C Ratio	0.208	-	-	0.048	-
HCM Ctrl Dly (s/v)	16.3	-	-	9.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-

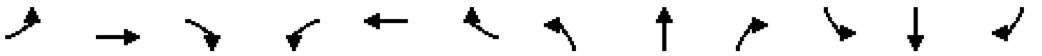
Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	656	3	30	259	8	94
Future Vol, veh/h	656	3	30	259	8	94
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	737	3	34	291	9	106

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	740	0	1097	739
Stage 1	-	-	-	-	739	-
Stage 2	-	-	-	-	358	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	866	-	236	417
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	866	-	225	417
Mov Cap-2 Maneuver	-	-	-	-	225	-
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	674	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.97	17.97
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	391	-	-	187	-
HCM Lane V/C Ratio	0.293	-	-	0.039	-
HCM Ctrl Dly (s/v)	18	-	-	9.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.2	-	-	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	218	21	44	381	73	67	137	31	47	93	18
Future Volume (veh/h)	13	218	21	44	381	73	67	137	31	47	93	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	15	253	24	51	443	85	78	159	36	55	108	21
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	136	683	62	162	604	110	235	271	54	232	287	47
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	29	1503	137	77	1330	242	333	1063	212	319	1128	186
Grp Volume(v), veh/h	292	0	0	579	0	0	273	0	0	184	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1649	0	0	1608	0	0	1633	0	0
Q Serve(g_s), s	0.0	0.0	0.0	2.5	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.5	0.0	0.0	9.0	0.0	0.0	4.6	0.0	0.0	2.8	0.0	0.0
Prop In Lane	0.05		0.08	0.09		0.15	0.29		0.13	0.30		0.11
Lane Grp Cap(c), veh/h	881	0	0	876	0	0	559	0	0	567	0	0
V/C Ratio(X)	0.33	0.00	0.00	0.66	0.00	0.00	0.49	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	1480	0	0	1474	0	0	1444	0	0	1431	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	7.0	0.0	0.0	10.2	0.0	0.0	9.6	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.9	0.0	0.0	0.7	0.0	0.0	0.3	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	0.4	0.0	0.0	1.2	0.0	0.0	1.0	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.8	0.0	0.0	7.9	0.0	0.0	10.9	0.0	0.0	9.9	0.0	0.0
LnGrp LOS	A			A			B			A		
Approach Vol, veh/h		292			579			273			184	
Approach Delay, s/veh		5.8			7.9			10.9			9.9	
Approach LOS		A			A			B			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.4		18.5		12.4		18.5				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		6.6		5.5		4.8		11.0				
Green Ext Time (p_c), s		1.3		1.4		0.9		3.1				

Intersection Summary												
HCM 7th Control Delay, s/veh			8.3									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	24.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	516	1974	1394
Demand Flow Rate, veh/h	0	516	1974	1408
Vehicles Circulating, veh/h	1721	1628	181	354
Vehicles Exiting, veh/h	41	527	1540	1790
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	70.8	19.7	14.5
Approach LOS	-	F	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.607	0.393	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	313	203	928	1046	662	746
Cap Entry Lane, veh/h	277	329	302	356	1204	1204	1029	1029
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.990	0.990
Flow Entry, veh/h	0	0	313	203	928	1046	655	739
Cap Entry, veh/h	277	329	302	356	1204	1205	1018	1019
V/C Ratio	0.000	0.000	1.037	0.570	0.770	0.868	0.643	0.725
Control Delay, s/veh	13.0	10.9	100.2	25.6	16.1	22.9	12.9	15.9
LOS	B	B	F	D	C	C	B	C
95th %tile Queue, veh	0	0	12	3	8	12	5	7

Intersection	
Intersection Delay, s/veh	144.6
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	636	969	1691	1306
Demand Flow Rate, veh/h	636	969	1691	1319
Vehicles Circulating, veh/h	1431	1718	686	1057
Vehicles Exiting, veh/h	945	659	1381	1630
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	43.0	313.7	92.6	136.1
Approach LOS	E	F	F	F

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	299	337	455	514	795	896	620	699
Cap Entry Lane, veh/h	362	421	278	330	718	793	511	578
Entry HV Adj Factor	1.000	1.000	1.001	0.999	1.000	1.000	0.990	0.990
Flow Entry, veh/h	299	337	455	514	795	896	614	692
Cap Entry, veh/h	362	421	278	329	718	793	505	573
V/C Ratio	0.826	0.801	1.637	1.559	1.107	1.130	1.214	1.209
Control Delay, s/veh	47.3	39.1	334.7	295.1	89.6	95.2	139.2	133.3
LOS	E	E	F	F	F	F	F	F
95th %tile Queue, veh	7	7	28	30	23	26	23	25

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	42	0	1863	1292	58
Future Vol, veh/h	0	42	0	1863	1292	58
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	46	0	2025	1404	63

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	734	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	367	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	367	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	16.19	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	367	-	-
HCM Lane V/C Ratio	-	0.124	-	-
HCM Ctrl Dly (s/v)	-	16.2	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-

Intersection	
Intersection Delay, s/veh	33.5
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	281	439	1829	1301
Demand Flow Rate, veh/h	287	439	1829	1314
Vehicles Circulating, veh/h	1355	1836	441	309
Vehicles Exiting, veh/h	268	434	1201	1966
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	23.1	60.9	44.0	11.8
Approach LOS	C	F	E	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.819	0.181	0.522	0.478	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	235	52	229	210	860	969	618	696
Cap Entry Lane, veh/h	388	449	249	298	951	951	1072	1072
Entry HV Adj Factor	0.979	0.981	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	230	51	229	210	860	969	612	690
Cap Entry, veh/h	380	440	249	298	950	951	1061	1062
V/C Ratio	0.605	0.116	0.918	0.704	0.905	1.019	0.577	0.649
Control Delay, s/veh	26.0	9.8	80.1	39.9	31.6	55.0	10.8	12.7
LOS	D	A	F	E	D	F	B	B
95th %tile Queue, veh	4	0	8	5	13	20	4	5

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	366	16	84	573	11	69
Future Vol, veh/h	366	16	84	573	11	69
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	411	18	94	644	12	78

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	429	0	1253	420
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	833	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1130	-	190	633
Stage 1	-	-	-	-	663	-
Stage 2	-	-	-	-	427	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1130	-	165	633
Mov Cap-2 Maneuver	-	-	-	-	165	-
Stage 1	-	-	-	-	663	-
Stage 2	-	-	-	-	371	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.08	14.83
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	456	-	-	230	-
HCM Lane V/C Ratio	0.197	-	-	0.084	-
HCM Ctrl Dly (s/v)	14.8	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.3	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	425	10	65	650	7	62
Future Vol, veh/h	425	10	65	650	7	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	478	11	73	730	8	70

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	489	0	1360	483
Stage 1	-	-	-	-	483	-
Stage 2	-	-	-	-	876	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1074	-	164	583
Stage 1	-	-	-	-	620	-
Stage 2	-	-	-	-	407	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1074	-	145	583
Mov Cap-2 Maneuver	-	-	-	-	145	-
Stage 1	-	-	-	-	620	-
Stage 2	-	-	-	-	361	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.78	14.75
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	446	-	-	164	-
HCM Lane V/C Ratio	0.174	-	-	0.068	-
HCM Ctrl Dly (s/v)	14.8	-	-	8.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Appendix C: Estimated Future Traffic Volume Maps

Exhibit C-1. 2027 Background Traffic

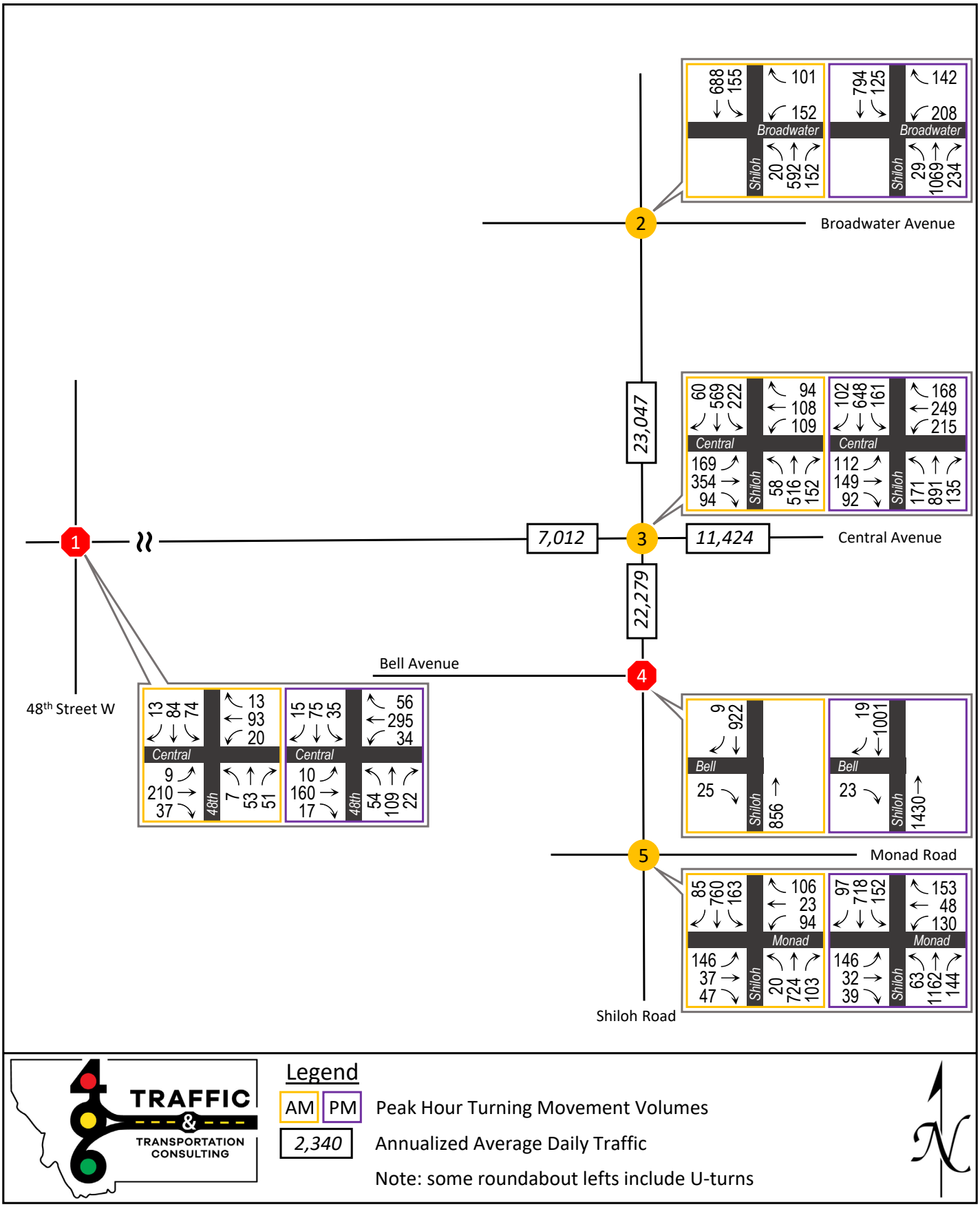


Exhibit C-2. 2027 Phase 1A Project Trips

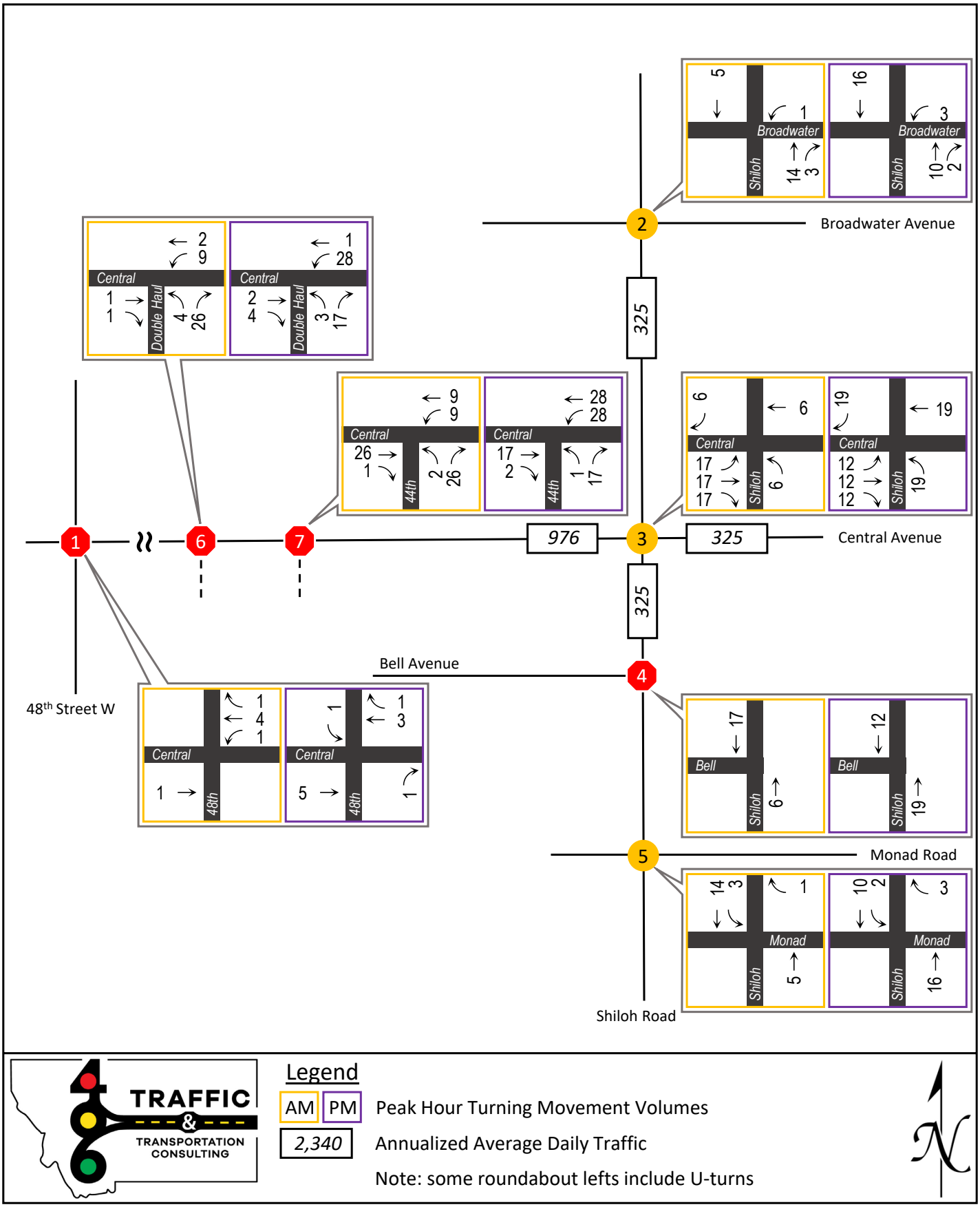


Exhibit C-3. 2027 Phase 1A Total Traffic

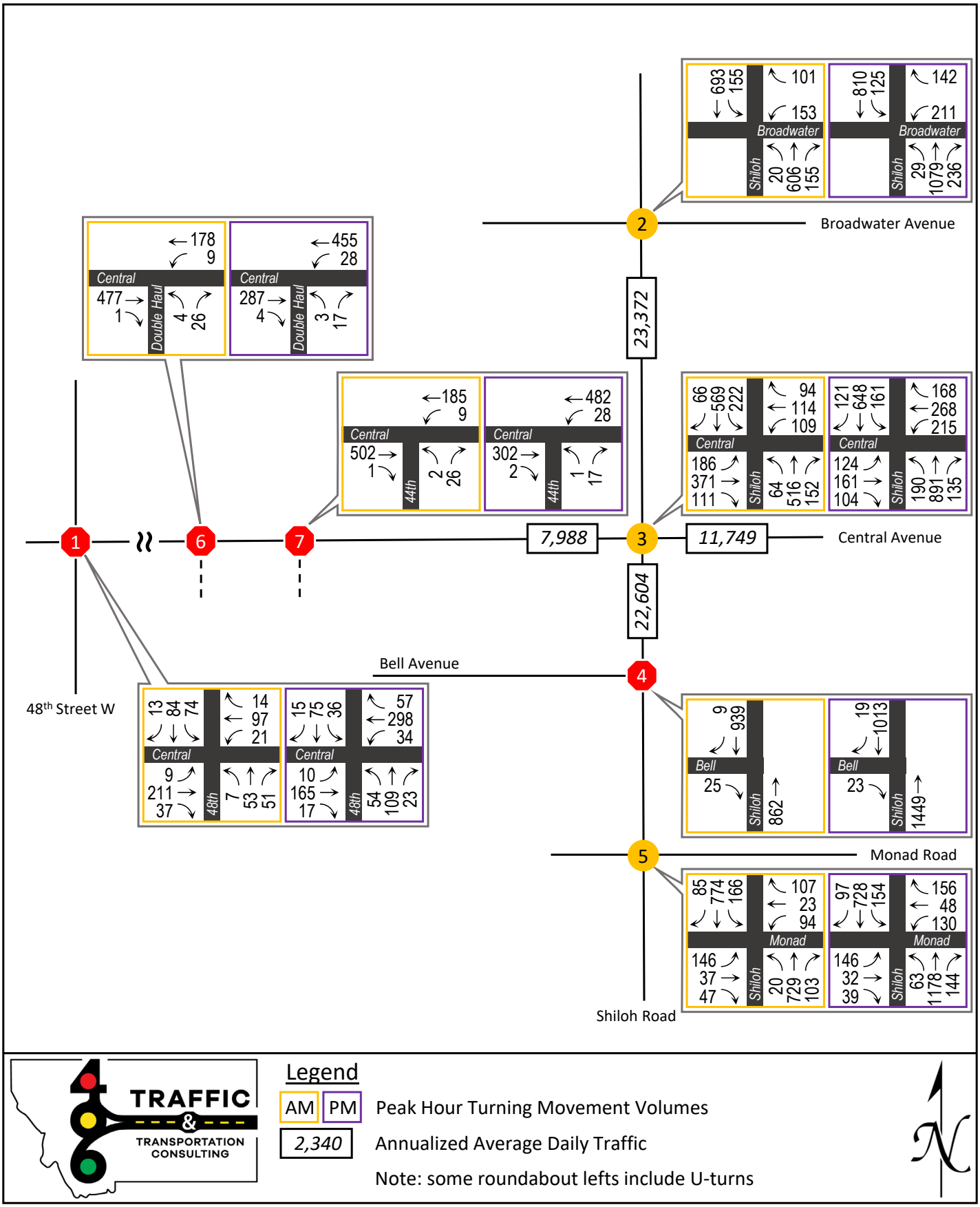


Exhibit C-4. 2029 Traffic Without Phase 1B

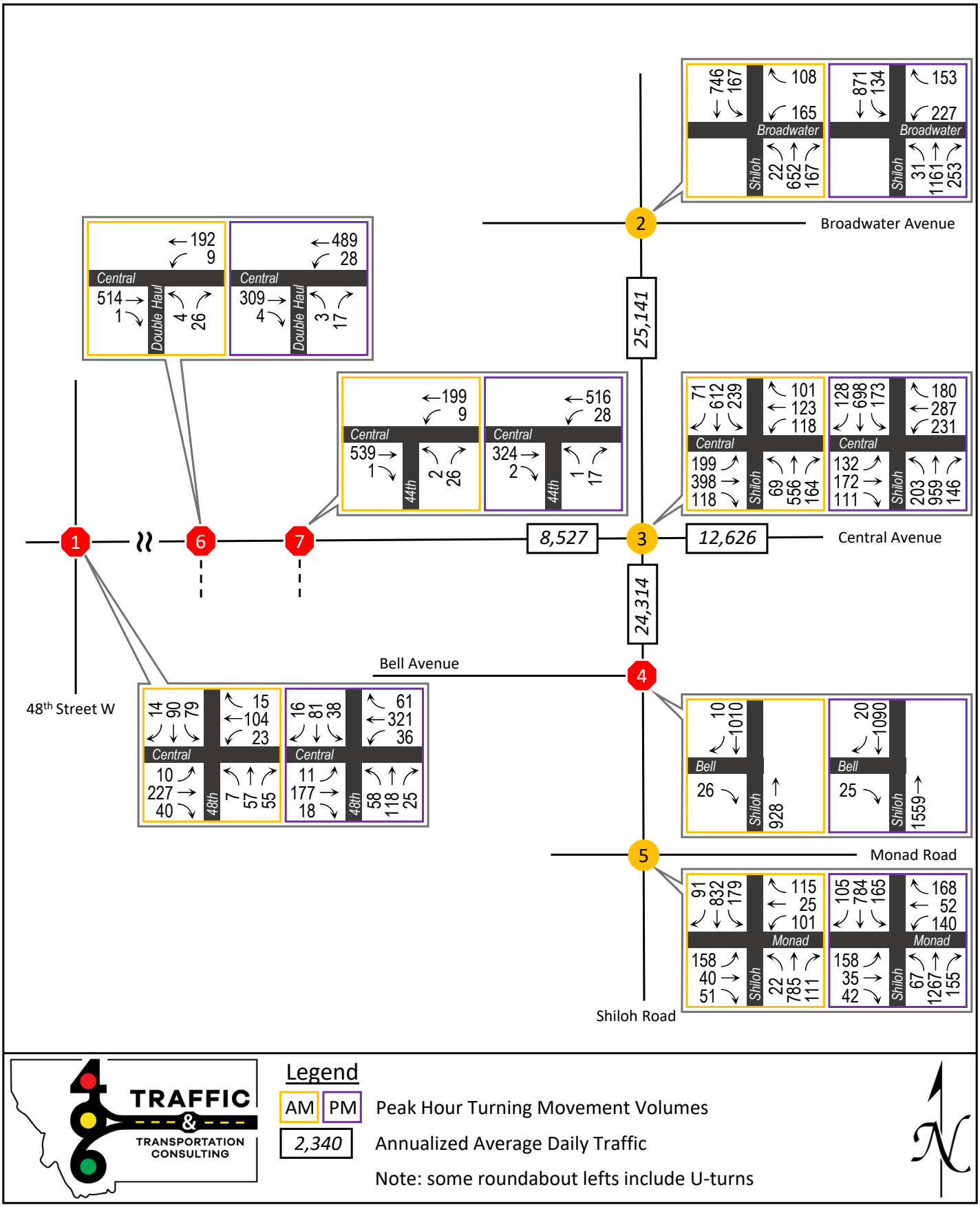


Exhibit C-5. 2029 Phase 1B Project Trips

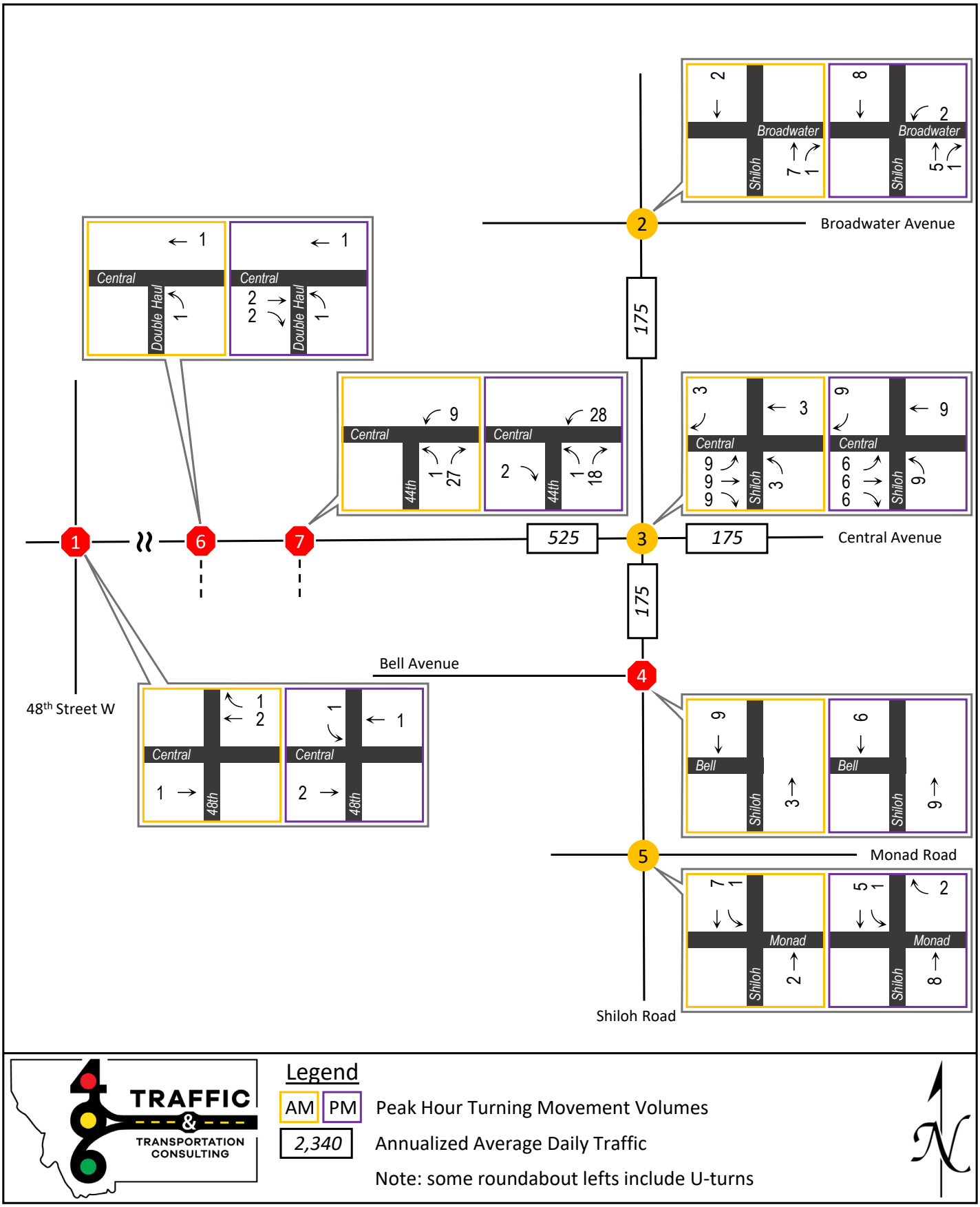


Exhibit C-6. 2029 Phase 1B Total Traffic

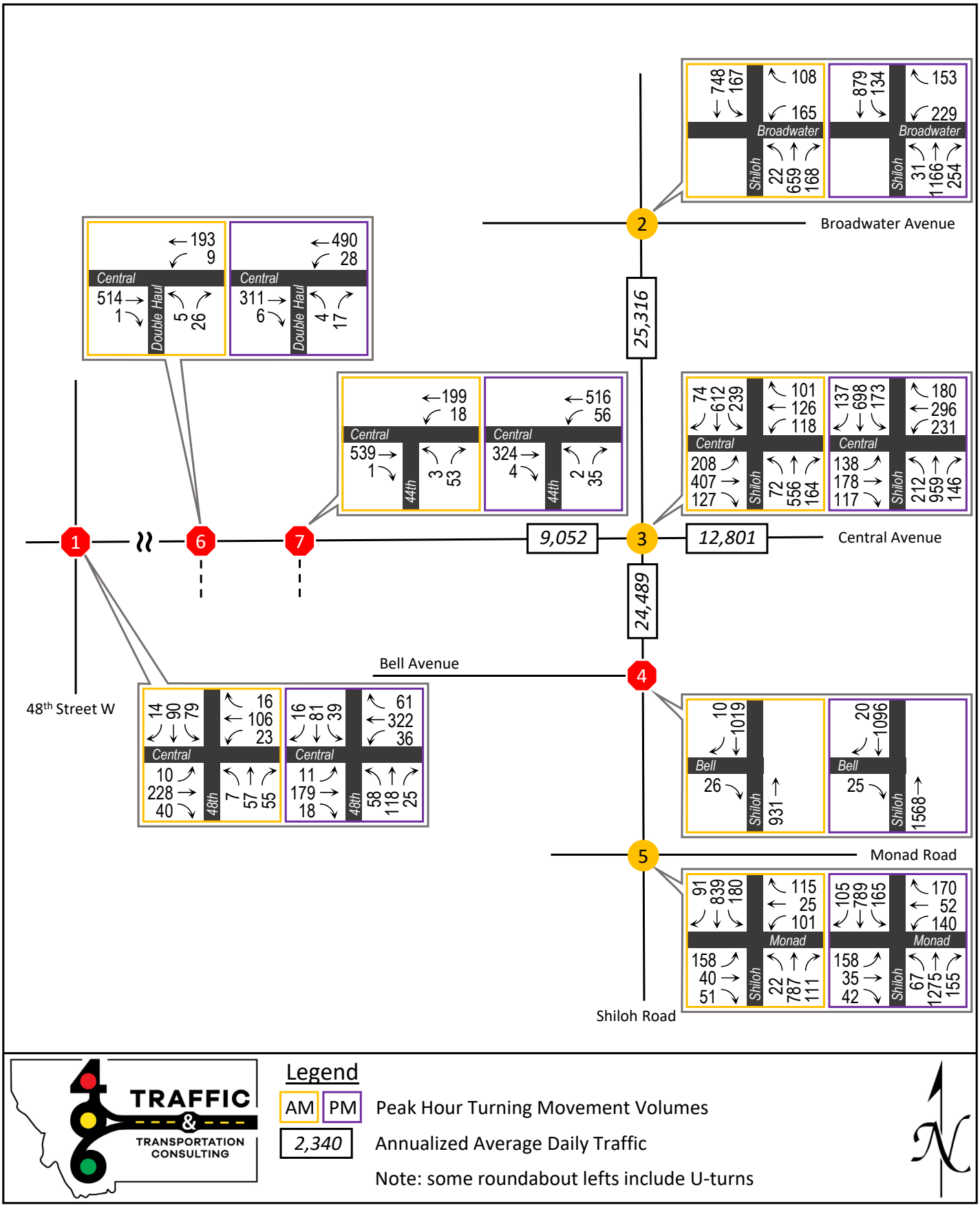


Exhibit C-7. 2031 Traffic Without Phase 1C

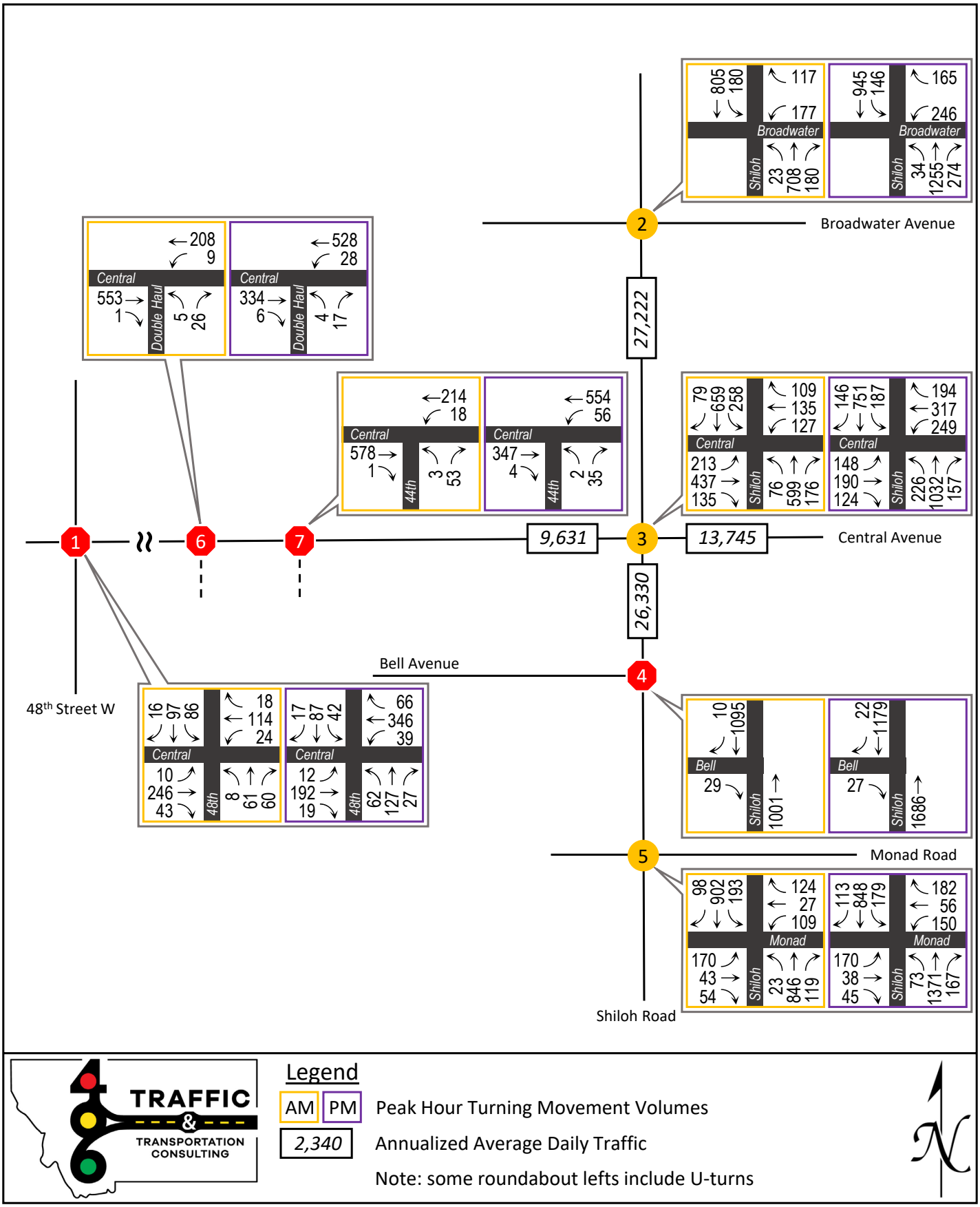


Exhibit C-8. 2031 Phase 1C Project Trips

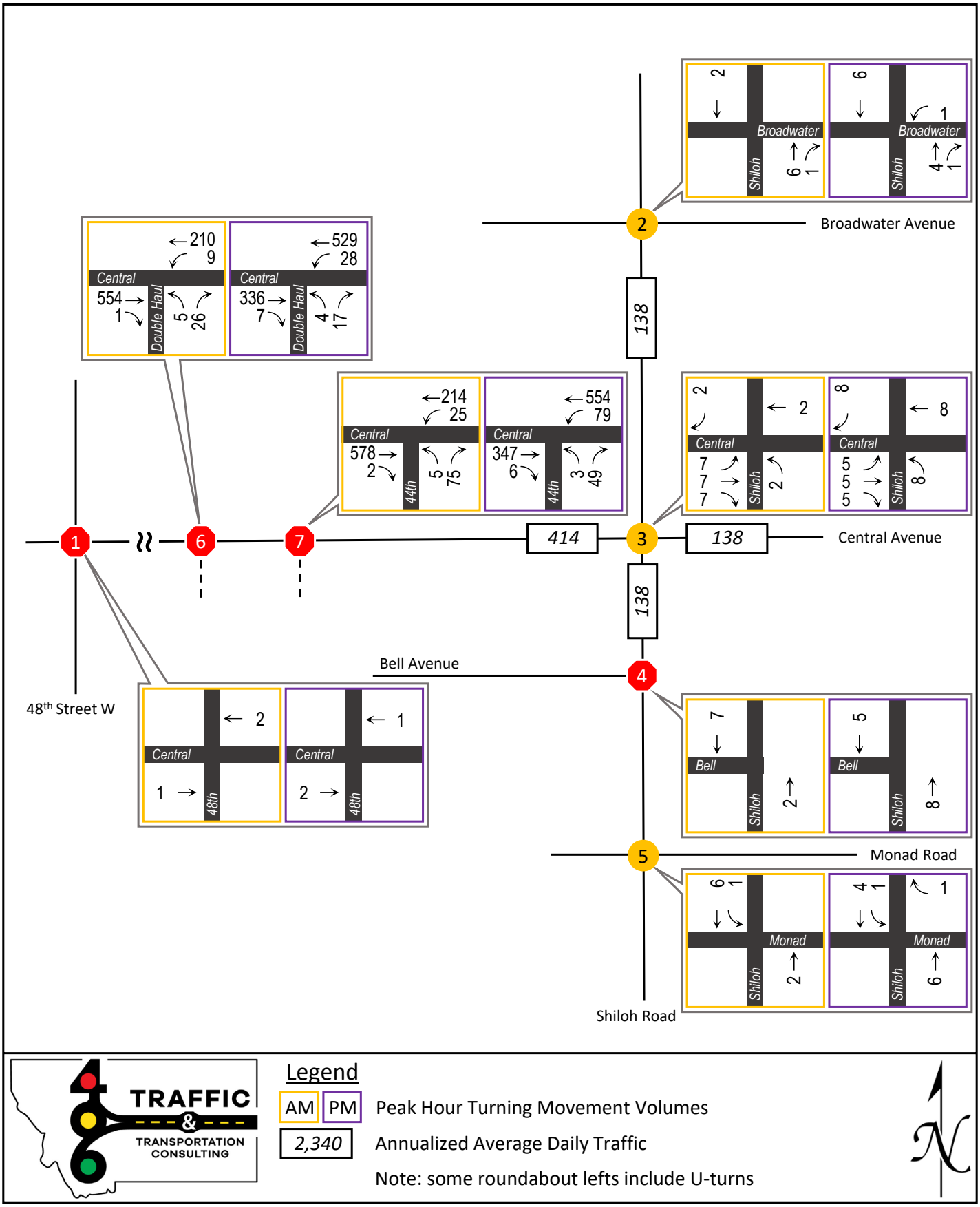
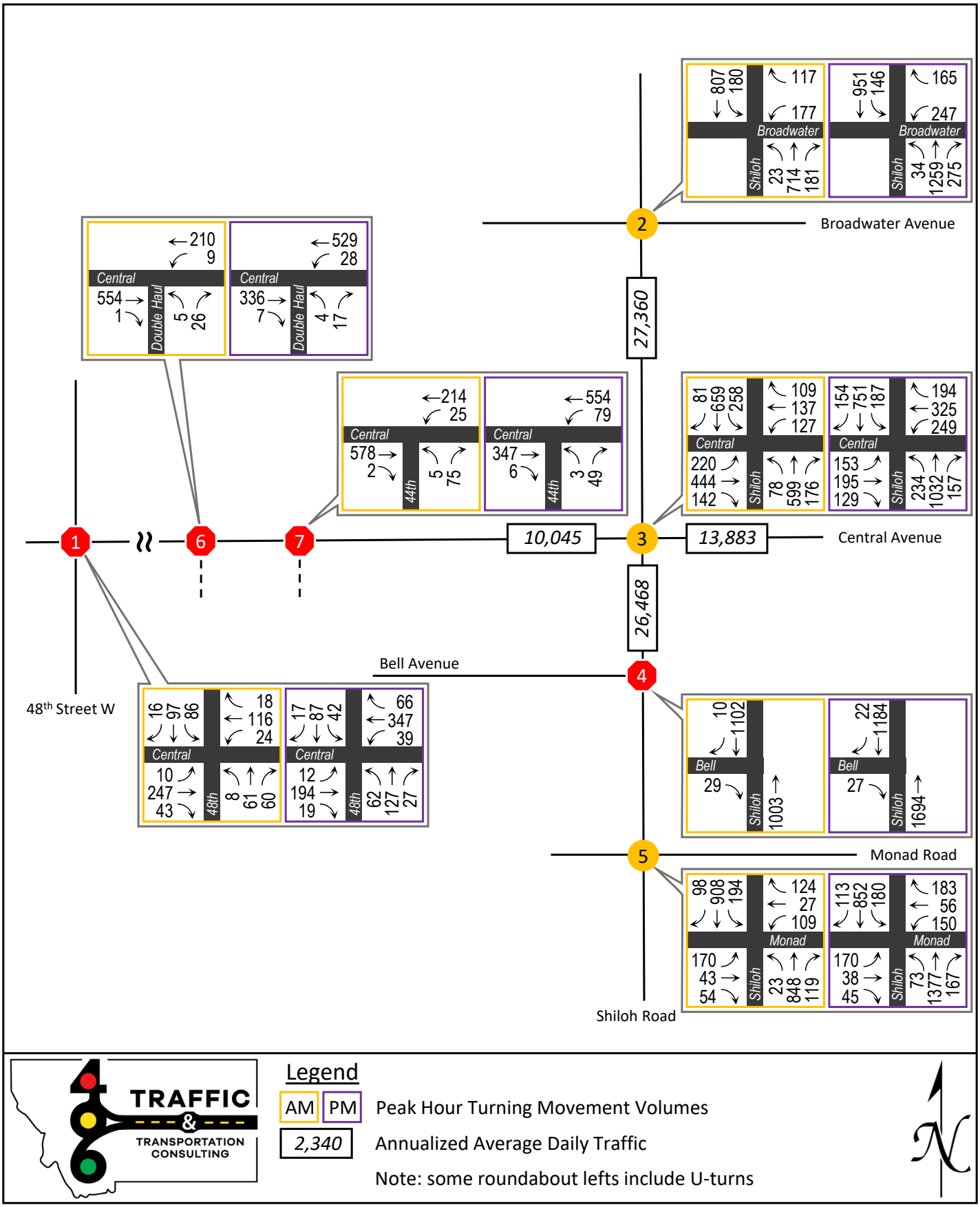


Exhibit C-9. 2031 Phase 1C Total Traffic



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Legend

AM | PM — Peak Hour Turning Movement Volumes

2,340 — Annualized Average Daily Traffic

Note: some roundabout lefts include U-turns

Exhibit C-10. 2033 Traffic Without Phase 2

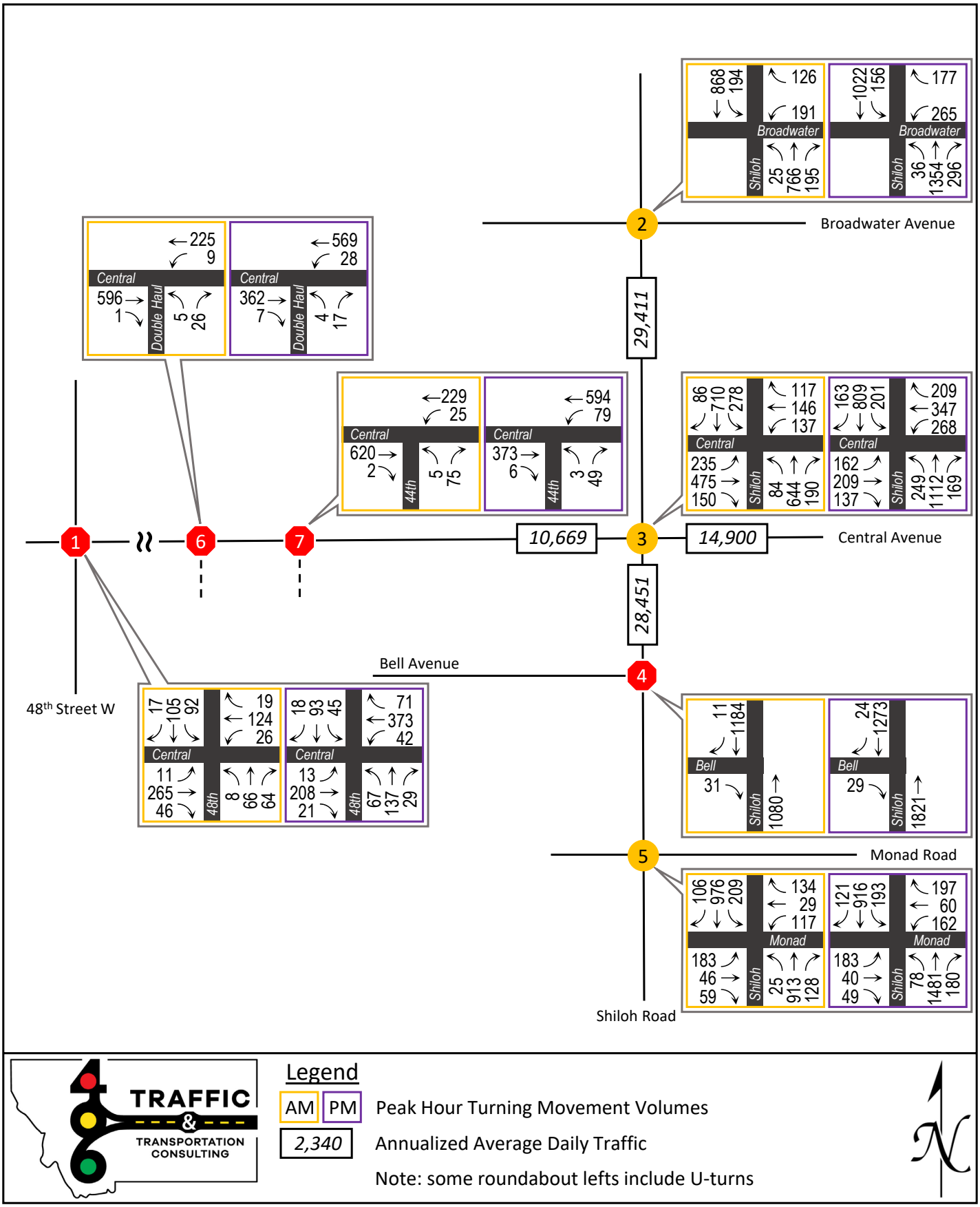


Exhibit C-11. 2033 Phase 2 Project Trips

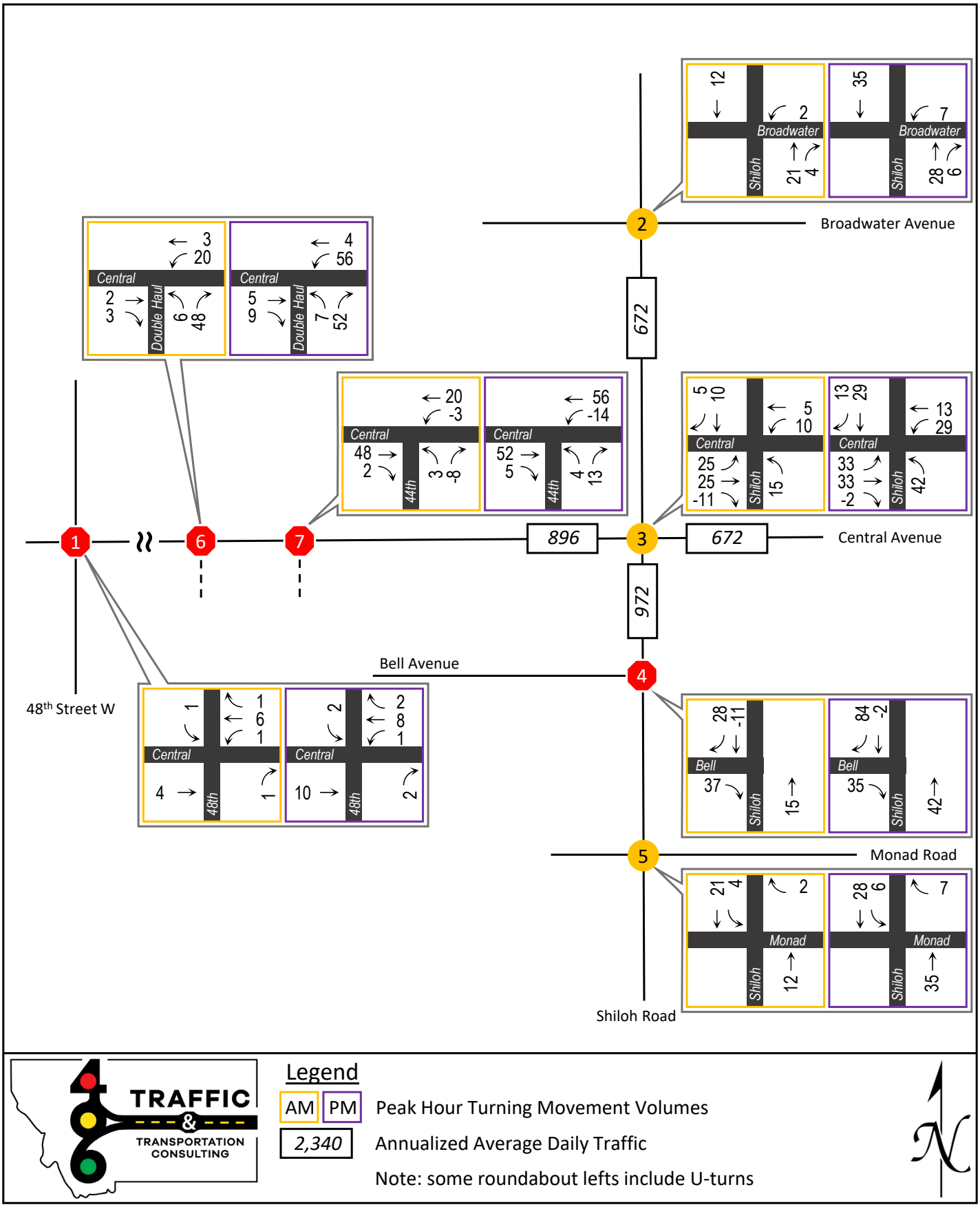
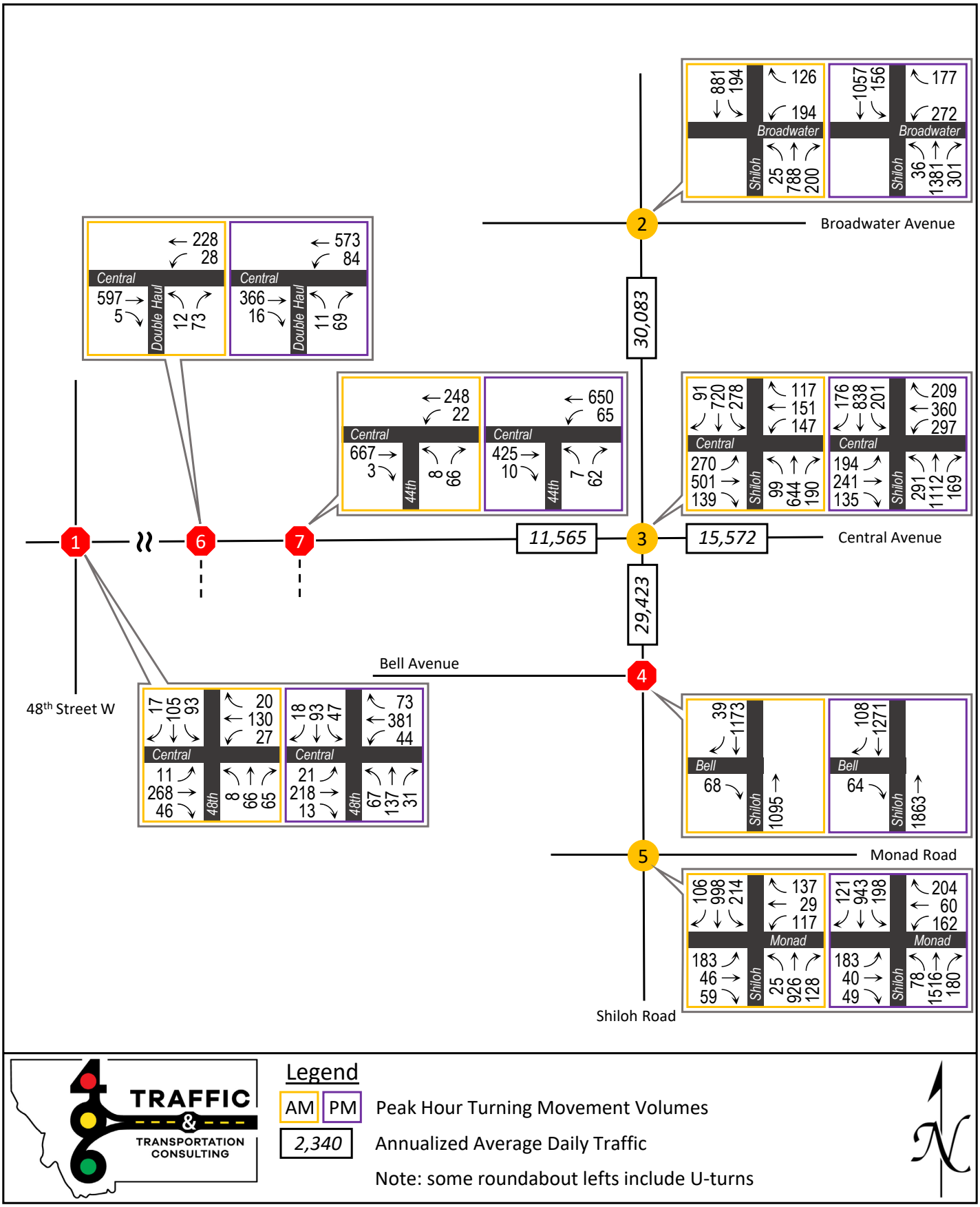
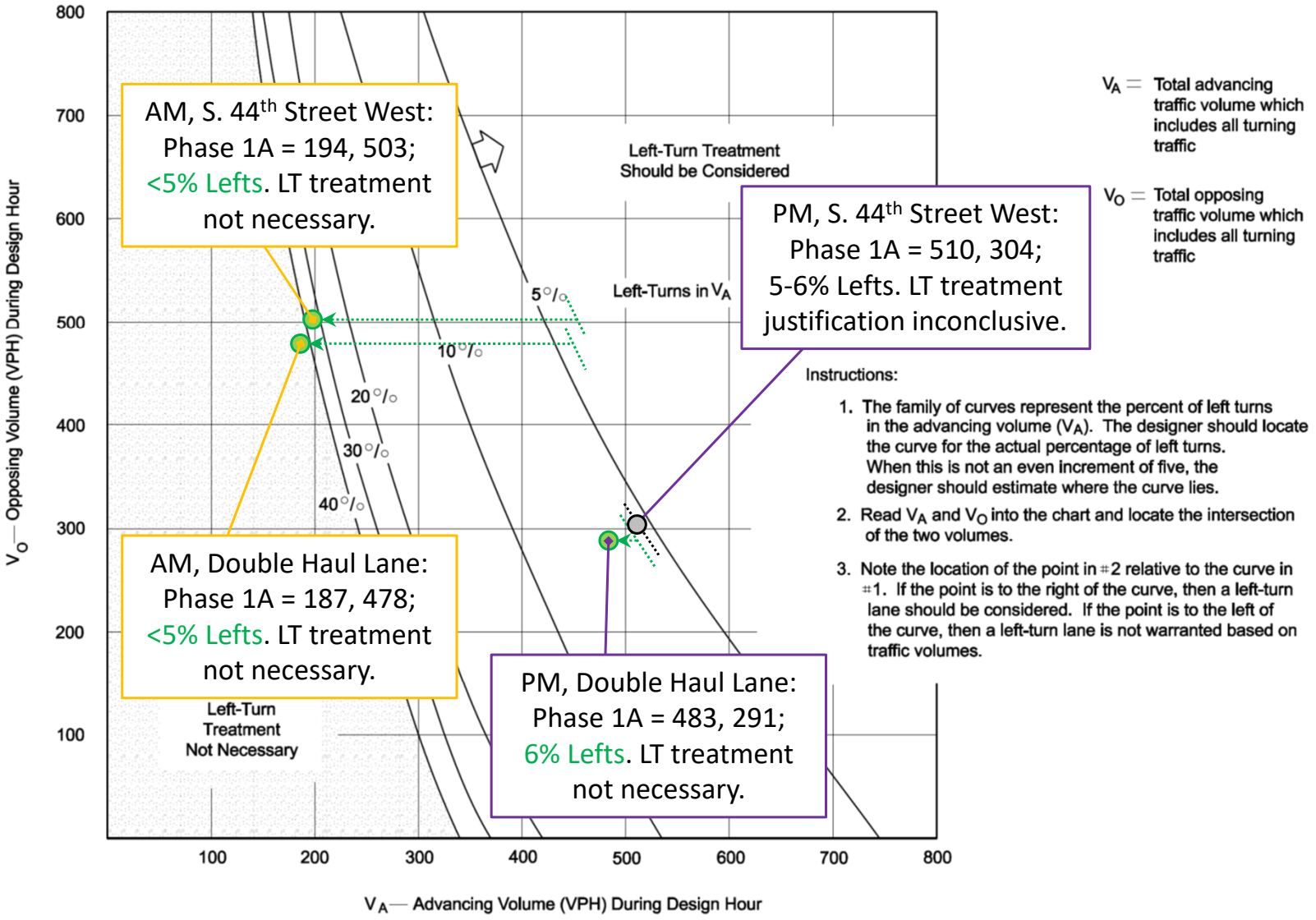


Exhibit C-12. 2033 Total Traffic with Phase 2 (Full project buildout)



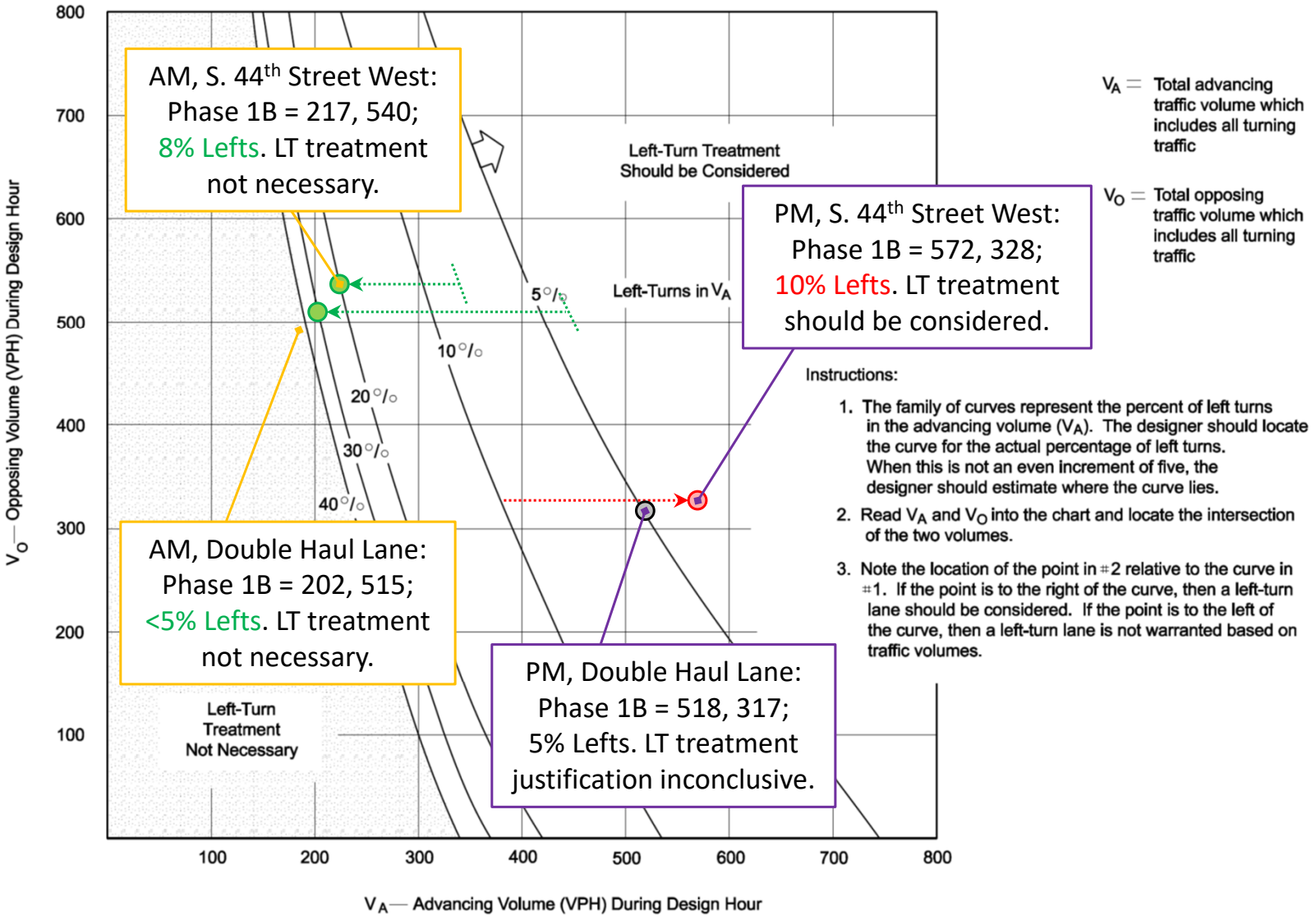
Appendix D: Auxiliary Turn Lane Analysis Charts

Exhibit D-1. 2027 Phase 1A Left Turn Lane Chart



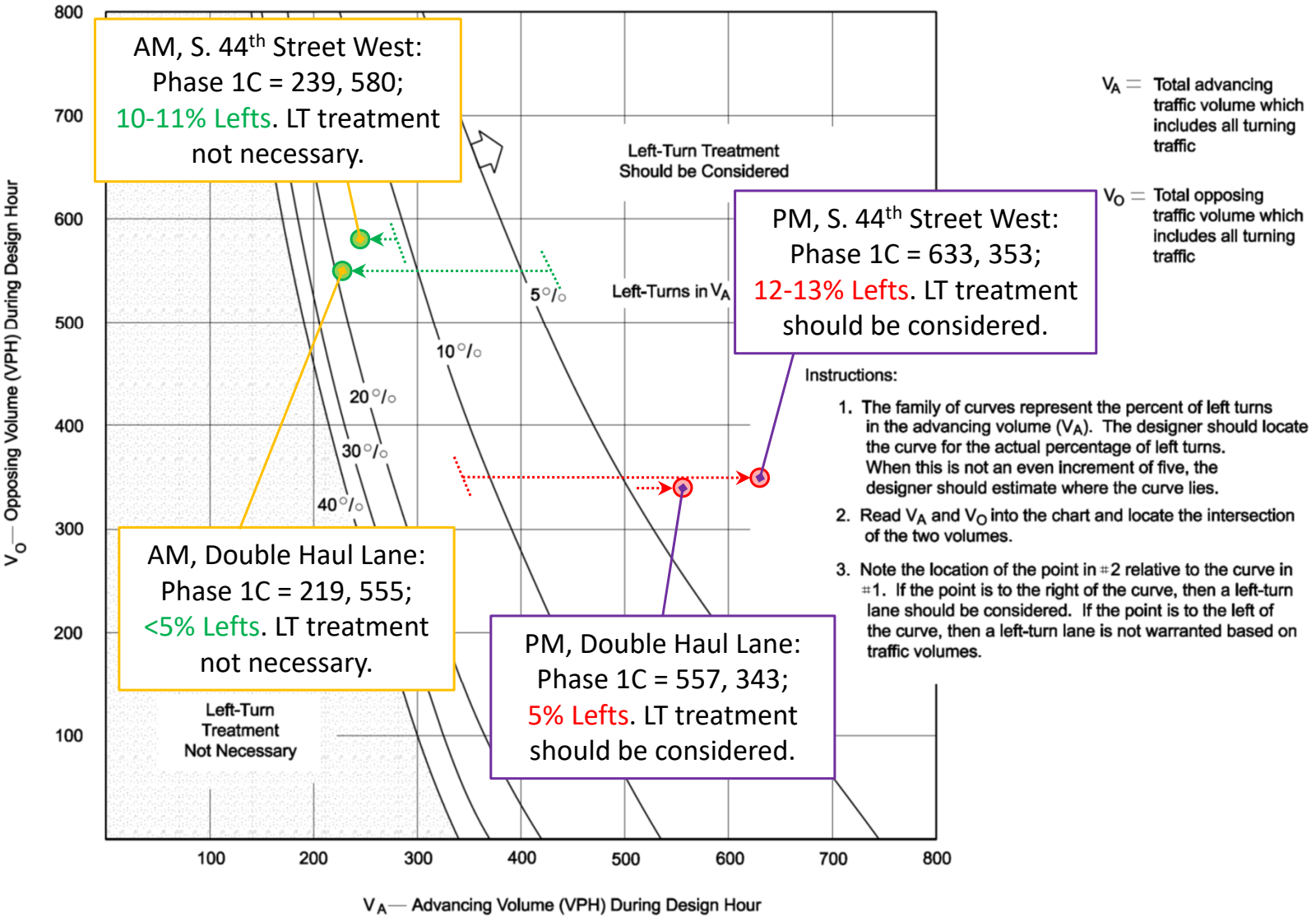
VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)

Exhibit D-2. 2029 Phase 1B Left Turn Lane Chart



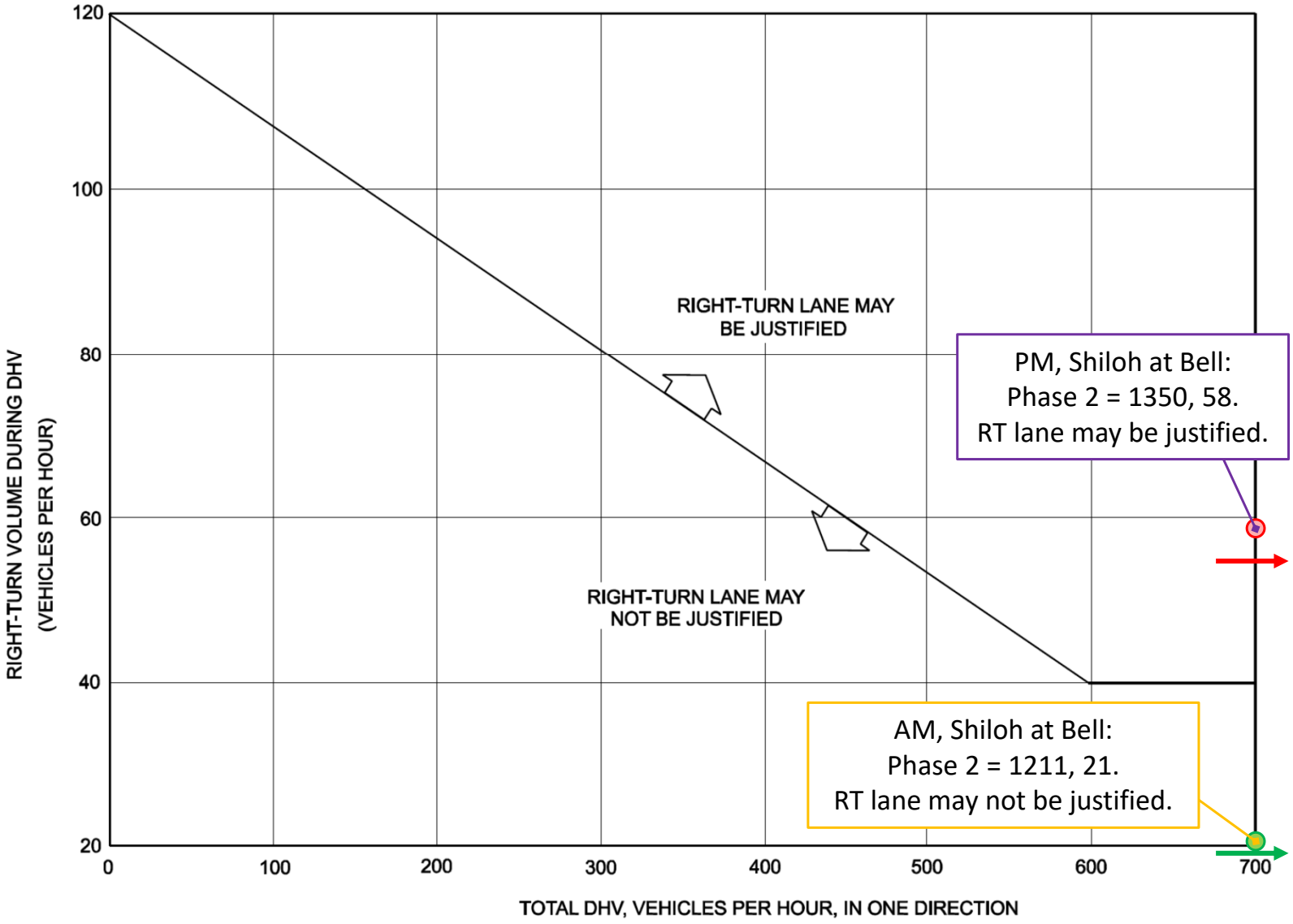
VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)

Exhibit D-3. 2031 Phase 1C Left Turn Lane Chart



VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)

Exhibit D-4. 2033 Phase 2 Right Turn Lane Chart



Note: For highways with a design speed below 50 mph (80 km/h) with a DHV < 300 and where right turns are > 40, an adjustment should be used. To read the vertical axis of the chart, subtract 20 from the actual number of right turns.

Appendix E: 44th at Central Avenue Intersection Signal Warrant Summaries

Traffic Signal Needs Analysis Summary: S 44th St W at Central Ave

Scenario: **Completion of Phase 1A in 2027**
Analysis Date: 8/13/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: S 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 3

Traffic Volumes

Hour:	1	2	3	4	5	6	7	8	9	10	11	12
Start Time:	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Central Ave Eastbound:	471	452	395	354	370	373	312	263	275	255	304	207
Central Ave Westbound:	179	178	194	215	272	323	317	316	391	425	502	345
S 44th St W Northbound:	28	23	16	14	14	14	15	16	15	18	19	16
Total Entering Volume:	678	653	605	583	656	710	644	595	681	698	825	568
TEV Rank:	5	7	9	11	6	2	**8**	10	**4**	3	**1**	12
Use for:							Warrant 1		Warrant 2		Warrant 3	
Major, Both Directions:	650	630	589	569	642	696	629	579	666	680	806	552
Minor, Higher Direction:	28	23	16	14	14	14	15	16	15	18	19	16

Warrants

			Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic* Major (Both Dir.) Value: 629; Minimum: 350[c] Minor (Higher Dir.) Value: 15; Minimum: 105[c] Met? No	*or Condition B: Interruption of Continuous Traffic* Major (Both Dir.) Value: 629; Minimum: 525[c] Minor (Higher Dir.) Value: 15; Minimum: 53[c] Met? No	**No**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph* Major (Both Dir.) Value: 666; Minimum: - Minor (Higher Dir.) Value: 15; Minimum: 60 Met? No		**No**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)* 1. Veh-Hrs of Delay — Value: 0.1; Minimum: 4; Met? No 2. Minor Volume — Value: 19; Minimum: 100; Met? No 3. Total Ent. Volume — Value: 825; Minimum: 650; Met? Yes	*or Condition B (MUTCD Figure 4C-4)* Major (Both Dir.) Value: 806; Minimum: N/A Minor (Higher Dir.) Value: 19; Minimum: 75 Met? No	**No**
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)* Major (Both Dir.) Value: 666; Minimum: Pedestrians Value: ; Minimum: Met? n/a	*or Criterion B: One Hour (MUTCD Figure 4C-8)* Major (Both Dir.) Value: 806; Minimum: Pedestrians Value: ; Minimum: Met? n/a	**Not Evaluated**
5 School Crossing	No students projected to cross the major street at this location.		**No**
6 Coordinated Signal System	Only one signal in the roadway network nearby.		**No**
7 Crash Experience ** Condition A not evaluated *(all conditions)*	*Condition B, 1-year Period (Table 4C-4)* Angle+Ped Crashes Value: n/a; Minimum: 4 or Fatal+Injury Angle+Ped Value: n/a; Minimum: 3 Met? n/a *or Condition B, 3-year Period (Table 4C-5)* Angle+Ped Crashes Value: n/a; Minimum: 6 or Fatal+Injury Angle+Ped Value: n/a; Minimum: 4 Met? n/a	***and*** *Condition C, 80% of Warrant 1 [Condition A]* Major (Both Dir.) Value: 629; Minimum: Minor (Higher Dir.) Value: 15; Minimum: Met? n/a *or Condition C, 80% of Warrant 1 [Condition B]* Major (Both Dir.) Value: 629; Minimum: Minor (Higher Dir.) Value: 15; Minimum: Met? n/a *or Condition C, 80% of Warrant 4* Four Hour Ped Value: ; Minimum: One Hour Ped Value: ; Minimum: Met? n/a	**Not Evaluated**
8 Roadway Network	Not an intersection of two or more major routes.		**No**
9 Intersection Near Grade Xing	No railroad grade crossing nearby.		**No**
		Warrants Met:	**0**
		Recommendation:	**No Signal**

Notes:

c: Warrant 1 minimum values used for "70%" to account to reflect major-street speed over 40 mph

* Warrant 3, Peak Hour, is indicated by the MUTCD as follows: "This signal warrant should be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."

** No trial of alternatives with observance and enforcement has been attempted for crash reduction at this location.

Traffic Signal Needs Analysis Summary: S 44th St W at Central Ave

Scenario: **Completion of Phase 1B in 2029**
Analysis Date: 8/13/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: S 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 3

Traffic Volumes

Hour:	1	2	3	4	5	6	7	8	9	10	11	12
Start Time:	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Central Ave Eastbound:	506	486	425	381	399	401	336	283	296	275	328	223
Central Ave Westbound:	199	200	217	241	304	360	353	353	440	480	566	392
S 44th St W Northbound:	62	48	34	27	29	29	29	33	30	34	38	33
Total Entering Volume:	767	734	676	649	732	790	718	669	766	789	932	648
TEV Rank:	**4**	6	9	11	7	2	**8**	10	5	3	**1**	12
Use for:	Warrant 2						Warrant 1				Warrant 3	
Major, Both Directions:	705	686	642	622	703	761	689	636	736	755	894	615
Minor, Higher Direction:	62	48	34	27	29	29	29	33	30	34	38	33

Warrants

													Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic*					*or Condition B: Interruption of Continuous Traffic*							
	Major (Both Dir.)		Minor (Higher Dir.)			Major (Both Dir.)		Minor (Higher Dir.)					
	Value	Minimum	Value	Minimum	Met?	Value	Minimum	Value	Minimum	Met?			
	689	350[c]	29	105[c]	No	689	525[c]	29	53[c]	No			**No**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph*												
	Major (Both Dir.)		Minor (Higher Dir.)										
	Value	Minimum	Value	Minimum	Met?								
	705	-	62	65	Yes								**No**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)*					*or Condition B (MUTCD Figure 4C-4)*							
			Value	Minimum	Met?	Major (Both Dir.)		Minor (Higher Dir.)					
						Value	Minimum	Value	Minimum	Met?			
	1. Veh-Hrs of Delay		0.1	4	No	894	N/A	38	75	No			
	2. Minor Volume		38	100	No								
	3. Total Ent. Volume		932	650	Yes								**No**
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)*					*or Criterion B: One Hour (MUTCD Figure 4C-8)*							
	Major (Both Dir.)		Pedestrians			Major (Both Dir.)		Pedestrians					
	Value	Minimum	Value	Minimum	Met?	Value	Minimum	Value	Minimum	Met?			
	705				n/a	894				n/a			**Not Evaluated**
5 School Crossing	No students projected to cross the major street at this location.												**No**
6 Coordinated Signal System	Only one signal in the roadway network nearby.												**No**
7 Crash Experience ** Condition A not evaluated *(all conditions)*	*Condition B, 1-year Period (Table 4C-4)*					***and*** *Condition C, 80% of Warrant 1 [Condition A]*							
	Angle+Ped Crashes		or Fatal+Injury Angle+Ped			Major (Both Dir.)		Minor (Higher Dir.)					
	Value	Minimum	Value	Minimum	Met?	Value	Minimum	Value	Minimum	Met?			
	n/a	4	n/a	3	n/a	689		29		n/a			
	or Condition B, 3-year Period (Table 4C-5)					*or Condition C, 80% of Warrant 1 [Condition B]*							
	Angle+Ped Crashes		or Fatal+Injury Angle+Ped			Major (Both Dir.)		Minor (Higher Dir.)					
	Value	Minimum	Value	Minimum	Met?	Value	Minimum	Value	Minimum	Met?			
	n/a	6	n/a	4	n/a	689		29		n/a			
						or Condition C, 80% of Warrant 4							
						Four Hour Ped		One Hour Ped					
						Value	Minimum	Value	Minimum	Met?			**Not Evaluated**
										n/a			
8 Roadway Network	Not an intersection of two or more major routes.												**No**
9 Intersection Near Grade Xing	No railroad grade crossing nearby.												**No**
												Warrants Met:	**0**
												Recommendation:	**No Signal**

Notes:

c: Warrant 1 minimum values used for "70%" to account to reflect major-street speed over 40 mph

* Warrant 3, Peak Hour, is indicated by the MUTCD as follows: "This signal warrant should be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."

** No trial of alternatives with observance and enforcement has been attempted for crash reduction at this location.

Traffic Signal Needs Analysis Summary: S 44th St W at Central Ave

Scenario: **Completion of Phase 1C in 2031**
Analysis Date: 8/13/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: S 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 3

Traffic Volumes

Hour:	1	2	3	4	5	6	7	8	9	10	11	12
Start Time:	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Central Ave Eastbound:	543	522	457	410	429	432	361	304	319	296	353	240
Central Ave Westbound:	219	221	239	266	335	396	388	390	487	532	626	436
S 44th St W Northbound:	87	68	48	38	41	41	41	46	42	48	54	47
Total Entering Volume:	849	811	744	714	805	869	790	740	848	876	1033	723
TEV Rank:	**4**	6	9	12	7	3	**8**	10	5	2	**1**	11
Use for:	Warrant 2						Warrant 1				Warrant 3	
Major, Both Directions:	762	743	696	676	764	828	749	694	806	828	979	676
Minor, Higher Direction:	87	68	48	38	41	41	41	46	42	48	54	47

Warrants

		Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic* — Major (Both Dir.) Value 749, Minimum 350[c]; Minor (Higher Dir.) Value 41, Minimum 105[c]; Met? No. *or Condition B: Interruption of Continuous Traffic* — Major (Both Dir.) Value 749, Minimum 525[c]; Minor (Higher Dir.) Value 41, Minimum 53[c]; Met? No	**No**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph* — Major (Both Dir.) Value 762, Minimum -; Minor (Higher Dir.) Value 87, Minimum 60; Met? Yes	**Yes**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)*: 1. Veh-Hrs of Delay — Value 0.2, Minimum 4, Met? No; 2. Minor Volume — Value 54, Minimum 100, Met? No; 3. Total Ent. Volume — Value 1033, Minimum 650, Met? Yes. *or Condition B (MUTCD Figure 4C-4)* — Major (Both Dir.) Value 979, Minimum -; Minor (Higher Dir.) Value 54, Minimum 75; Met? No	**No**
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)* — Major (Both Dir.) Value 762, Minimum; Pedestrians Value, Minimum; Met? n/a. *or Criterion B: One Hour (MUTCD Figure 4C-8)* — Major (Both Dir.) Value 979, Minimum; Pedestrians Value, Minimum; Met? n/a	**Not Evaluated**
5 School Crossing	No students projected to cross the major street at this location.	**No**
6 Coordinated Signal System	Only one signal in the roadway network nearby.	**No**
7 Crash Experience ** Condition A not evaluated *(all conditions)*	*Condition B, 1-year Period (Table 4C-4)* — Angle+Ped Crashes Value n/a, Minimum 4; or Fatal+Injury Angle+Ped Value n/a, Minimum 3; Met? n/a. *and Condition C, 80% of Warrant 1 [Condition A]* — Major (Both Dir.) Value 749, Minimum; Minor (Higher Dir.) Value 41, Minimum; Met? n/a. *or Condition B, 3-year Period (Table 4C-5)* — Angle+Ped Crashes Value n/a, Minimum 6; or Fatal+Injury Angle+Ped Value n/a, Minimum 4; Met? n/a. *or Condition C, 80% of Warrant 1 [Condition B]* — Major (Both Dir.) Value 749, Minimum; Minor (Higher Dir.) Value 41, Minimum; Met? n/a. *or Condition C, 80% of Warrant 4* — Four Hour Ped; One Hour Ped; Value, Minimum; Met? n/a	**Not Evaluated**
8 Roadway Network	Not an intersection of two or more major routes.	**No**
9 Intersection Near Grade Xing	No railroad grade crossing nearby.	**No**
	Warrants Met:	**1**
	Recommendation:	**No Signal**

Notes:

c: Warrant 1 minimum values used for "70%" to account to reflect major-street speed over 40 mph

* Warrant 3, Peak Hour, is indicated by the MUTCD as follows: "This signal warrant should be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."

** No trial of alternatives with observance and enforcement has been attempted for crash reduction at this location.

Traffic Signal Needs Analysis Summary: S 44th St W at Central Ave

Scenario: **Completion of Phase 2 in 2033**
Analysis Date: 8/13/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: S 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 3

Traffic Volumes

Hour:	1	2	3	4	5	6	7	8	9	10	11	12
Start Time:	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Central Ave Eastbound:	610	596	527	481	500	503	431	366	389	369	430	306
Central Ave Westbound:	251	266	258	264	301	325	461	461	574	628	728	521
S 44th St W Northbound:	106	83	59	48	50	52	52	58	54	62	67	58
Total Entering Volume:	967	945	844	793	851	880	944	885	1017	1059	1225	885
TEV Rank:	**4**	5	11	12	10	9	6	7	3	2	**1**	**8**
Use for:	Warrant 2										Warrant 3	Warrant 1
Major, Both Directions:	861	862	785	745	801	828	892	828	963	997	1158	827
Minor, Higher Direction:	106	83	59	48	50	52	52	58	54	62	67	58

Warrants

		Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic* — Major (Both Dir.) Value 827, Minimum 350[c]; Minor (Higher Dir.) Value 58, Minimum 105[c]; Met? No. *or Condition B: Interruption of Continuous Traffic* — Major (Both Dir.) Value 827, Minimum 525[c]; Minor (Higher Dir.) Value 58, Minimum 53[c]; Met? Yes	**Yes**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph* — Major (Both Dir.) Value 861, Minimum -; Minor (Higher Dir.) Value 106, Minimum 60; Met? Yes	**Yes**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)*: 1. Veh-Hrs of Delay — Value 0.3, Minimum 4; 2. Minor Volume — Value 67, Minimum 100; Met? No; 3. Total Ent. Volume — Value 1225, Minimum 650; Met? Yes. *or Condition B (MUTCD Figure 4C-4)* — Major (Both Dir.) Value 1158, Minimum -; Minor (Higher Dir.) Value 67, Minimum 75; Met? No	**No**
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)* — Major (Both Dir.) Value 861, Minimum; Pedestrians Value, Minimum; Met? n/a. *or Criterion B: One Hour (MUTCD Figure 4C-8)* — Major (Both Dir.) Value 1158, Minimum; Pedestrians Value, Minimum; Met? n/a	**Not Evaluated**
5 School Crossing	No students projected to cross the major street at this location.	**No**
6 Coordinated Signal System	Only one signal in the roadway network nearby.	**No**
7 Crash Experience ** Condition A not evaluated *(all conditions)*	*Condition B, 1-year Period (Table 4C-4)* — Angle+Ped Crashes Value n/a, Minimum 4; or Fatal+Injury Angle+Ped Value n/a, Minimum 3; Met? n/a. ***and*** *Condition C, 80% of Warrant 1 [Condition A]* — Major (Both Dir.) Value 827, Minimum; Minor (Higher Dir.) Value 58, Minimum; Met? n/a. *or Condition B, 3-year Period (Table 4C-5)* — Angle+Ped Crashes Value n/a, Minimum 6; or Fatal+Injury Angle+Ped Value n/a, Minimum 4; Met? n/a. *or Condition C, 80% of Warrant 1 [Condition B]* — Major (Both Dir.) Value 827, Minimum; Minor (Higher Dir.) Value 58, Minimum; Met? n/a. *or Condition C, 80% of Warrant 4* — Four Hour Ped; One Hour Ped Value, Minimum; Met? n/a	**Not Evaluated**
8 Roadway Network	Not an intersection of two or more major routes.	**No**
9 Intersection Near Grade Xing	No railroad grade crossing nearby.	**No**
	Warrants Met:	**2**
	Recommendation:	**Consider Signal**

Notes:

c: Warrant 1 minimum values used for "70%" to account to reflect major-street speed over 40 mph

* Warrant 3, Peak Hour, is indicated by the MUTCD as follows: "This signal warrant should be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."

** No trial of alternatives with observance and enforcement has been attempted for crash reduction at this location.

Appendix F: Intersection Cost Participation Calculations

City of Billings Intersection Cost Participation Worksheet: Clearwater/44 West Phase 1A + Phase 2 Retail

1: Central at 48th

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	3	3	**10**	**10**
WB L	1	1	1	**1**	**1**
WB T	1	**5**	**5**	8	8
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1	**0**	**0**	**2**	**2**
SB T	1	No project traffic			
NB L	1				
Project **Critical** Lane Volume			**5**		**13**
Critical Lane Capacity			1200		1200
% Increase			0.4%		1.1%
Max % Increase			1.1%		

2: Shiloh at Broadwater

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**2**	**2**	**6**	**6**
WB T	1	No project traffic			
EB L	1				
NB T	2	**19**	**10**	26	13
SB L	1	No project traffic			
SB T	2	12	6	**32**	**16**
NB L	1	No project traffic			
Project **Critical** Lane Volume			**12**		**22**
Critical Lane Capacity			1140		1140
% Increase			1.1%		1.9%
Max % Increase			1.9%		

3: Shiloh at Central

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	2	23	12	32	16
WB L	1	No project traffic			
WB T	2	**14**	**7**	**38**	**19**
EB L	1	**23**	**23**	**32**	**32**
NB T	2	No project traffic			
SB L	1				
SB T	2				
NB L	1	**14**	**14**	**38**	**38**
Project **Critical** Lane Volume			**44**		**89**
Critical Lane Capacity			1200		1200
% Increase			3.7%		7.4%
Max % Increase			7.4%		

5: Shiloh at Monad

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1				
WB T	1				
EB L	1				
NB T	2	**12**	**6**	**32**	**16**
SB L	1	**4**	**4**	**5**	**5**
SB T	2	19	10	26	13
NB L	1	No project traffic			
Project **Critical** Lane Volume			**10**		**21**
Critical Lane Capacity			1200		1200
% Increase			0.8%		1.8%
Max % Increase			1.8%		

6: West Central Ave Site Access (Double Haul Lane)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	**1**	**1**	**2**	**2**
WB L	1	**34**	**34**	**86**	**86**
WB T	1	2	2	1	1
EB L	0	No project traffic			
NB T	0	No project traffic			
SB L	0				
SB T	0				
NB L	1	**6**	**6**	**10**	**10**
Project **Critical** Lane Volume			**41**		**98**
Critical Lane Capacity			1140		1140
% Increase			3.6%		8.6%
Max % Increase			8.6%		

7:East Central Ave Site Access (S. 44th St W.)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	**43**	**43**	**76**	**76**
WB L	1	**9**	**9**	**28**	**28**
WB T	1	34	34	86	86
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1				
SB T	1				
NB L	1	**2**	**2**	**1**	**1**
Project **Critical** Lane Volume			**54**		**105**
Critical Lane Capacity			1140		1140
% Increase			4.7%		9.2%
Max % Increase			9.2%		

City of Billings Intersection Cost Participation Worksheet: Clearwater Phase 1B

1: Central at 48th

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	1	1	**2**	**2**
WB L	1	No project traffic			
WB T	1	**2**	**2**	1	1
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1	**0**	**0**	**1**	**1**
SB T	1	No project traffic			
NB L	1				
Project **Critical** Lane Volume			**2**		**3**
Critical Lane Capacity			1200		1200
% Increase			0.2%		0.3%
Max % Increase			0.3%		

2: Shiloh at Broadwater

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**0**	**0**	**2**	**2**
WB T	1	No project traffic			
EB L	1				
NB T	2	**7**	**4**	5	3
SB L	1	No project traffic			
SB T	2	2	1	**8**	**4**
NB L	1	No project traffic			
Project **Critical** Lane Volume			**4**		**6**
Critical Lane Capacity			1140		1140
% Increase			0.4%		0.5%
Max % Increase			0.5%		

3: Shiloh at Central

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	2	**9**	**5**	6	3
WB L	1	No project traffic			
WB T	2	3	2	**9**	**5**
EB L	1	9	9	**6**	**6**
NB T	2	No project traffic			
SB L	1				
SB T	2				
NB L	1	**3**	**3**	**9**	**9**
Project **Critical** Lane Volume			**14**		**20**
Critical Lane Capacity			1200		1200
% Increase			1.2%		1.7%
Max % Increase			1.7%		

5: Shiloh at Monad

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1				
WB T	1				
EB L	1				
NB T	2	2	1	**8**	**4**
SB L	1	1	1	**1**	**1**
SB T	2	**7**	**4**	5	3
NB L	1	No project traffic			
Project **Critical** Lane Volume			**4**		**5**
Critical Lane Capacity			1200		1200
% Increase			0.3%		0.4%
Max % Increase			0.4%		

6: West Central Ave Site Access (Double Haul Lane)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	0	0	**2**	**2**
WB L	1	No project traffic			
WB T	1	**1**	**1**	1	1
EB L	0	No project traffic			
NB T	0	No project traffic			
SB L	0				
SB T	0				
NB L	1	**1**	**1**	**1**	**1**
Project **Critical** Lane Volume			**2**		**3**
Critical Lane Capacity			1140		1140
% Increase			0.2%		0.3%
Max % Increase			0.3%		

7:East Central Ave Site Access (S. 44th St W.)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**9**	**9**	**28**	**28**
WB T	1	No project traffic			
EB L	1				
NB T	1	No project traffic			
SB L	1				
SB T	1				
NB L	1	**1**	**1**	**1**	**1**
Project **Critical** Lane Volume			**10**		**29**
Critical Lane Capacity			1140		1140
% Increase			0.9%		2.5%
Max % Increase			2.5%		

City of Billings Intersection Cost Participation Worksheet: Clearwater Phase 1C

1: Central at 48th

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	1	1	**2**	**2**
WB L	1	0	0	**0**	**0**
WB T	1	**2**	**2**	1	1
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1	**0**	**0**	**0**	**0**
SB T	1	No project traffic			
NB L	1				
Project **Critical** Lane Volume			**2**		**2**
Critical Lane Capacity			1200		1200
% Increase			0.2%		0.2%
Max % Increase			0.2%		

2: Shiloh at Broadwater

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**0**	**0**	**1**	**1**
WB T	1	No project traffic			
EB L	1				
NB T	2	**6**	**3**	4	2
SB L	1	No project traffic			
SB T	2	2	1	**6**	**3**
NB L	1	No project traffic			
Project **Critical** Lane Volume			**3**		**4**
Critical Lane Capacity			1140		1140
% Increase			0.3%		0.4%
Max % Increase			0.4%		

3: Shiloh at Central

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	2	7	4	5	3
WB L	1	No project traffic			
WB T	2	**2**	**1**	**8**	**4**
EB L	1	**7**	**7**	**5**	**5**
NB T	2	No project traffic			
SB L	1				
SB T	2				
NB L	1	**2**	**2**	**8**	**8**
Project **Critical** Lane Volume			**10**		**17**
Critical Lane Capacity			1200		1200
% Increase			0.8%		1.4%
Max % Increase			1.4%		

5: Shiloh at Monad

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1				
WB T	1				
EB L	1				
NB T	2	2	1	**6**	**3**
SB L	1	1	1	**1**	**1**
SB T	2	**6**	**3**	4	2
NB L	1	No project traffic			
Project **Critical** Lane Volume			**3**		**4**
Critical Lane Capacity			1200		1200
% Increase			0.3%		0.3%
Max % Increase			0.3%		

6: West Central Ave Site Access (Double Haul Lane)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	1	1	**2**	**2**
WB L	1	No project traffic			
WB T	1	**2**	**2**	1	1
EB L	0	No project traffic			
NB T	0	No project traffic			
SB L	0				
SB T	0				
NB L	1	**0**	**0**	**0**	**0**
Project **Critical** Lane Volume			**2**		**2**
Critical Lane Capacity			1140		1140
% Increase			0.2%		0.2%
Max % Increase			0.2%		

7:East Central Ave Site Access (S. 44th St W.)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**7**	**7**	**23**	**23**
WB T	1	No project traffic			
EB L	1				
NB T	1	No project traffic			
SB L	1				
SB T	1				
NB L	1	**2**	**2**	**1**	**1**
Project **Critical** Lane Volume			**9**		**24**
Critical Lane Capacity			1140		1140
% Increase			0.8%		2.1%
Max % Increase			2.1%		

City of Billings Intersection Cost Participation Worksheet: Clearwater Phase 2 (residential only, no retail)

1: Central at 48th

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	2	2	**5**	**5**
WB L	1	1	1	**1**	**1**
WB T	1	**5**	**5**	3	3
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1	**0**	**0**	**1**	**1**
SB T	1	No project traffic			
NB L	1				
Project **Critical** Lane Volume			**5**		**7**
Critical Lane Capacity			1200		1200
% Increase			0.4%		0.6%
Max % Increase			0.6%		

2: Shiloh at Broadwater

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**1**	**1**	**4**	**4**
WB T	1	No project traffic			
EB L	1				
NB T	2	**16**	**8**	11	6
SB L	1	No project traffic			
SB T	2	5	3	**19**	**10**
NB L	1	No project traffic			
Project **Critical** Lane Volume			**9**		**14**
Critical Lane Capacity			1140		1140
% Increase			0.8%		1.2%
Max % Increase			1.2%		

3: Shiloh at Central

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	2	20	10	13	7
WB L	1	3	3	11	11
WB T	2	**3**	**2**	**11**	**6**
EB L	1	**20**	**20**	**13**	**13**
NB T	2	No project traffic			
SB L	1				
SB T	2	**4**	**2**	**14**	**7**
NB L	1	**4**	**4**	**14**	**14**
Project **Critical** Lane Volume			**28**		**40**
Critical Lane Capacity			1200		1200
% Increase			2.3%		3.3%
Max % Increase			3.3%		

5: Shiloh at Monad

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1				
WB T	1				
EB L	1				
NB T	2	5	3	**19**	**10**
SB L	1	3	3	**2**	**2**
SB T	2	**16**	**8**	11	6
NB L	1	No project traffic			
Project **Critical** Lane Volume			**8**		**12**
Critical Lane Capacity			1200		1200
% Increase			0.7%		1.0%
Max % Increase			1.0%		

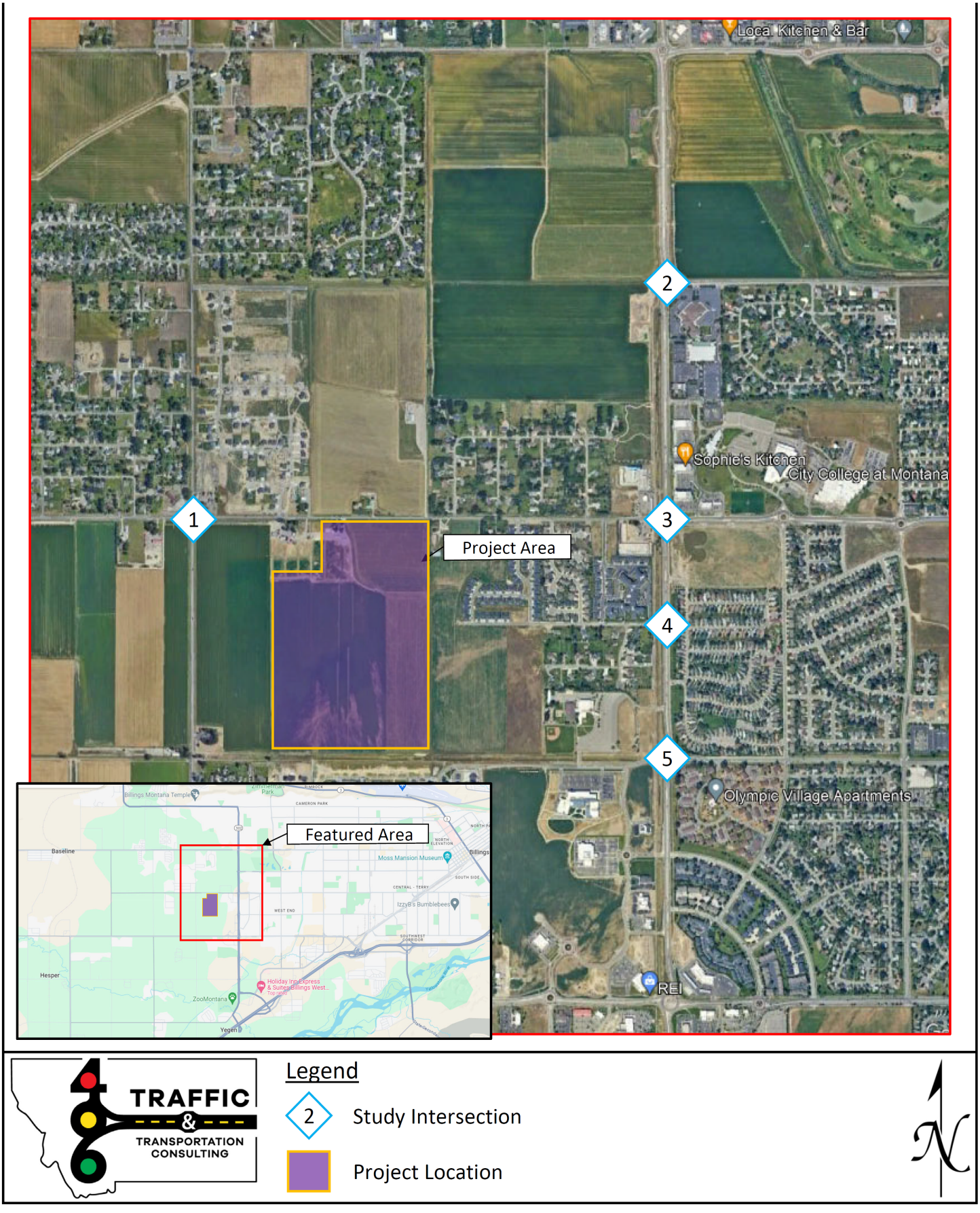
6: West Central Ave Site Access (Double Haul Lane)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	**1**	**1**	**3**	**3**
WB L	1	**5**	**5**	**17**	**17**
WB T	1	3	3	2	2
EB L	0	No project traffic			
NB T	0	No project traffic			
SB L	0				
SB T	0				
NB L	1	**4**	**4**	**3**	**3**
Project **Critical** Lane Volume			**10**		**23**
Critical Lane Capacity			1140		1140
% Increase			0.9%		2.0%
Max % Increase			2.0%		

7:East Central Ave Site Access (S. 44th St W.)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	**20**	**20**	**13**	**13**
WB L	1	**5**	**5**	**17**	**17**
WB T	1	5	5	17	17
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1				
SB T	1				
NB L	1	**3**	**3**	**2**	**2**
Project **Critical** Lane Volume			**28**		**32**
Critical Lane Capacity			1140		1140
% Increase			2.5%		2.8%
Max % Increase			2.8%		

Exhibit 1. Overall Site Location and Study Intersections



Planning Board

Date:	06/09/2026
Title:	44 West Subdivision, 3rd Filing, Major Preliminary Plat Review
Presented by:	David Green
Department:	Planning & Community Services
Presentation:	Yes

Information

RECOMMENDATION

Staff recommends the Planning Board recommend to City Council that the preliminary plat of 44 West Subdivision, 3rd Filing, be conditionally approved and the Findings of Fact adopted as presented in the staff report.

BACKGROUND (Consistency with Adopted Plans and Policies, if applicable)

On May 1, 2026, Performance Engineering applied for preliminary major plat approval for 44 West Subdivision, 3rd Filing. The proposed subdivision creates 23 lots for residential development. The subject property is generally located south of Central Avenue, and west of Twin Pines Townhomes. The property is zoned NX1 Mixed Residential 1 (1 to 4 units) for residential uses.

VARIANCES

No variances have been requested:

PROPOSED CONDITIONS OF APPROVAL

1. Minor changes may be made in the SIA and final documents, as requested by the Planning, Legal or Public Works Departments to clarify the documents and bring them into the standard acceptable format.
2. The final plat shall comply with all requirements of the City of Billings Subdivision Regulations, rules, regulations, policies, and resolutions of the City of Billings, and the laws and Administrative Rules of the State of Montana.

PROCEDURAL HISTORY

Pre-Application Meeting: April 2, 2026
Preliminary Plat application submitted to Planning Division: April 2, 2026
Departmental Review Meeting: May 14, 2026
Preliminary Plat Resubmittal: May 21, 2026
Planning Board Plat Review: June 9, 2026
Planning Board Public Hearing: June 23, 2026
Preliminary Plat to City Council: July 27, 2026
60 Working-Day Preliminary Plat Review period ends: July 28, 2026

PLAT INFORMATION

General Location: South of Central Avenue, and west of Twin Pines Townhomes
Legal Description: Being Lot 28, Block 2 of the 44 West Subdivision, 2nd Filing
Owner/Subdivider: McCall Development, Inc.
Engineer/Surveyor: Performance Engineering
Existing Zoning: NX1
Existing Land Use: Agricultural land
Proposed Land Use: Residential
Gross Area: ± 2.48 Acres
Lot Size:
Minimum: ± 4,400 square feet
Maximum: ± 6,502 square feet

Parkland Requirements: Parkland dedication requirement for this filing is 0.33 acres. Previous dedication with previous filings were greater than the required 2.36 Acres. Total parkland requirement to this point is 2.19 acres. The applicant will not be providing additional parkland with this submittal.

This subdivision is not subject to the Billings 2045 Land Use Plan and Future Land Use Map as it was submitted prior to adoption or effective dates of the new land use regulations. Incidentally, this request matches the Future Land Use Map designations for this area as Urban Residential Limited. Applications that will be subject to the new regulations, Plan and Map will be processed after July 1, 2026.

Traffic Impact Study

A traffic accessibility study has been completed for the 44 West Subdivision, 1st through 3rd Filings. All required intersection improvement contributions identified therein shall be completed by the Subdivider at the their expense. The percent of traffic contributions to the following intersections shall be in accordance with the traffic accessibility study which includes the 3rd filing:

a. S. 48th and Central – 0.20%
b. Shiloh and Broadwater – 0.40%
c. Shiloh and Central – 1.40%
d. Shiloh and Monad – 0.30%
e. Central and S 44th West – 2.10%

The cash contributions shall be based on the percent of traffic contributions to the intersections based on the total cost of an intersection as determined by City Engineering for the year in which the contribution is made. These cash contributions for the intersection improvement will be made prior to final plat approval.

A left turn lane on Central Avenue at the Double Haul Lane intersection is required to be constructed with this subdivision, 44 West Subdivision, 3rd Filing.

STAKEHOLDERS

There are no stakeholder responses at this time. Stakeholder input will be received at a public hearing scheduled for this subdivision on June 23, 2026.

ALTERNATIVES

In accordance with state law, the City Council has 60 working days to act upon this major preliminary plat. The 60 working day review period for the proposed plat ends July 28, 2026. State and City subdivision regulations also require that preliminary plat be reviewed using specific criteria, as stated within this report. The City may not unreasonably restrict an owner's ability to develop land if the subdivider provides evidence that any identified adverse effects can be mitigated. Within the 60 working day review period, the City Council is required to:

1. Approve;
2. Conditionally Approve; or
3. Deny the Preliminary Plat

FISCAL EFFECTS

The preliminary plat of this subdivision will have no financial impact on the Planning Division.

SUMMARY

One of the purposes of the City's subdivision review process is to identify potential negative effects of property being subdivided. Negative effects that are identified become the subdivider's responsibility to mitigate. Various City departments, private service/utility providers and the affected school district/s, have reviewed this application and provided input on effects and mitigation. The Findings of Fact, which are presented as an attachment, discuss potential negative impacts of the subdivision and conditions of approval are recommended as measures to further mitigate any impacts. In this case, there were found to be minimal impacts from this proposed subdivision.

Attachments

Proposed Plat
Draft SIA
Findings of Fact
Traffic Study
TIS Studied Intersetions

PRELIMINARY PLAT OF

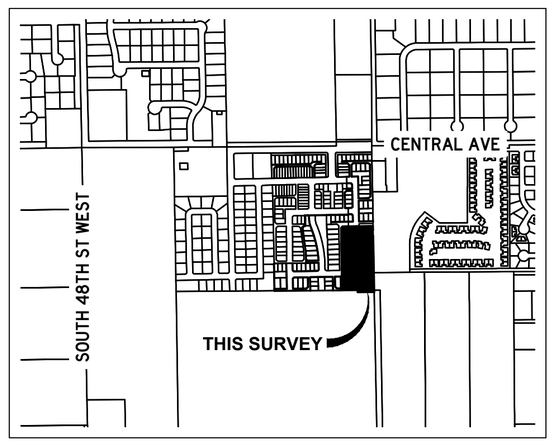
44 WEST SUBDIVISION, 3RD FILING

BEING LOT 28, BLOCK 2 OF THE 44 WEST SUBDIVISION, 2ND FILING
LOCATED IN THE NW1/4 OF SECTION 10, TOWNSHIP 01 SOUTH, RANGE 25
EAST, P.M.M., CITY OF BILLINGS, YELLOWSTONE COUNTY, MONTANA

PREPARED FOR : 44 WEST DEVELOPMENT, LLC

PREPARED BY : PERFORMANCE ENGINEERING, LLC

TOTAL AREA OF SUBDIVISION : ± 2.48 ACRES



VICINITY MAP
NOT TO SCALE

SITE DATA	
GROSS AREA	2.48 AC
NET AREA	1.08 AC
LOT COUNT	23
MAX. LOT AREA	6,502 SF
MIN. LOT AREA	4,400 SF
ZONING	NX1
PARKLAND DED.	0 SF

ADJOINING PROPERTY OWNER INFORMATION:

1. BROWN DEVELOPMENT, LLC
745 S 56TH STREET WEST
BILLINGS, MT 59106

2. 44 WEST DEVELOPMENT, LLC
1536 MULLOWNEY LANE, SUITE 100
BILLINGS, MT 59101

3. BRADLEY W HARDT
4620 CENTRAL AVENUE
BILLINGS, MT 59106

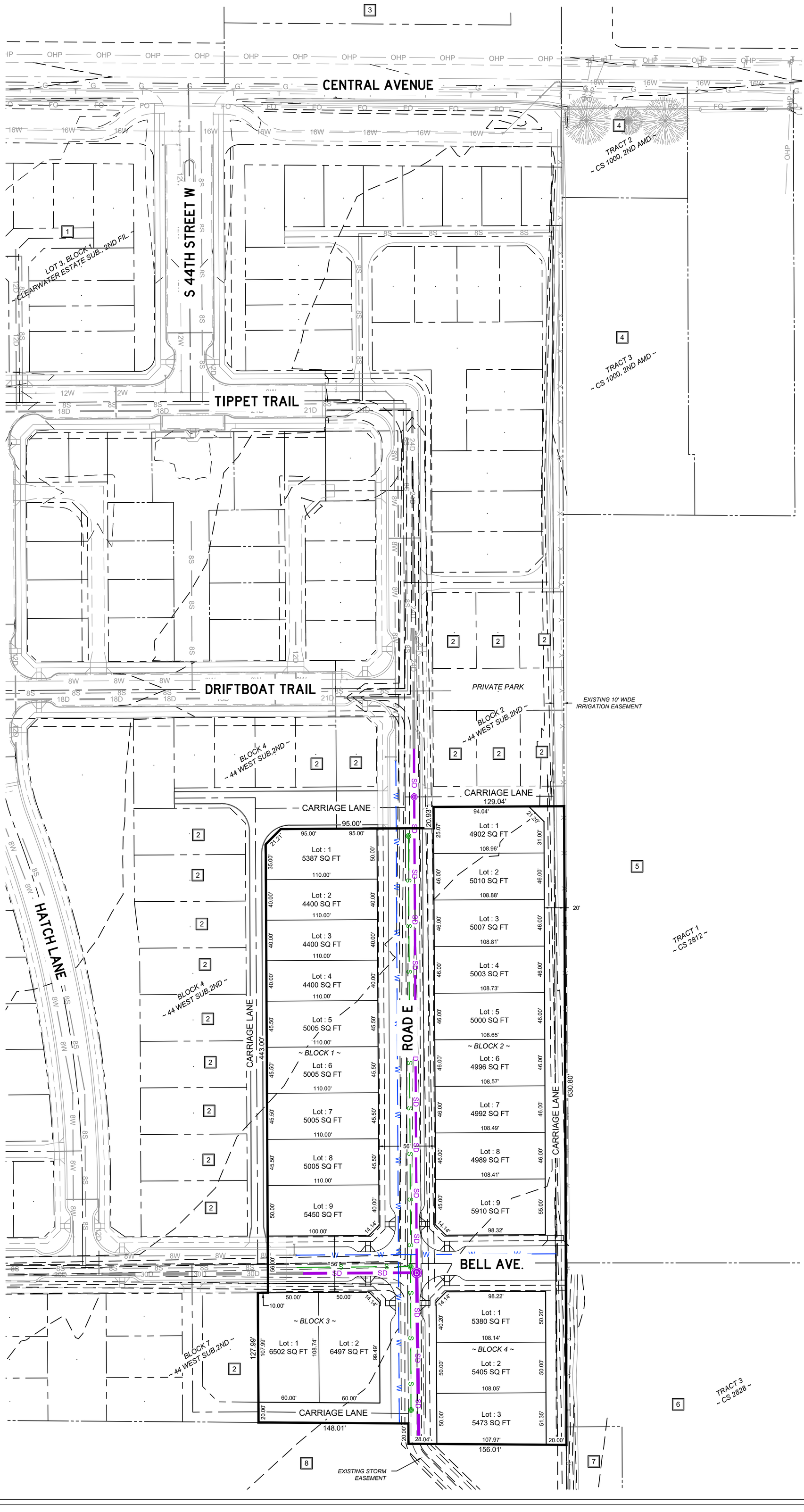
4. BRYAN KARL LEITZ
4420 CENTRAL AVENUE
BILLINGS, MT 59106

5. EDWARD L HOFMANN JR
4246 CENTRAL AVENUE
BILLINGS, MT 59106

6. JANET B BERGMAN REVOCABLE TRUST
1322 BROADWATER AVENUE
BILLINGS, MT 59102

7. DORN PROPERTIES AND HOMES, LLC
PO BOX 81524
BILLINGS, MT 59108

8. BRADLEY W & TAMMY JO HARDT
4620 CENTRAL AVENUE
BILLINGS, MT 59106



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SUBDIVISION IMPROVEMENTS AGREEMENT
&WAIVER OF RIGHT TO PROTEST FUTURE SPECIAL IMPROVEMENT DISTRICTS

44 West Subdivision, 3rd Filing

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(City of Billings)

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SUBDIVISION IMPROVEMENTS AGREEMENT & WAIVER OF RIGHT TO PROTEST FUTURE SPECIAL IMPROVEMENT DISTRICTS

44 West Subdivision, 3rd Filing

This agreement is made and entered into this ____ day of _____, 20__, by and between *44 West Development, LLC*, whose address for the purpose of this agreement is **1536 Mullowney Lane, Suite 100; Billings, Montana 59101**, hereinafter referred to as "Subdivider," and **CITY OF BILLINGS**, Billings, Montana, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the plat of *44 West Subdivision, 3rd Filing*, located in Yellowstone County, Montana was submitted to the Yellowstone County Board of Planning; and

WHEREAS, at a regular meeting conducted on _____ day of _____, 20__, the Board of Planning recommended conditional approval of a preliminary plat of *44 West Subdivision, 3rd Filing*; and

WHEREAS, at a regular meeting conducted on _____ day of _____, 20__, the City Council conditionally approved a preliminary plat of *44 West Subdivision, 3rd Filing*; and

WHEREAS, a Subdivision Improvements Agreement is required by the City prior to the approval of the final plat.

WHEREAS, the provisions of this agreement shall be effective and applicable to *44 West Subdivision, 3rd Filing* upon the filing of the final plat thereof in the office of the Clerk and Recorder of Yellowstone County, Montana. The Subdivision shall comply with all requirements of the City of Billings Subdivision Regulations, the rules, regulations, policies, and resolutions of the City of Billings, and the laws and administrative rules of the State of Montana.

THEREFORE, THE PARTIES TO THIS AGREEMENT, for and in consideration of the mutual promises herein contained and for other good and valuable consideration, do hereby agree as follows:

I. VARIANCES

A. Subdivider has requested, and the City hereby grants, the following variances by City Council from the strict interpretation of the City's Subdivision Regulations (Section 23.1101, BMCC):

1. No variances are requested.

II. PROPERTY CONDITIONS AND INFORMATION FOR LOT PURCHASERS

A. Lot owners will be required to construct that segment of the required sidewalk that fronts their property at the time of lot development. If sidewalk is not constructed within 5 years, the City has the right to construct the sidewalk and assess the property owners.

B. Lot owners should be aware that this subdivision is being built in close proximity to prime deer and antelope habitat and it is likely that homeowners will experience problems with damage to landscaped shrubs, flowers, and gardens. The Montana Fish, Wildlife, and Parks Department does not provide damage assistance unless there is damage to commercial crops and/or a threat to public health and safety.

C. Lot owners should be aware that soil characteristics within the area of this subdivision, as described in the 1972 Yellowstone County Soil Survey, indicate that there could be potential limitations for proposed construction on the lots, which may require a geotechnical survey prior to construction.

D. No water rights have been transferred to the lot owners. Irrigation ditches that exist on the perimeter of this development are for the benefit of other properties. Perimeter ditches and drains shall remain in place and shall not be altered by the Subdivider or subsequent owners.

E. There is attached hereto a Waiver waiving the right to protest the creation of the special improvement district or districts which by this reference is expressly incorporated herein and made as much a part hereof as though fully and completely set forth herein at this point. The Waiver will be filed with the plat, shall run with the land, and shall constitute the guarantee by the Subdivider and property owner or owners of the developments described herein. Said Waiver is effective upon filing and is not conditioned on the completion of the conditions set forth in this Agreement. The Subdivider and owner specifically agree that they are waiving valuable rights and do so voluntarily.

F. The subdivider and subsequent contractors/builders acknowledge that there is a Stormwater Pollution and Prevention Plan (SWPPP) filed with the City and the Montana Department of Environmental Quality (MDEQ). This SWPPP shall be adhered to during all phases of construction and shall be updated as required by MDEQ under the General Permit for Stormwater Discharges Associated with Construction Activity, Chapter 28, BMCC and the Billings Stormwater Management Manual.

G. Individual lot owners should be aware that Best Management Practices for stormwater control shall be required for new construction on lots. Best Management Practices are defined within Section 28-201, BMCC and detailed in the Billings Stormwater Management Manual.

III. TRANSPORTATION

A. Streets

- All internal access roads and site improvements within the subdivision will be in accordance with the City of Billings Site Development Ordinance, City Zoning Ordinance, the Stormwater Management Manual, and other applicable City codes, rules, and regulations.

- All internal streets to provide a 34-foot back of curb to back of curb street width. The street improvements will be completed by private contract or SID

- A traffic accessibility study has been completed for the *44 West Subdivision, 3rd Filing.* All required intersection improvement contributions identified therein shall be completed by the Subdivider at the Subdivider's expense. The percent of traffic contributions to the following intersections shall be in accordance with the traffic accessibility study:

    a. S. 48th and Central – 0.20%
    b. Shiloh and Broadwater – 0.40%
    c. Shiloh and Central – 1.40%
    d. Shiloh and Monad – 0.30%
    e. Central and 44th S West – 2.10%

  The cash contributions shall be based on the percent of traffic contributions to the intersections based on the total cost of an intersection as determined by City Engineering for the year in which the contribution is made. These cash contributions for the intersection improvement will be made prior to final plat approval.

- A left turn lane on Central Avenue at the Double Haul Lane intersection is required to be constructed with this subdivision.

B. Carriage Lanes

- All carriage lanes within the subdivision shall be built to grade with a satisfactory subbase, base course, and asphalt surface or concrete surface. All carriage lane approaches constructed with asphalt shall be replaced with concrete by the Subdivider at the time when home construction is complete. In the event asphalt approaches within the subdivision are not

replace with concrete within three years of the date of recording of the final plat, the City may construct the concrete approaches and assess the Subdivider for the costs associated with the approach construction. Carriage Lane pavement widths shall be 12 feet. No trees are allowed to be planted in Carriage Lane rights-of-way. In addition, no shrubs taller than two (2) feet are allowed to be planted in Carriage Lane rights-of-way.

C. Sidewalks

- Individual lot owners will be responsible for the construction of the sidewalks within public right-of-way or easements adjacent to or through their lot at the time of lot construction and shall be included in each building permit. The Subdivider shall construct sidewalk adjacent to private parks at the time of private park development.

- Sidewalks shall be 5-foot wide with a minimum 5-foot boulevard planting strip between the sidewalk and the curb with handicap ramps and aprons installed where necessary.

D. Street Lighting

- Street lighting will be installed by private contract or SID. A Street Light Maintenance District will be created in the future and is included in the waiver of right to protest.

E. Traffic Control Devices

- Street name signs for streets within the subdivision, or located immediately adjacent thereto, shall be furnished and installed in accordance with the specifications of the City of Billings Public Works and Fire Departments.

- No traffic signals are required within this subdivision.

- The Subdivider shall furnish and install all necessary traffic control devices in accordance with the Manual of Uniform Traffic Control Devices and approved by the City of Billings Public Works Department.

F. Access

- Access to the Subdivision will be provided by Tippet Trail, Driftboat Trail, and Bell Avenue. Carriage Lane access is also provided to all residential lots within the subdivision.

G. Billings Area Bikeway and Trail Master Plan

- The Subdivision is within the Billings Area Bikeway and Trail Master Plan. A 10-foot-wide multi-use trail was constructed as part of a previous filing along Central Avenue. No additional trail improvements are required.

H. Public Transit

- MET Transit provides services along Central Avenue with the closest stop at the intersection of Central Avenue and Shiloh Road, approximately 0.5 miles east of the Subdivision. No improvements are required to ensure public transit service.

IV. EMERGENCY SERVICE

Construction of buildings made of combustible materials shall have adequate fire apparatus access roads and water supply (fire hydrants) in place to allow for fire suppression requirements. Prior to the issuance of a building permit for construction using combustible materials (i.e. lumber, plywood, wood trusses, etc.), fire apparatus access roads and water supply requirements shall be provided in accordance with the International Fire Code as adopted by the City of Billings.

At a minimum, the following is required:

- An unobstructed gravel road or gravel road base must be within 150 feet of the furthest portion of a building under construction as measured along the approved route.
- The access roads are required to support fire apparatus vehicle loading (40 tons) during all weather conditions and shall be a minimum of twenty (20) feet wide.
- An operational fire hydrant shall be located within 600 feet of the furthest portion of a residence under construction or within 400 feet of the furthest portion of a commercial building under construction as measured along the access roads to the site.
- The above requirements do not alter or effect the current minimum subdivision requirements for fire apparatus access and water supply.

V. STORM DRAINAGE

All drainage improvements shall comply with the provisions set forth in Chapter 28, BMCC, and the Stormwater Management Manual in place at the time of development. Additionally, a comprehensive drainage study has been completed for the Monad Drain with requirements that superseded the Stormwater Management Manual. The *Comprehensive Drainage Plan for the Monad Drain* is on-file at the City Engineering Department. A complete stormwater management plan shall be submitted to the Engineering Division for review and approval at the time of development.

Stormwater drainage will discharge to a drainage ditch constructed as part of the 44 West Subdivision, 1st Filing private contract. The ditch conveys stormwater drainage south to a stormwater detention facility that is located within an off-site area on Tract 3, Certificate of Survey No. 3844. This detention facility has been sized to accept runoff generated from the *44 West Subdivision, 3rd Filing*. The detention facility will outfall to the Monad Drain as described in the *Comprehensive Drainage Plan for the Monad Drain.*

Per the *Comprehensive Drainage Plan for the Monad Drain*, construction of a dike and control structure within the drain will be required as part of a future subdivision of Tract 3 of Certificate of Survey No. 3844, or as determined necessary by City Engineering. These improvements are included as part of the Waiver of Right to Protest a Special Improvement District.

The HOA is responsible for participating in the maintenance of stormwater facilities directly associated with the treatment and detention of runoff produced by the Subdivision.

VI. UTILITIES

The Subdivision Improvements Agreement does not constitute an approval for extension of or connection to water mains and sanitary sewers. The property owner shall make application for extension/connection of water mains and sanitary sewers to the Public Works Department – Engineering Division. The extension/connection of/to water mains and sanitary sewers is subject to the approval of the applications and the conditions of approval. Applications shall be submitted for processing prior to the start of any construction and prior to review and approval of any project plans and specifications.

The Developer/Owner acknowledges that the subdivision shall be subject to the applicable System Development Fees in effect at the time new water and/or sanitary sewer service connections are made.

The design/installation of sanitary sewers and appurtenances, and water mains and appurtenances (fire hydrants, etc.) shall be in accordance with design standards, specifications, rules, regulations of and as approved by the City of Billings Public Works Department, Fire Department and the Montana Department of Environmental Quality.

A. Water

- The Subdivision is served by existing 8-inch water mains located in Road E and Bell Avenue.
- Water mains no less than 8 inches in diameter will be extended throughout the Subdivision. Mains shall be sized to accommodate future growth inside and outside of the Subdivision.

B. Sanitary Sewer

- Gravity sewer mains no less than 8 inches in diameter will be extended throughout the Subdivision. Mains shall be sized to accommodate future growth inside and outside of the Subdivision.

C. Power, Telephone, Gas, and Cable Television

- Private utility facilities currently exist to serve the subdivision. The private utility facilities will be installed within Carriage Lane right-of-way and by easements included on the plat, as requested by the utility companies, to provide routes to the Carriage Lanes.

VII. PARKS/OPEN SPACE

Section 76-3-621 of the Montana Code Annotated covers the park dedication requirement. Paragraph (1) calls for park area to be 11 percent of the land proposed to be subdivided into parcels of one-half acre or smaller. The required Parkland Dedication for the *44 West Subdivision, 3rd Filing* is 0.33 acres. Parkland dedications have been made in previous filings (2.36 acres) to meet the total 44 West Development's dedication requirements (2.19 acres). No additional parkland is being dedicated with this Subdivision.

This Subdivision will participate in the maintenance of the existing private parks in the 44 West Development via a Private HOA created by the Subdivider.

VIII. POSTAL DELIVERY

The Subdivider shall provide centralized delivery boxes with sufficient pullout to accommodate a mail carrier vehicle. The location of the boxes shall be reviewed and approved by the United States Postal Service.

IX. IRRIGATION

No water rights have been transferred to the lot owners. Irrigation ditches that exist on the perimeter of this development are for the benefit of other properties. Perimeter ditches and drains shall remain in place and shall not be altered by the Subdivider or subsequent owners.

X. SOILS/GEOTECHNICAL STUDY

A soils/geotechnical study has been performed for the subdivision. A copy of this report is included as part of the infrastructure permitting documents and made public record through the Engineering Department. Lot owners and contractors/builders are encouraged to review the report and its recommendations or complete a site-specific geotechnical investigation.

XI. PHASING OF IMPROVEMENTS

The Subdivision is not proposed to be constructed in phases.

XII. FINANCIAL GUARANTEES

Except as otherwise provided, Subdivider shall install and construct said required improvements with cash or by utilizing the mechanics of a private contract secured by letters of credit or a letter of commitment to lend funds from a commercial lender, or by SID. All engineering and legal work in connection with such improvements shall be paid by the contracting parties pursuant to said private contract, and the improvements shall be installed as approved by the City Engineer and Utility Department Manager.

XIII. LEGAL PROVISIONS APPLYING TO SUBDIVIDER

A. Subdivider agrees to guarantee all public improvements for a period of two (2) years from the date of final acceptance by the City of Billings.

B. The owners of the properties involved in this proposed Subdivision by signature subscribed herein below agree, consent, and shall be bound by the provisions of this Agreement.

C. The covenants, agreements, and all statements in this Agreement run with the land and apply to and shall be binding on the heirs, personal representatives, successors, assigns and transferees of the respective parties.

D. In the event it becomes necessary for either party to this Agreement to retain an attorney to enforce any of the terms or conditions of this Agreement or to give any notice required herein, then the prevailing party or the party giving notice shall be entitled to reasonable attorney fees and costs.

E. Any amendments or modifications of this Agreement or any provisions herein shall be made in writing and executed in the same manner as this original document and shall after execution become a part of this Agreement.

F. Subdivider shall comply with all applicable federal, state, and local statutes, ordinances, and administrative regulations during the performance and discharge of its obligations. Subdivider acknowledges and agrees that nothing contained herein shall relieve or exempt it from such compliance.

IN WITNESS WHEREOF, the parties hereto have set their hands and official seals on the date first above written.

"SUBDIVIDER" *44 West Development, LLC*

By: _____

Title: _____

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____, known to me to be the _____ of *44 West Development, LLC*, who executed the foregoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

This agreement is hereby approved and accepted by the City of Billings, this ____ day of _____, 20__.

"CITY"
CITY OF BILLINGS
MONTANA

By: _____
Mayor

Attest: _____
City Clerk

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____ and _____, known to me to be the Mayor and City Clerk, respectively, of the City of Billings, Montana, whose names are subscribed to the foregoing instrument in such capacity and acknowledged to me that they executed the same on behalf of the City of Billings, Montana.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

Waiver of Right to Protest
FUTURE SPECIAL IMPROVEMENTS DISTRICTS

FOR VALUABLE CONSIDERATION, the undersigned, being the Subdivider and all of the owners of the hereinafter described real property, do hereby waive the right to protest the formation of one or more Special Improvement District(s) for a period of no more than twenty years from the recording of this waiver, for street light maintenance and energy, and for the construction of streets, street widening, sidewalks, survey monuments, street name signs, curb and gutter, street lights, driveways, traffic signals, and traffic control devices, parks and park maintenance, trails, sanitary sewer lines, water lines, storm drains (either within or outside the area), and other improvements which the City of Billings may require.

This Waiver and Agreement is independent from all other agreements and is supported by sufficient independent consideration to which the undersigned are parties, and shall run with the land and shall be binding upon the undersigned, their successors and assigns, and the same shall be recorded in the office of the County Clerk and Recorder of Yellowstone County, Montana.

This Waiver is in addition to any other recorded waiver related to the property described herein and is not intended to replace, supersede, or invalidate any such waiver.

The real property hereinabove mentioned is more particularly described as follows:

44 West Subdivision, 3rd Filing

Signed and dated this _____ day of _____, 20__.

44 West Development, LLC

By:_____

Title:_____

STATE OF MONTANA)
: ss
County of Yellowstone)

On this ____ day of _____, 20__, before me, a Notary Public in and for the State of Montana, personally appeared _____, known to me to be the _____ of *44 West Development, LLC*, who executed the foregoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

FINDINGS OF FACT

The Planning staff has prepared the Findings of Fact for the preliminary plat of 44 West Subdivision, 3rd Filing. These findings are based on the preliminary plat application and supplemental documents and address the review criteria required by the Montana Subdivision and Platting Act (76-3-608, MCA) and the Billings Subdivision Regulations (Section 23-303(H), BMCC).

A. What are the effects on agriculture, local services, the natural environment, wildlife, wildlife habitat, and public health, safety and welfare? [MCA 76-3-608 (3) (a) and BMCC 23-302.H.2.]

1. Effect on agriculture and agricultural water user facilities

The subject property has been used for agricultural purposes in the past. The Monad Drain is to the south of this proposed subdivision and is not part of the proposed area to be subdivided. Perimeter ditches and drains shall remain in place and not be altered by the subdivider or subsequent owners. The subdivision should not affect agricultural water users' facilities. With farming activity wildlife habitat has not been maintained. Perimeter areas are good for birds to hide in and smaller ungulates, such as deer.

2. Effect on local services

a. **Utilities** – Water service will be provided by the City of Billings. A 16-inch water main will be extended along Central Avenue for the proposed subdivision. 12-inch and 8-inch water lines will be provided within the proposed subdivision. 12-inch in the northern area and 8-inch throughout the majority of the subdivision. New individual services will be provided to all the lots, and new fire hydrants will be installed as required by the City Fire Department.

   Sanitary sewer service to the subdivision will be by an existing 10-inch sanitary sewer main located within the alleyway along the western boundary at the south end of the Subdivision. The Subdivider is responsible for extending an 8-inch gravity sewer main to Central Avenue via South 44th Street West to allow for future connections to the north of the Subdivision. Sewer lines within the subdivision shall be no smaller than 8-inches in diameter.

   The subdivider will install all new water lines and sewer lines in the local streets and individual services for each lot in accordance with design standards, specifications, rules, and regulations of the City of Billings Engineering/Public Works Department and MDEQ. This is outlined in the SIA under the heading 'VI. Utilities.'

   Private Utilities will be provided from existing facilities to the subdivision. The private utilities will be installed within the Carriage Lane right-of-way and by easements included on the plat, as requested by the utility companies, to provide routes to the Carriage Lanes.

   Stormwater – The storm drainage system for 44 West Subdivision, 3rd Filing, will consist of a curb and gutter surface collection and curb inlets that drain into storm drainage piping,

as well as surface conveyance. Stormwater drainage will discharge to a drainage ditch constructed as part of the 44 West Subdivision, 1st Filing private contract. The ditch conveys stormwater drainage south to a stormwater detention facility that is located within an off-site area on Tract 3, Certificate of Survey No. 3844. This detention facility has been sized to accept runoff generated from the 44 West Subdivision, 3rd Filing. The detention facility will outfall to the Monad Drain as described in the Comprehensive Drainage Plan for the Monad Drain. The Subdivision will be allowed to discharge stormwater into the Monad Drain as part of its stormwater management strategy. Complete information about the stormwater drainage plan is outlined in the SIA under the heading 'V. Storm Drainage.'

All drainage improvements shall satisfy the criteria set forth by the *City of Billings Stormwater Management Manual* and will be subject to review and approval by the City Engineering Department.

b. **Solid Waste** – The City of Billings will provide solid waste collection and disposal. The City's landfill has adequate capacity for this waste.

c. **Streets** – All internal streets within the subdivision shall be built to grade with a satisfactory subbase, base course, curb and gutter, and asphalt surface. All public roads will be built to provide a 34-foot back-to-back curb street width.

   All internal streets and carriage lanes will be built according to the standards of the City of Billings Public Works Department. Street improvements are included in the Waiver of Right to Protest Future Special Improvement Districts.

   The sidewalks will be installed by the respective lot owners on a lot-by-lot basis, as lots develop. Sidewalks along the street frontage shall be minimum 5-foot-wide and separated with a boulevard width not less than five feet. The developer will also install all ADA required ramps at the intersections within the proposed subdivision. The developer shall construct the 5-foot-wide boulevard sidewalk adjacent to private parks. This information is all in the SIA under the heading 'III. Transportation.'

Traffic Impact Study overview:

A traffic accessibility study has been completed for the 44 West Subdivision, 1st through 3rd Filings. All required intersection improvement contributions identified therein shall be completed by the Subdivider at the Subdivider's expense. The percent of traffic contributions to the following intersections shall be in accordance with the traffic accessibility study which includes the 3rd Filing:

a. S. 48th and Central – 0.20%
b. Shiloh and Broadwater – 0.40%
c. Shiloh and Central – 1.40%
d. Shiloh and Monad – 0.30%
e. Central and S 44th West – 2.10%

The cash contributions shall be based on the percent of traffic contributions to the intersections based on the total cost of an intersection as determined by City Engineering for the year in which the contribution is made. These cash contributions for the 44 West Subdivision, 3rd Filing, intersection improvement will be made prior to final plat approval.

A left turn lane on Central Avenue at the Double Haul Lane intersection is required to be constructed with this subdivision.

Street lighting is required for this subdivision. In the SIA the applicant has indicated that street lighting will be installed by private contract or SID. A Street Light Maintenance District will be created for operation and maintenance of the lighting at a future date and is included in the waiver of right to protest. This is outlined in the SIA under the heading 'III. Transportation, D. Street Lighting.'

d. **Emergency Services** – The Billings Police and Fire Departments will respond to emergencies within the proposed subdivision. The fire station that provides service for this area is Fire Station #7, is located at 1501 54th Street West. The subdivision is located within the ambulance service area of American Medical Response (AMR).

e. **Schools** – School District #2 provides service to students within this subdivision for elementary through high school. Big Sky for elementary school, capacity is shown as 394 with a current enrollment of 368. Ben Steele for middle school, capacity is shown as 750 with a current enrollment of 744. West for high school, capacity shown as 1731with current enrollment of 2133.

f. **Parks and Recreation** – This subdivision is required to provide 0.33 acres of parkland. The applicant will be providing no additional parkland. Parkland dedications have been made in previous filings (2.36 acres). To meet the total 44 West Development's dedication requirements to this point in the development is 2.19 acres. No additional parkland is being dedicated with this Subdivision, they have already met the requirements up to this point.

g. **Mail Delivery -** The developer shall coordinate with the United States Postal Service to determine the preferred type and location of mail delivery system for this subdivision. This requirement is outlined in the SIA under the heading 'VIII. Postal Delivery.'

h. **Phasing of Development** – This subdivision will not be developed in phases.

3. Effect on the natural environment

The subject property is currently vacant with the proposed use of residential development with a small portion of possible commercial development. The property is not located within a floodplain. During development, storm water pollution prevention best management practices are required to be used and monitored to prevent erosion on exposed ground. Overall, the effect on the natural environment should be minimal.

4. Effect on wildlife and wildlife habitat

There are no known endangered or threatened species on the property. There is a paragraph in the SIA that warns future lot owners of the presence of deer in the area, which may cause damage to their landscaping. This subdivision should have a minimal effect on wildlife and wildlife habitat.

5. Effect on public health, safety and welfare

There will be no significant impacts to public health, safety and welfare because of this subdivision.

B. Was an Environmental Assessment required? [(MCA 76-3-616 and BMCC 23-302.H.1.]

The proposed subdivision is exempt from the requirement for an Environmental Assessment pursuant to Section 76-3-616, MCA.

C. Does the subdivision conform to the City of Billings 2016 Growth Policy, the 2014 Transportation Plan, and the Billings Area Bikeway and Trail Master Plan? [BMCC 23-302.H.4.]

1. City of Billings 2016 Growth Policy

The proposed subdivision is consistent with the following goals of the Growth Policy:

> **Strong Neighborhoods (livable, safe, sociable and resilient neighborhoods):** Neighborhoods that are safe and attractive and provide essential services are much desired.
>
> **Home Base (healthy, safe and diverse housing options):** Planning and construction of interconnected sidewalks and trails are important to the economy and livability of Billings.
>
> **Essential Investments (relating public and private expenditures to public values)**: Planning and construction of safe and affordable interconnected sidewalks and trails are important to the economy and livability of Billings.
>
> Developed parks that provide recreation and active living opportunities are desirable for an attractive and healthy community.

3. 2023 Billings Urban Area Long Range Transportation Plan

The proposed subdivision adheres to the goals and objectives of the 2023 Transportation Plan and preserves the street network and street hierarchy specified in the plan.

4. Billings Area Bikeway and Trail Master Plan (BABTMP)

The proposed subdivision is within the Billings Area Bikeways and Trail Master Plan. There are no trails identified within the subdivision. There is a 10-foot-wide bike and pedestrian trail already built along the south side of Central Avenue. This was installed with previous filings of 44 West Subdivision. No additional improvements of this nature are anticipated.

D. Does the subdivision conform to the Montana Subdivision and Platting Act and to local subdivision regulations? [MCA 76-3-608 (3) (b) and BMCC 23-302.H.3.a.]

The proposed subdivision satisfies the requirements of the Montana Subdivision and Platting Act, and the design standards specified in the local subdivision regulations. The subdivider and the local government have complied with the subdivision review and approval procedures set forth in the local and state subdivision regulations.

E. Does the proposed subdivision conform to all requirements of the zoning in effect? [BMCC 23-302.H.3.e.]

The subject property is located within NX1 Mixed Residential 1 (1 to 4 units). The lot frontages conform to the requirements of this zone. Other building setbacks and structure specific requirements will be reviewed for compliance at the time of building permit review.

F. Does the proposed plat provide easements for the location and installation of any utilities? [MCA 76-3-608 (3) (c) and BMCC 23-302.H.3.b.]

The subdivider will provide utility easements as requested by private utility companies on the face of the plat.

G. Does the proposed plat provide legal and physical access to each parcel within the subdivision and notation of that access on the plat? [MCA 76-3-608 (3) (d) and BMCC 23-302.H.3.c.]

Legal and physical access to the subdivision will be provided by Central Avenue, South 44th Street West and Tippet Trail and Road E (temporary name). Carriage Lane access is also provided to residential lots within the subdivision.

CONCLUSIONS OF FINDINGS OF FACT

- The preliminary plat of 44 West Subdivision, 3rd Filing does not create any adverse impacts that warrant denial of the subdivision.

- The proposed subdivision conforms to several of the goals and policies of the 2016 Growth Policy and does not conflict with the Transportation or Bikeway/Trail Plans.

- The proposed subdivision complies with state and local subdivision regulations, local zoning, and sanitary requirements and provides legal and physical access to each lot.

- Any potential negative or adverse impacts will be mitigated with the proposed conditions of approval.

RECOMMENDATION

Staff proposes the Planning Board recommends to City Council that the preliminary plat of 44 West Subdivision, 3rd Filing, be conditionally approved and the Findings of Fact adopted as presented in the staff report.

Traffic Impact Study

Prepared for submittal to:

CITY OF Billings

for the project:

Clearwater/44 West Subdivision

on behalf of:

Performance Engineering
3412 Colton Blvd., Suite 202
Billings, MT 59102

by:

TRAFFIC & TRANSPORTATION CONSULTING

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LICENSED PROFESSIONAL ENGINEER

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August 2025

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A: Original Raw Count Data for Intersections

B: Intersection Analysis Software Output

C: Estimated Future Traffic Volume Maps

D: Auxiliary Turn Lane Analysis Charts

E: 44th at Central Avenue Intersection Signal Warrant Summaries

F: Intersection Cost Participation Calculations

1 INTRODUCTION

This report documents the Traffic Impact Study (TIS) conducted for the Clearwater/44 West subdivision project in northwest Billings. This is a working title for the project. Some parts of the site could be marketed under a different name before final occupancy. The study was conducted by and under the direction of a Professional Traffic Operations Engineer and Montana-licensed PE with expertise and experience in traffic engineering.

1.1 PROJECT SITE AND STUDY AREA

The overall subdivision site is shown in **Exhibit 1** along with the intersections studied. The existing study intersections were identified during preapplication review with City of Billings staff as:

1. S. 48th Street West at Central Avenue
2. Shiloh Road at Broadwater Avenue
3. Shiloh Road at Central Avenue
4. Shiloh Road at Bell Avenue
5. Shiloh Road at Monad Road

From here forward in this report, existing intersections are generally referred to only by their distinguishing street names (e.g., “Shiloh at Central”) for the sake of brevity. The two new subdivision access points on Central Avenue, Double Haul Lane and S. 44th Street West, have been analyzed for all future scenarios that include project traffic. The site’s third access will be to existing Bell Avenue, which is expected to be extended west into the site to serve the final phase. The new western terminus of Bell will be built to accommodate a potential future connection to the property west of this site, but no such connection has been planned there at the time of this study. The east-west Bell Avenue alignment generally separates the subdivision site into northern and southern parts of similar size.

1.2 LAND USE AND PHASING

The site is currently agricultural land, though it was in the process of being cleared for construction at the time of this study. The subdivision’s proposed land uses will be almost exclusively residential, with 259 single-family detached homes and 125 attached ones. The latter will include 60 attached multi-story units (townhomes) and 65 “cottage” units that would be smaller units not directly classifiable as apartments. One commercial lot sized to support two 11,000 square-foot buildings will be situated near the northwest corner of the site, abutting Central Avenue and Double Haul Lane.

The project is divided into two logical phases. All 125 of the “attached” type of residential units are included in Phase 1 and are located on the northern part of the site. Phase 1 also includes about one half (131) of the total single-family detached units. Phase 2 includes the commercial parcel and all residential lots on the southern part of the site, which are for the remaining 128 single-family homes. Phase 1 is further divided into three sub-phases, termed A, B, and C for this study, to help identify when certain traffic impact mitigation improvements would be needed. The dwelling unit totals for each sub-phase are described later in this report, in the context of this sensitivity analysis. Bell Avenue access was only assumed to be available for Phase 2.

Because the site is generally rural, the types and locations of specific pathways or other facilities and connections for pedestrians and bicycles have not yet been identified. A brief examination of potential traffic calming needs indicated that some streets have long enough blocks that the need for such measures could arise. On-street parking is expected to be allowed throughout the site wherever street width and sight distance allow for it and such parking does not interfere with operations at the Central Avenue access intersections.

Exhibit 2 shows the Clearwater/44 West site plan on which the analysis here is based. It includes land use types, streets, alleys, access points, and parkland areas, as well as phasing. This site plan drawing is provided for illustrative purposes only. The full high-resolution drawing is submitted separately by the applicant.

Exhibit 1. Overall Site Location and Study Intersections

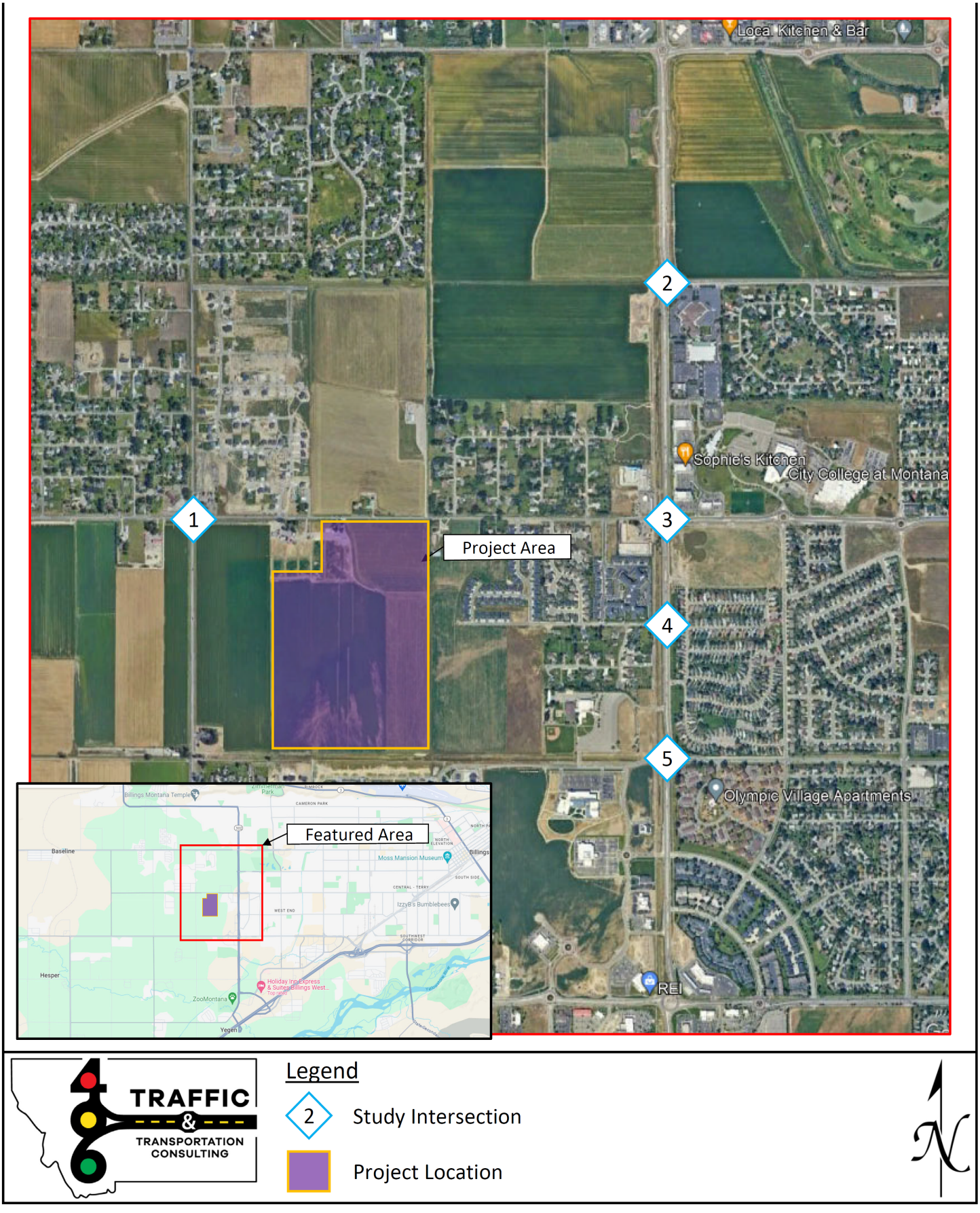
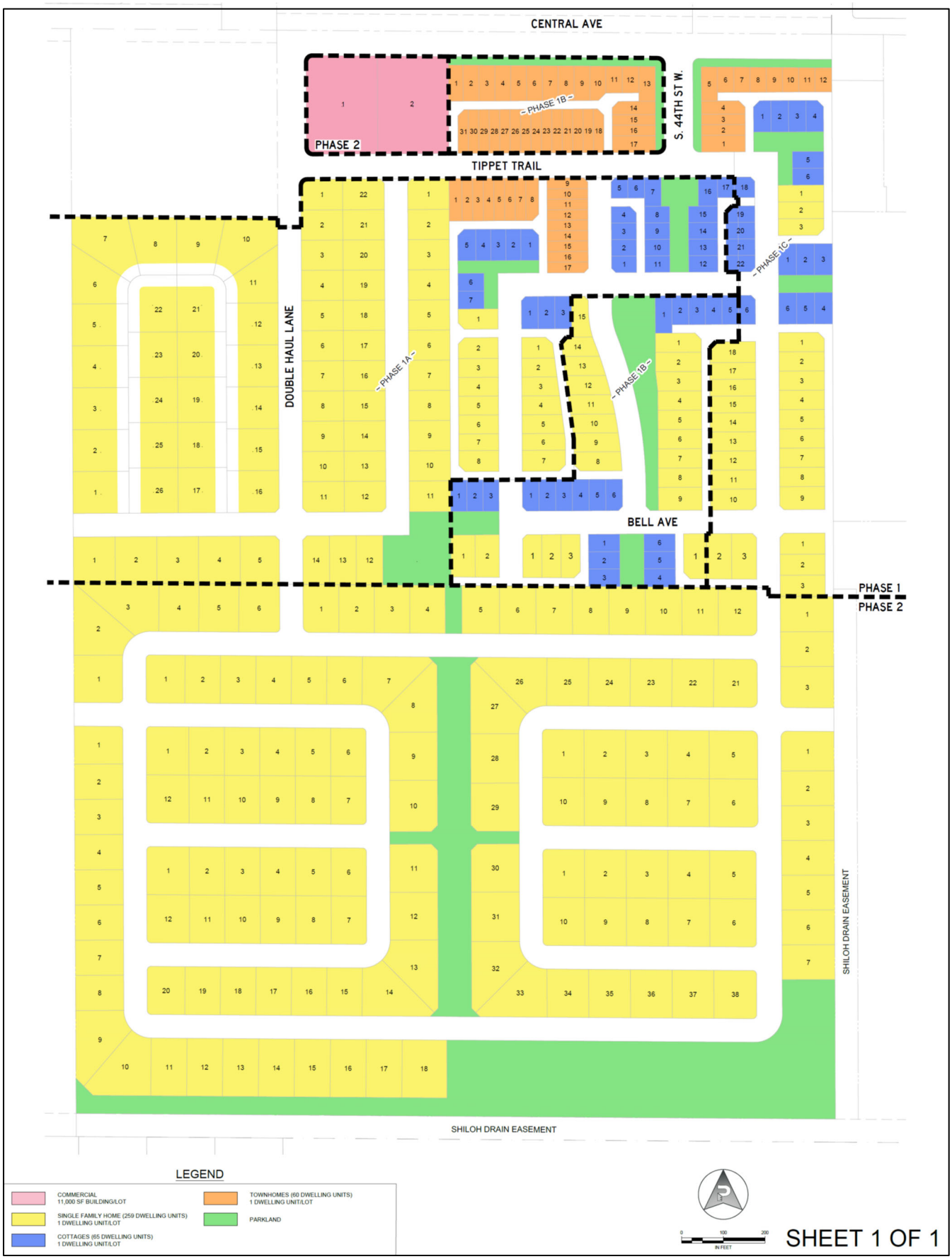


Exhibit 2. Site Plan and Phasing



Excerpted from: Performance Engineering concept site plan provided 7/17/2025

For analysis purposes, both Double Haul Lane and S. 44th Street West are assumed to have one northbound lane and one southbound lane at their intersections with Central, such that vehicles leaving the site waits in a single shared lane whether they are turning right or left.

1.3 ANALYSIS METHODS AND REFERENCES

Raw field traffic counts were gathered from other recent traffic study work in the area by Sanbell and provided to this project's applicant team. These raw counts were then adjusted slightly for this TIS based on both (a) recent traffic growth and (b) 2024 City of Billings annualization factors prior to their use in impact analysis.

Trip generation rates, or equations as applicable, are from the Institute of Transportation Engineers (ITE) Trip Generation suite's 11th edition, which was the most current available at the onset of this study. ITE trip generation data, when aggregated across enough varied sites, produce both simple average rates and best-fit equations, either linear or logarithmic, to help the analyst derive proper estimates for their situation. Equations are generally preferred over rates, especially for larger sites where trip generation per unit of land use can diminish with increasing project size. General ITE guidance calls for the use of the fitted curve equation when the data set for the land use type in question is comprised of studies from 20 or more separate sites and when the equation produces a correlation coefficient (R^2) of 0.75 or higher, with 1.0 being the best possible fit.

Operational performance was analyzed at the study intersections through the use of the industry-standard methods presented in the USDOT's Highway Capacity Manual (HCM), published in its modern form as Transportation Research Board Special Report 209. Synchro Studio 12 was employed as both a data repository and a capacity analysis tool, with reports for each intersection generated using Synchro's application of the assumptions of the HCM's 7th edition, the most recent available at the time of this study.

The HCM methodology for intersection capacity analysis produces delay estimates for each turning movement (or "lane group", when multiple turning movements operate from the same lane). These delay estimates are assigned Level of Service (LOS) grades that range from A (best) to F (worst), as indicated in **Exhibit 3**. It's also important to note that for unsignalized intersections with only side-street Stop sign control, LOS for the intersection is represented by the LOS for the worst lane group. "T" intersections with side-street stop control also fall under this category. All stop-controlled intersections in this study area, including the two new proposed accesses to Central, are "T" intersections, where the approach on the stem of the T, rather than a main street turning movement, contains the worst lane group.

Exhibit 3. LOS Definitions

LOS	Delay, seconds per vehicle
A	0 - 10.0
B	10.1 - 15.0
C	15.1 - 25.0
D	25.1 - 35.0
E	35.1 - 50.0
F	50.1 or more

Source: HCM 7th Edition

Operations impacts are determined by how peak hour LOS relates to acceptability standards. Billings employs a LOS standard of C or better. When LOS without the project is D or worse, an operations impact is usually defined when the project would increase delay.

In addition to intersection operations analysis, the need for auxiliary left- and right-turn lanes was examined as part of this study effort. These movements on arterial roadways at stop-controlled site access points with volumes that meet MDT criteria with respect to the department's guidelines indicated in Chapter 28 of its Traffic Engineering Manual. These auxiliary lanes would serve traffic entering the project site. Only locations with free-flowing traffic on the primary street are considered in this auxiliary lane analysis.

Potential mitigation of traffic impacts at the Central/44th intersection included the examination of traffic signal warrants according to the guidance in the Manual on Uniform Traffic Control Devices (MUTCD).

2 EXISTING AND BACKGROUND CONDITIONS

2.1 STREETS AND INTERSECTIONS

Shiloh Road, which also carries the designation of MT-302, is a north-south urban principal arterial according to the MDT (Montana Department of Transportation, and a principal arterial according to the 2023 Billings LRTP (Long Range Transportation Plan). It has two travel lanes in each direction and a speed limit of 45 mph in the study area. Shiloh Road has been a key facilitator of the city's westward expansion, with substantial residential and commercial growth having occurred adjacent to it in recent years. It is characterized by a series of roundabouts at intersections with several of western Billings's east-west arterials and collectors. It also provides access to Interstate 90 via Zoo Drive to the south. A raised median prevents left turns at many two-way stop-controlled intersections, including the one at Bell Avenue. Exclusive left-turn lanes exist at a few select site accesses and local streets. A sidewalk runs along the east side of the road, and a shared-use path called Shiloh Road Trail runs along the west side, much of it separated from the road by a large ditch. There are also two MET Transit bus stops on its east side between the Broadwater and Central roundabouts. These are not considered to be close enough to the project to site to provide meaningful transit access.

Central Avenue is an east-west road that is classified by the MDT as an urban collector to the west of Shiloh Road and as an urban principal arterial to the east of it. Accordingly, it has one travel lane in each direction to the west of Shiloh, and two travel lanes in each direction to the east of it. Its entire length from 64th St W to Montana Avenue is classified as a principal arterial in the 2023 Billings LRTP. It has a speed limit of 45 mph on both sides of Shiloh Road, but it becomes 50 mph to the west of 48th St W. It connects residential neighborhoods to many of western Billings' commercial centers. Central currently has no exclusive turning lanes or multimodal facilities to the west of Shiloh Road. However, the 2023 Billings LRTP shows that a shared-use path and/or trail are planned to be installed on Central Avenue to the west of Shiloh Road. There are also plans to expand Central Avenue to a three-lane cross-section to the west of Shiloh Road: one travel lane in each direction and a center left-turn lane.

48th Street W is a north-south local road according to the MDT, and a principal arterial according to the 2023 Billings LRTP. It has one travel lane in each direction, and its speed limit is 45 mph to the north of Central Avenue and 50 mph to the south of it. It links residences and agricultural properties on the western edges of Billings to the east-west routes that lead into the city, such as Central Avenue and King Avenue. No exclusive turning lanes or multimodal facilities currently exist on 48th in the study area.

Bell Avenue is an east-west local street according to both the MDT and the 2023 Billings LRTP. It has one travel lane in each direction and no posted speed limit. Currently, it provides access to Shiloh Road for a private senior living community and a few other residences. Its eastern terminus is at its intersection with Shiloh Road, where left turns are prohibited. Its western terminus is at a dead-end approximately 2300 feet to the west of this intersection, just past Big Pine Court. While three other streets that intersect Bell Avenue also lead to Central Avenue, these streets traverse private property. As such, Bell Avenue has no outlet for non-residents. The street has no exclusive turning lanes or bike infrastructure, but there is a sidewalk along most of its northern side, starting from the Shiloh Road Trail.

Monad Road is an east-west road that is classified by the MDT as an urban major collector to the east of Shiloh Road and as a local street to the west of it. The 2023 Billings LRTP classifies it as a minor arterial to the east of Shiloh Road, and it was planned to be a collector to the west of Shiloh Road at the time of the LRTP's publishing. West of Shiloh, it has one travel lane in each direction, as well as a center left-turn lane. East of Shiloh Road, it has one travel lane in each direction, but no center left-turn lane. Its speed limit is 35 mph to the east of Shiloh, but it does not have a speed limit posted on the west side. Monad Road connects many of western Billings' residential neighborhoods to the industrial areas near the railroad tracks and to north-south routes such as 32nd Street W and 24th Street W that lead to large commercial centers. It has exclusive right-turn lanes on the east and west legs of the roundabout at Shiloh Road, as well as an exclusive left-turn lane at

Henry Chapple Street. To the east of Shiloh Road, there are sidewalks, designated on-street parking, and unprotected bike lanes on both sides of the road. To the west of Shiloh, there is a shared-use path on much of the north side and a sidewalk on much of the south side of the street. There are also two nearby MET Transit bus stops on the south side of the road: one at Henry Chapple Street and the other at Hurdle Circle.

Broadwater Avenue is an east-west urban principal arterial according to the MDT, and a principal arterial according to the 2023 Billings LRTP. It has one travel lane in each direction and a speed limit of 35 mph in the study area. It serves as a link between residential neighborhoods in western Billings, some small commercial centers, and downtown Billings. Its eastern terminus is at its intersection with Division Street, 1st Ave N, and N 36th Street near downtown. Its western terminus is currently at a roundabout intersection with Shiloh Road. Currently, the roundabout's west leg only connects to two agricultural lots in active use, but the roundabout's infrastructure here has been built out in preparation for a potential westward extension of the road. 48th St W also intersects a road called Broadwater Avenue, but this local road segment is currently disconnected from the rest of the arterial network and is only accessible via 48th Street W. The arterial Broadwater Avenue has an exclusive westbound right-turn lane at the Shiloh roundabout. There is a shared-use path on the road's north side, and there is a sidewalk on the road's south side extending east.

Intersection traffic control currently comes in only three forms at the five existing study intersections: two-way stop control (TWSC), all-way stop control (AWSC), and roundabouts. Each leg of the three roundabouts has a crosswalk with a pedestrian refuge in the splitter island. Most of these crosswalks have solar-powered rectangular rapid flashing beacons. The intersection of Shiloh Road and Bell Avenue is considered two-way stop-controlled even though only one direction of traffic is stop-controlled. Only four movements are permitted at this intersection: northbound and southbound through movements and southbound and eastbound rights. Shiloh Road's center median prevents all left turns. The intersection of 48th Street and Central Avenue is all-way stop-controlled and is augmented with flashing red beacons facing all four directions, but it is projected to be upgraded to signalized control in 2026. **Exhibit 4** shows schematically the existing traffic control and lane arrangements at each existing intersection as well as posted speed limits on selected road segments as of the start of this study effort.

2.2 EXISTING TRAFFIC VOLUMES

Existing (2024) annualized volumes were estimated from raw field counts as described earlier in subsection 1.3 and are shown in **Exhibit 5**. These raw counts are provided in Appendix A.

2.3 HISTORIC GROWTH AND BACKGROUND CONDITION TRAFFIC

The "Background Condition" described here is represented by the volumes and intersection performance after multiple years of traffic growth assumed to occur during the permitting, construction, sales, and occupancy of the project. These steps are expected to be complete for Phase 1A in 2027. The resulting volumes and operating conditions form the basis for evaluating marginal intersection delay effects of traffic generated by this first phase of the Clearwater/44 West subdivision. Each new phase is projected to be completed two years before the last; Phase 1B in 2029, Phase 1C in 2031, and full buildout (Phase 2) in 2033. In order to estimate traffic growth without the project, average daily traffic volumes were gathered from selected MDT periodic data collection locations in the study area. The best and most logical data set available was represented by the four legs of the Shiloh intersection at Central. Data were recorded or estimated by MDT annually on each leg dating back at least 20 years. This historical traffic information is shown in the graph in **Exhibit 6**.

Counts from the most recent ten of these years were used to calculate the average annual growth rate in daily traffic for these four locations in aggregate, which was approximately 3.8% per year. This rate was then applied to the annualized peak hour intersection counts for each study year. Because the four phases of this project will be constructed sequentially and were not considered independent 'all-or-nothing' conditions at each two-year interval, each phase's traffic builds on that of the previous phase and each phase's traffic impacts were analyzed incrementally.

Exhibit 4. Existing Road and Intersection Basics

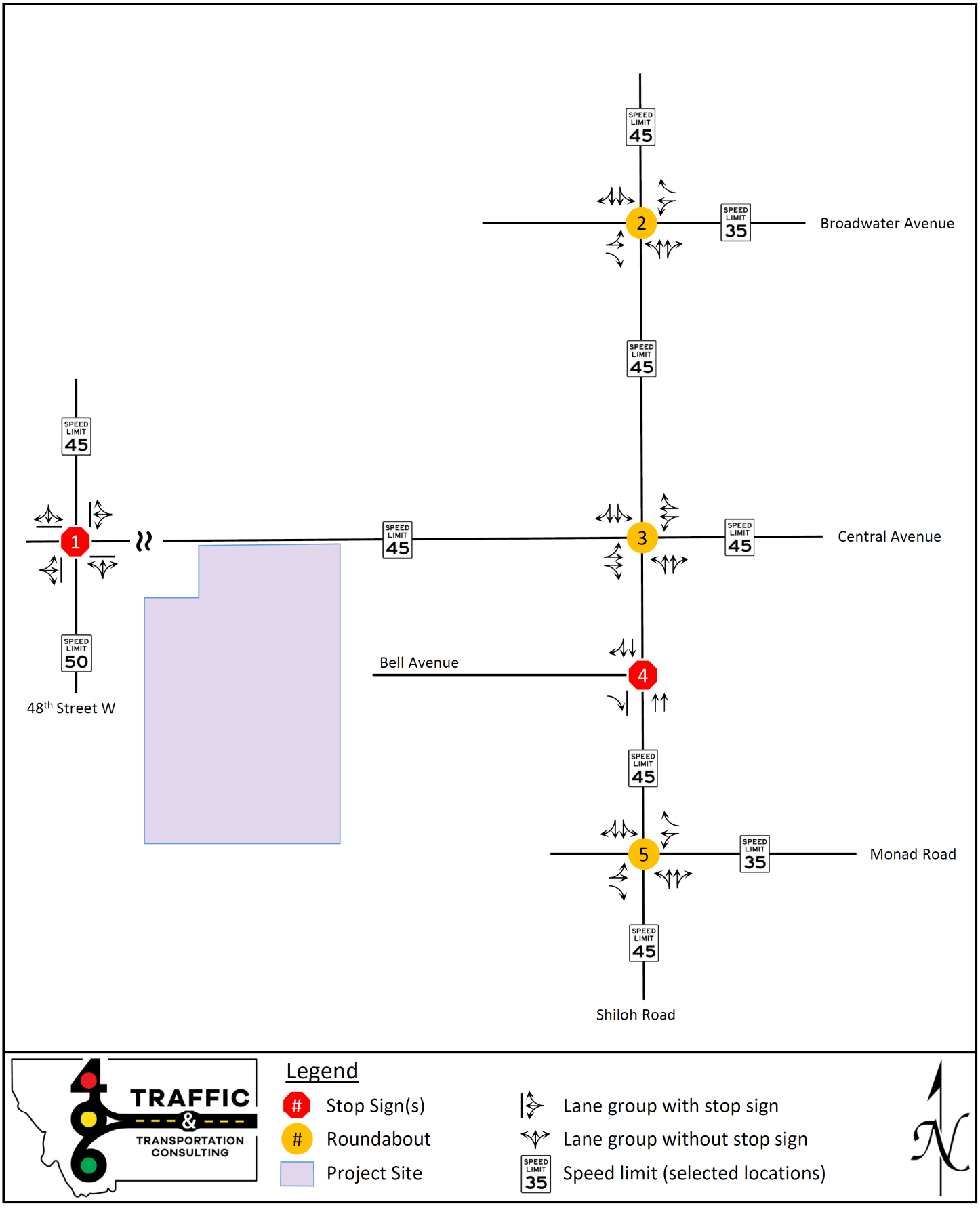


Exhibit 5. Existing Traffic Volumes

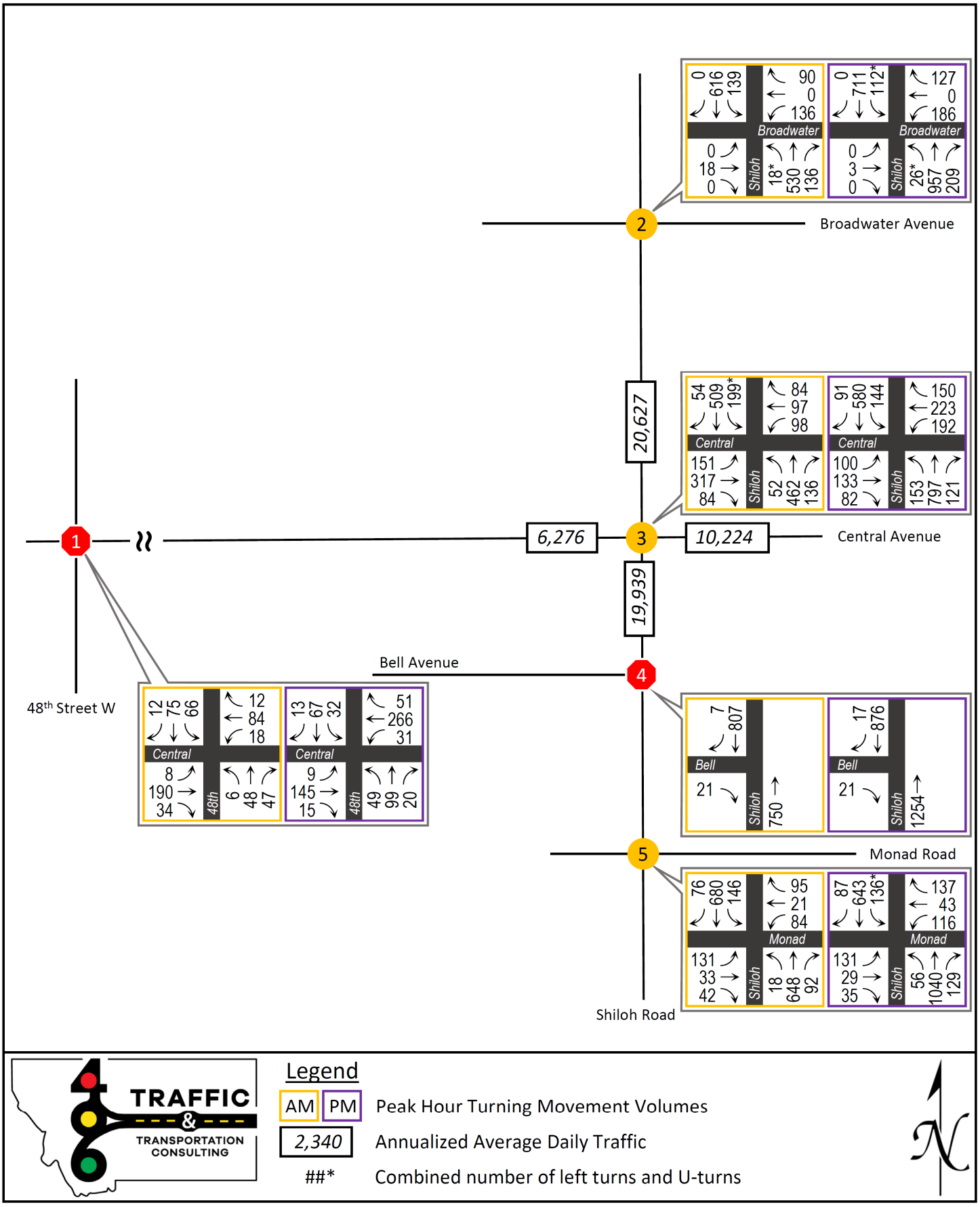
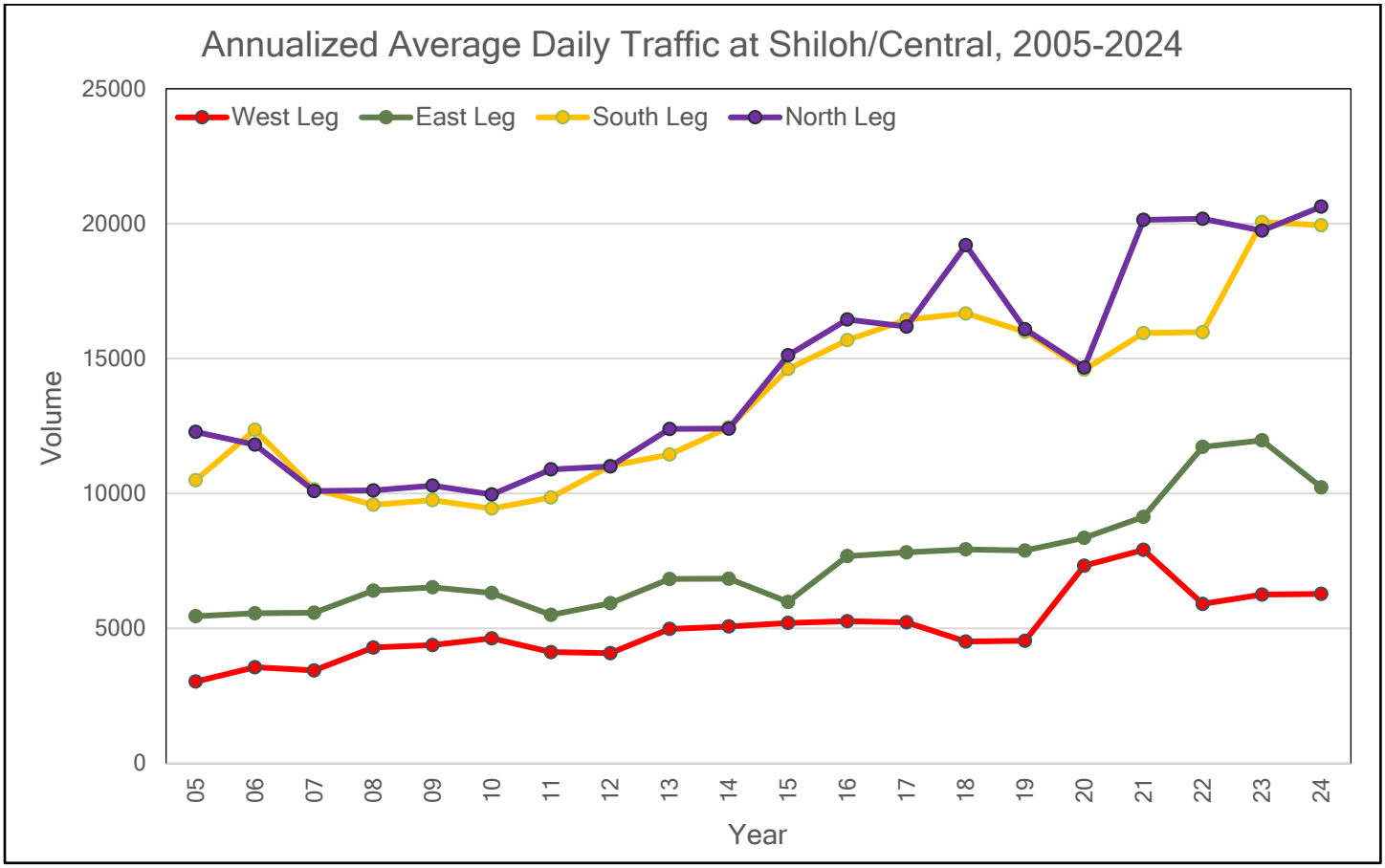


Exhibit 6. Historical Daily Traffic Volumes



2.4 Intersection Traffic Operations Without the Project

The existing and background peak hour intersection Level of Service (LOS) and delay results are shown in **Exhibit 7**. Analysis software results are provided in Appendix B.

Exhibit 7. Existing and Future Background Intersection LOS and Delay

	Intersection	Traffic Control	Peak Hour LOS (delay, in seconds/vehicle)
AM Peak Hour	1. 48th at Central	AWSC	A (9.6)
	2. Shiloh at Broadwater	Roundabout	A (6.0)
	3. Shiloh at Central	Roundabout	B (11.2)
	4. Shiloh at Bell	TWSC*	B (11.9)
	5. Shiloh at Monad	Roundabout	A (9.0)
PM Peak Hour	1. 48th at Central	AWSC	B (12.5)
	2. Shiloh at Broadwater	Roundabout	A (9.1)
	3. Shiloh at Central	Roundabout	B (13.6)
	4. Shiloh at Bell	TWSC*	B (12.2)
	5. Shiloh at Monad	Roundabout	B (10.0)

* *At Intersection 4, the worst lane group, which determines LOS, is Eastbound in both peak hours.*

The results in the table indicate that with 2024 annualized average traffic volume, all intersections operate at LOS B or better. Each roundabout has at least one approach that operates at LOS C in one or both peaks, but no approaches at LOS D or worse. Note that the only movement that must yield at Intersection 4 is eastbound Bell Avenue and that northbound traffic is not considered part of the intersection, due to the median present on Shiloh Road. At Intersection 5 in the PM peak, the delay estimate appears consistent with LOS A, but it is a rounded value that is actually just over 10.0 seconds so the software returns a LOS B result.

3 PROJECT TRIP GENERATION AND DISTRIBUTION

3.1 TRIP GENERATION

Trip generation rates, or equations as applicable, are from the Institute of Transportation Engineers (ITE) Trip Generation package's 11th edition. ITE trip generation data, when aggregated across enough varied sites, produce both simple average rates and best-fit equations, either linear or logarithmic, to help the analyst derive proper estimates for their situation. Equations are generally preferred over rates, especially for larger sites where trip generation per unit of land use can diminish with increasing project size.

Clearwater/44 West will consist almost entirely of residential land uses. Small parkland areas within the subdivision are designed and intended for use by residents and their guests, and will be similar to park spaces located in other residential areas around Billings. For that reason, they will not generate external traffic. The strip retail space in Phase 2, programmed for 22,000 square feet, has not had specific tenants or any sub-type(s) of retail use identified, but no drive-through activity is expected.

Three types of adjustments to trip generation were evaluated for this project. First, a discount is sometimes taken to reflect internal capture where multiple uses are present in a single project site. Second, a modal adjustment can be taken if a facility is clearly served by robust high-capacity transit and serves a clientele inclined to use transit to get there, or if the potential land use mix and walk/bike network are likely to lead to nonmotorized trips, either internal or external. Finally, some land uses such as gas stations or coffee shops attract trips that were already using the adjacent or nearby road network by virtue of improved convenience over a similar site that could have been used before. These are called "pass-by" and "diverted-linked" trips. Pass-by trips are those on streets bordering the site, while diverted-linked trips are those that might go slightly out of their way to stop at the establishment on their way to their destination.

The Phase 2 retail element is the only part of the site considered for these discounts. Due to the retail site's location, small size, and expected similarity to other sites along the Central Avenue corridor, only a small aggregate discount of the first two types was assumed here; it is not expected to support a use special enough or large enough to generate offsite multimodal or pass-by/diverted-linked trip activity. The estimated reduction in vehicle trip use for the on-site retail due to residents' use applied here is 10%. This reduction in retail vehicle trip use could take the form of subdivision residents (a) residents stopping at the on-site retail on their way to/from home, (b) choosing to drive to and from the on-site retail rather than a site farther away due to its proximity and convenience, or (c) choosing to walk or bike to and from the on-site retail for the same reason.

To arrive at phase-specific residential trip generation totals, the land use totals for the entire project (259 single family lots and 125 townhome or cottage lots) were first estimated, then the resulting trip totals were proportioned according to the amount of each home type in each phase. **Exhibit 8** shows trip generation details for each phase of the project.

Exhibit 8. Clearwater/44 West Trip Generation

		Daily	AM Peak Hour	PM Peak Hour
Full Project	ITE Land Use 210 – Single Family Detached Housing: X = 259 dwelling units			
	Equation	Ln(T) = 0.92(X) + 2.68	Ln(T) = 0.91(X) + 0.12	T = 0.60(X) - 3.93
	Peak hour in/out split		*25% / 75%*	*63% / 37%*
	Trips	2,422	177 (44 in / 133 out)	243 (153 in / 90 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 125 dwelling units (townhomes and "cottage" homes)			
	Equation	T = 7.62(X) - 50.48	T=0.52(X) - 5.70	T = 0.60(X) - 3.93
	Peak hour in/out split		*25% / 75%*	*59% / 41%*
	Trips	902	59 (15 in / 44 out)	71 (42 in / 29 out)
	ITE Land Use 822 – Strip Retail Plaza: X = 22 ksf (thousands of square feet)			
	Equation	T = 42.2(X) + 229.68	T = 2.36(X)	T = 6.59(X)
	Peak hour in/out split		*60% / 40%*	*50% / 50%*
	Gross retail trips	1,158	52 (31 in / 21 out)	145 (72 in / 73 out)
	Less 10% internal	-116	-5 (-3 in / -2 out)	-14 (-7 in / -7 out)
	Trips [net]	1,042	47 (28 in / 19 out)	131 (65 in, 66 out)
	Combined net trips, all uses:	**4,366**	**283 (87 in / 196 out)**	**445 (260 in / 185 out)**
by Phase		**Daily**	**AM Peak Hour**	**PM Peak Hour**
1A	ITE Land Use 210 – Single Family Detached Housing: X = 82 dwelling units			
	Trips	767	56 (14 in / 42 out)	77 (48 in / 29 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 44 dwelling units			
	Trips	317	21 (5 in / 16 out)	25 (15 in / 10 out)
	Phase 1A Total Trips	1,084	77 (19 in / 58 out)	102 (63 in / 39 out)
1B	ITE Land Use 210 – Single Family Detached Housing: X = 23 dwelling units			
	Trips	215	16 (4 in / 12 out)	22 (14 in / 8 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 51 dwelling units (townhomes and cottages)			
	Trips	368	24 (6 in / 18 out)	29 (17 in / 12 out)
	Phase 1B Total Trips	583	40 (10 in / 30 out)	51 (31 in / 20 out)
1C	ITE Land Use 210 – Single Family Detached Housing: X = 26 dwelling units			
	Trips	243	17 (4 in / 13 out)	24 (15 in / 9 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 30 dwelling units (townhomes and "cottage" homes)			
	Trips	216	15 (4 in / 11 out)	17 (10 in / 7 out)
	Phase 1C Total Trips	459	32 (8 in / 24 out)	41 (25 in / 16 out)
2	Phase 2 – Single Family Detached Housing: X = 128 dwelling units			
	Trips	1,197	88 (22 in / 66 out)	120 (76 in / 44 out)
	ITE Land Use 822 – Strip Retail Plaza: X = 22 ksf (thousands of square feet)			
	Trips [net]	1,042	47 (28 in / 19 out)	131 (65 in, 66 out)
	Phase 2 Total Trips	2,239	135 (50 in / 85 out)	251 (141 in, 110 out)
	Combined net trips, all phases:	**4,366**	**283 (87 in / 196 out)**	**445 (260 in / 185 out)**

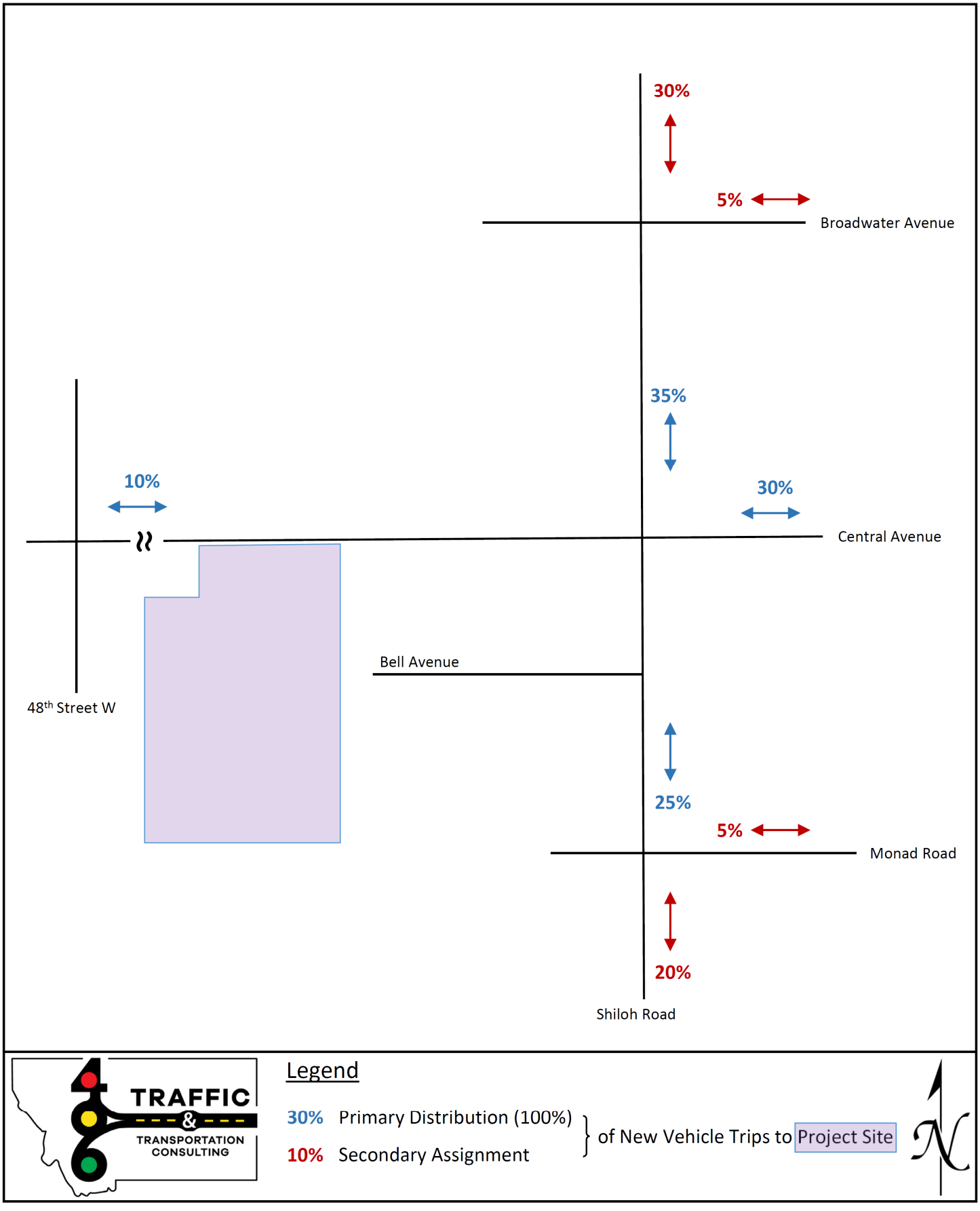
Source: Equations from ITE Trip Generation, 11th Edition.

3.2 TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution has been estimated for the streets surrounding the project site in percentages that add to 100%. Farther from the site, traffic eventually disperses in smaller percentages to/from other routes. Because there is no new information regarding a future developer's plan to connect Bell Avenue and/or the similar connection in Phase 2 to the neighborhood to the west, no Clearwater traffic was assumed to use either such connection. Trip distribution and large-scale assignment percentages are shown in **Exhibit 9**.

Note that the Shiloh median that blocks all left turns results in some differences in routing of in-out pairs once Bell becomes available for Phase 2 access to this site. For example, many residents leaving the site bound for the Shiloh/Monad intersection can turn right at the Shiloh/Bell intersection, but when they return to this site they must go north on Shiloh past Bell, then make a u-turn or left turn at the Shiloh/Central roundabout.

Exhibit 9. Trip Distribution Percentages for New Trips



Background traffic, project trips and total traffic reflected as peak hour intersection turning movement volumes and selected daily link volumes are shown in exhibits for each future phase-specific study year. Only the future traffic for the first phase (1A) is a true "without the project" estimate. Each subsequent phase's impact is assessed with the previous phase assumed to be open. As such, "Phase 2" conditions represent full project buildout. For the sake of report continuity, all 'future traffic volume' exhibits are provided in Appendix C.

4 CAPACITY ANALYSIS

The analysis results described in this section are organized by project phase order. Note again that project traffic by phase is additive such that, for example, Phase 1B also includes Phase 1A. Summaries of intersection capacity and auxiliary turn lane analysis results are provided for each phase in the study area when it's projected to be fully open. As with the existing condition, intersection capacity analysis software output results for the future conditions analyzed are provided in Appendix B. Turn lane warrant summaries for applicable situations are provided in Appendix D and summaries of MUTCD signal warrant analysis for Intersection 7 are provided by phase in Appendix E.

4.1 PHASE 1A

The peak hour intersection Level of Service (LOS) and delay results in 2027 with and without Clearwater/ 44 West subdivision Phase 1A traffic are shown in **Exhibit 10**.

Exhibit 10. Projected 2027 Intersection LOS and Delay: Phase 1A

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle)	
			Background (Without Phase 1A)	With Phase 1A
AM Peak Hour	1. 48th at Central	Signal	A (6.2)	A (6.2)
	2. Shiloh at Broadwater	Roundabout	A (6.5)	A (6.6)
	3. Shiloh at Central	Roundabout	B (14.5)	C (15.9)
	4. Shiloh at Bell	TWSC*	B (12.6)	B (12.7)
	5. Shiloh at Monad	Roundabout	B (10.8)	B (10.9)
	6. Double Haul at Central	TWSC*	-	B (12.5)
	7. 44th at Central	TWSC*	-	B (12.6)
PM Peak Hour	1. 48th at Central	Signal	A (7.0)	A (7.0)
	2. Shiloh at Broadwater	Roundabout	B (11.0)	B (11.2)
	3. Shiloh at Central	Roundabout	C (18.9)	C (21.8)
	4. Shiloh at Bell	TWSC*	B (12.9)	B (13.0)
	5. Shiloh at Monad	Roundabout	B (12.5)	B (12.7)
	6. Double Haul at Central	TWSC*	-	B (11.3)
	7. 44th at Central	TWSC*	-	B (10.7)

* *Worst lane group is Eastbound at Intersection 4 and Northbound at Intersections 6 and 7.*

Both of the site accesses on Central would operate at LOS B in both 2027 peak hours. All intersections and both new site accesses would operate within the City's LOS standard of C or better in both peak hours. As a result of this finding, no additional control beyond a side-street (northbound) stop sign is considered necessary.

A simple look at 2027 Phase 1 turning volumes on Central made it clear that the potential need for auxiliary left turn lanes was worth examining, in accord with the MDT procedures described earlier in this report, in subsection 1.3. Right turn lane volumes at Intersections 6 and 7 would be too low (under 40 vph) for potential auxiliary turn lane consideration. Although left-turning volumes into the site will be higher in the PM peak due to the project's residential nature, conditions on the appropriate MDT left turn chart have been plotted for both peaks. While a westbound left turn auxiliary lane at Double Haul is not justified by Phase 1A traffic under the assumptions in this study, the potential case for such a lane at 44th appears to be inconclusive.

At Intersection 7, no signal warrants would be met under Phase 1A conditions.

4.2 PHASE 1B

The peak hour intersection Level of Service (LOS) and delay results in 2029 with and without Clearwater/44 West subdivision Phase 1B traffic are shown in **Exhibit 11**.

Exhibit 11. Projected 2029 Intersection LOS and Delay: Phase 1B

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle) Without Phase 1B	With Phase 1B
AM Peak Hour	1. 48th at Central	Signal	A (6.4)	A (6.4)
	2. Shiloh at Broadwater	Roundabout	A (7.2)	A (7.2)
	3. Shiloh at Central	Roundabout	C (20.9)	C (22.4)
	4. Shiloh at Bell	TWSC*	B (13.2)	B (13.3)
	5. Shiloh at Monad	Roundabout	B (12.8)	B (13.0)
	6. Double Haul at Central	TWSC*	B (13.0)	B (13.1)
	7. 44th at Central	TWSC*	B (13.0)	B (13.6)
PM Peak Hour	1. 48th at Central	Signal	A (7.3)	A (7.3)
	2. Shiloh at Broadwater	Roundabout	B (13.1)	B (13.3)
	3. Shiloh at Central	Roundabout	D (31.1)	D (33.7)
	4. Shiloh at Bell	TWSC*	B (13.6)	B (13.6)
	5. Shiloh at Monad	Roundabout	C (15.5)	C (15.7)
	6. Double Haul at Central	TWSC*	B (11.7)	B (12.1)
	7. 44th at Central	TWSC*	B (11.0)	B (11.3)

* *Worst lane group is Eastbound at Intersection 4 and Northbound at Intersections 6 and 7.*

Both of the site accesses on Central would operate at LOS B in both 2029 peak hours. The 2029 study year marks the first time an intersection's peak LOS would exceed the City's standard (C or better), with the Shiloh intersection at Central projected operate at LOS D with or without Phase 1B traffic. In addition, each of the four approaches to the intersection would operate at the same LOS with or without Phase 1B traffic. The discussion of mitigating the LOS impact at this location is deferred to the next subsection, on Phase 1C.

With respect to auxiliary turn lanes at Intersections 6 and 7, as with 2027, the 2029 right turn lane volumes would remain too low for potential consideration. Although left-turning volumes into the site will be higher in the PM peak due to the project's residential nature, conditions on the appropriate MDT chart have been plotted for both peaks. A westbound left turn auxiliary lane at 44th would be justified by Phase 1B traffic, but the potential case for such a lane at Double Haul Lane appears to be inconclusive.

Note that the LOS results shown in Exhibit 11 above for the 44th intersection do not reflect the addition of a westbound left turn auxiliary lane, but that lane addition could be expected to result in a slight improvement in overall operations.

At Intersection 7, no signal warrants would be met under Phase 1B conditions.

4.2 PHASE 1C

The peak hour intersection Level of Service (LOS) and delay results in 2031 with and without Clearwater/44 West subdivision Phase 1C traffic are shown in **Exhibit 12**.

Exhibit 12. Projected 2031 Intersection LOS and Delay: Phase 1C

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle) Without Phase 1C	With Phase 1C
AM Peak Hour	1. 48th at Central	Signal	A (6.6)	A (6.6)
	2. Shiloh at Broadwater	Roundabout	A (7.8)	A (7.8)
	3. Shiloh at Central	Roundabout	D (32.8)	E (35.3)
	4. Shiloh at Bell	TWSC*	B (13.9)	B (14.0)
	5. Shiloh at Monad	Roundabout	C (15.8)	C (15.9)
	6. Double Haul at Central	TWSC*	B (13.7)	B (13.7)
	7. 44th at Central	TWSC*	B (14.2)	B (15.0)
PM Peak Hour	1. 48th at Central	Signal	A (7.7)	A (7.7)
	2. Shiloh at Broadwater	Roundabout	C (16.5)	C (16.7)
	3. Shiloh at Central	Roundabout	F (54.2)	F (58.6)
	4. Shiloh at Bell	TWSC*	B (14.3)	B (14.4)
	5. Shiloh at Monad	Roundabout	C (20.6)	C (20.9)
	6. Double Haul at Central	TWSC*	B (12.5)	B (12.5)
	7. 44th at Central	TWSC*	B (11.6)	B (12.0)

* *Worst lane group is Eastbound at Intersection 4 and Northbound at Intersections 6 and 7.*

Both of the site accesses on Central would operate at LOS B in both 2031 peak hours. The Shiloh intersection at Central would remain the only intersection projected operate at LOS D or worse, and it would do so in both peaks with or without Phase 1C traffic. PM peak hour traffic would be expected to experience considerably higher delay than AM peak hour traffic, so the PM case is the one subject to the examination of potential mitigation to reduce projected delay.

To address future capacity deficiencies, a primary tool at roundabouts is the addition of a channelized right turn bypass lane on the approach(es) with the highest right-turning volumes. Such a bypass lane requires widening and would lengthen pedestrian crossings, as with the addition of a turn lane at any intersection. The westbound approach to Shiloh/Central would exhibit the longest delays and queues in the 2031 PM peak hour scenario, so it was the one examined for potential benefit. It also has the highest right-turn volume of the four approaches. Simple testing shows that addition of a bypass lane would reduce westbound delay by about 67%, which would be enough of an improvement to improve the overall intersection PM peak LOS (and delay) from the F (58.6) shown in Exhibit 12 above to E (40.0). Synchro's estimate of the 95th percentile westbound queue would be reduced by about half, from 17 vehicles in each lane to 9 in one lane and 8 in the other. While no site-oriented movements would benefit directly from the bypass lane because it carries no such trips, the secondary benefit makes it worth exploring further as an intersection delay impact mitigation action.

The projection of substandard operations at Shiloh/Central, even without Phase 1C traffic, echoes similar findings for other major Shiloh roundabouts from recent studies. Some of this congestion stems from the scarcity of east-west street network connections other than the major arterials that are generally a mile apart. To that end, a secondary, "bigger-picture" part of the overall solution could involve the westward extension of the east-west streets a half-mile north/south of Central (Broadwater and/or Monad) to help relieve the traffic burden on Grand, Central, and King. Examination of the complex and detailed effects of such extensions are well outside the scope of this project's mitigation analysis but still bear mentioning for general interest. The applicant team encourages the City to consider prioritizing, to the extent practicable, additional east-west connectivity between Shiloh and 48th with eventual functional extensions of Broadwater and/or Monad as additional land use changes occur along those alignments.

With respect to auxiliary turn lanes at Intersections 6 and 7, as with 2027 and 2029 the 2031 right turn lane volumes would remain too low for potential consideration. Although left-turning volumes into the site will be higher in the PM peak due to the project's residential nature, conditions on the appropriate MDT chart have been plotted for both peaks. Westbound left turn auxiliary lanes would be justified by Phase 1C traffic at both Double Haul Lane and 44th.

Note that the LOS results shown in Exhibit 12 above for the Double Haul and 44th intersections do not reflect the addition of westbound left turn auxiliary lanes, but that lane addition could be expected to result in a slight improvement in overall operations.

At Intersection 7, only the Four-Hour signal warrant would be met under Phase 1C conditions.

4.2 PHASE 2

The peak hour intersection Level of Service (LOS) and delay results in 2033 with and without Clearwater/44 West subdivision Phase 2 traffic are shown in **Exhibit 13**.

Exhibit 13. Projected 2033 Intersection LOS and Delay: Phase 2

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle) Without Phase 2	With Phase 2
AM Peak Hour	1. 48th at Central	Signal	A (6.9)	A (6.9)
	2. Shiloh at Broadwater	Roundabout	A (8.5)	A (8.7)
	3. Shiloh at Central	Roundabout	F (58.5)	F (74.9)
	4. Shiloh at Bell	TWSC*	B (14.8)	C (15.6)
	5. Shiloh at Monad	Roundabout	C (21.1)	C (22.3)
	6. Double Haul at Central	TWSC*	B (14.4)	C (16.3)
	7. 44th at Central	TWSC*	C (15.8)	C (18.0)
PM Peak Hour	1. 48th at Central	Signal	A (8.2)	A (8.3)
	2. Shiloh at Broadwater	Roundabout	C (22.3)	C (24.6)
	3. Shiloh at Central	Roundabout	F (96.1)	F (144.6)
	4. Shiloh at Bell	TWSC*	C (15.2)	C (16.2)
	5. Shiloh at Monad	Roundabout	D (30.4)	D (33.5)
	6. Double Haul at Central	TWSC*	B (13.1)	B (14.8)
	7. 44th at Central	TWSC*	B (12.5)	B (14.8)

* *Worst lane group is Eastbound at Intersection 4 and Northbound at Intersections 6 and 7.*

In 2033, both of the site accesses on Central would operate at LOS B in the PM peak hour and at LOS C in the AM peak hour with or without the addition of Phase 2 traffic. The Shiloh intersection at Central would operate at LOS F in both peaks with or without Phase 2 traffic. Increasing background traffic also results in a projection that the Shiloh intersection at Monad would operate beyond the City's standard under the 2033 conditions examined, at LOS D, with or without Phase 2 traffic. At all roundabout intersections, PM peak hour traffic would be expected to experience considerably higher delay than AM peak hour traffic.

Mitigation of the Shiloh/Central condition would take the same form described for Phase 1C impacts, at least in concept: the eventual addition of a westbound right turn bypass lane. Testing with 2033 Phase 2 PM volumes indicates that addition of a bypass lane would reduce westbound delay by about 59%, which would be enough of an improvement to improve the overall intersection PM peak LOS (and delay) from the F (144.6) shown in Exhibit 13 above to F (105.9). Synchro's estimate of the 95th percentile westbound queue would be reduced by about 43%, from 29 vehicles per lane to 17. If additional delay mitigation is needed to reduce overall delay to pre-Phase 2 level [F (96.0)], a northbound right turn lane could also be considered.

No mitigations were tested for the LOS D condition at the Monad intersection.

With respect to auxiliary turn lanes at Intersections 6 and 7, as with previous phases the 2033 right turn lane volumes would remain too low for potential consideration. Because left turn lanes were justified by traffic from the previous phase, no new analysis of those lanes was conducted with the addition of Phase 2 traffic. The potential need for a right turn auxiliary lane was examined for the intersection of Shiloh at Bell, and this analysis indicated that PM peak hour traffic in Phase 2 would help to justify the addition of such a lane. As with previous phases, the LOS results shown in Exhibit 13 above do not reflect the addition of any auxiliary lanes.

At Intersection 7, the Four-Hour signal warrant would be met by a considerable margin under Phase 2 conditions, and the Eight-Hour warrant would be within the margin of estimating/forecasting uncertainty, with minor street volume slightly over the minimum threshold. With these two warrants technically met, a signal could be considered under 2033 conditions at this location. The project team recommends further monitoring of traffic volume conditions and consideration of future traffic to and from the property directly across Central to the north. That development project would create a new fourth leg (a southbound approach) to this intersection and was only in the early stages of planning/permitting at the time this TIS report was completed.

5 COST PARTICIPATION

The net new trips identified in this report were subject to examination under the City's arterial intersection cost participation program to the extent that they would travel through studied intersections. City staff also requested that the two project access intersections on Central be included even though they are effectively local streets (low-speed with parking and driveways, not connected to other major routes) rather than arterials. Critical traffic shares that drive intersection cost participation can be excluded if they fall below 2%, but project trips from all phases are considered together when evaluating such a possibility. Right turns are not considered in cost participation, so intersection 4 (Bell) was omitted here with the permission of City staff because the Shiloh Road median dictates that the intersection's only conflicting critical pairs involve right turns. Phase-specific project trips used in this calculation are documented in the traffic volume graphics provided in Appendix C.

The retail part of the site is scheduled to be developed in Phase 2 but it's located in the area covered by Phase 1A. Because that area is subject to a Subdivision Improvement Agreement that directly benefits the two future retail lots on the Phase 1 property, cost participation associated with retail trips was pulled forward from Phase 2 to Phase 1A.

Exhibit 14 shows the incremental intersection cost participation for the new trips associated and the cost share calculation with each project phase. As shown in the table, no intersections qualify for the "sub-2%" waiver when all phases are considered.

Exhibit 14. Intersection Cost Participation by Phase

	Phase				Project
Intersection	**1A**	**1B**	**1C**	**2**	**Total**
1. 48th at Central	1.1%	0.3%	0.2%	0.6%	2.2%
2. Shiloh at Broadwater	1.9%	0.5%	0.4%	1.2%	4.0%
3. Shiloh at Central	7.4%	1.7%	1.4%	3.3%	13.8%
5. Shiloh at Monad	1.8%	0.4%	0.3%	1.0%	3.5%
Arterial Intersection Subtotal:	**12.2%**	**2.9%**	**2.3%**	**6.1%**	**23.5%**
6. Double Haul at Central (Local)	8.6%	0.3%	0.2%	2.0%	11.1%
7. 44th at Central (Local)	9.2%	2.5%	2.1%	2.8%	16.6%
Total Participation:	**30.0%**	**5.7%**	**4.6%**	**10.9%**	**51.2%**

Note: each % represents the highest project critical-volume share of the two peak hours (AM or PM)

For all six intersections evaluated for cost participation in all phases, the PM peak hour critical-pair traffic volume would be equal to or greater than in the AM peak hour. It's important to note that more than half of the critical traffic shares indicated would occur at the two local intersections (6 and 7), both of which would operate within the City's LOS C standard in both peaks in all project phases. The details of these cost participation calculations are provided in Appendix F.

This concludes the Clearwater/44 West Subdivision TIS.

Appendix A: Original Raw Traffic Count Data for Intersections

Study Name **Central and 48th**
Start Date **8/8/2023**
Start Time **7:30 AM**
Type **Road**
Classification **Totals**

	48th Street Southbound				Central Avenue Westbound				48th Street Northbound				Central Avenue Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM																
7:15 AM																
7:30 AM	3	13	19	0	3	27	2	0	18	9	2	0	5	62	1	0
7:45 AM	3	26	21	0	3	24	5	0	9	10	1	0	12	48	1	0
8:00 AM	4	19	12	0	3	17	5	0	10	13	3	0	10	44	2	0
8:15 AM	2	15	13	0	3	14	5	0	8	14	0	0	6	31	4	0
8:30 AM																
8:45 AM																
4:00 PM																
4:15 PM																
4:30 PM																
4:45 PM																
5:00 PM	1	15	6	0	14	70	7	0	7	23	9	0	5	38	1	0
5:15 PM	3	19	12	0	17	60	12	0	5	30	19	0	5	40	2	0
5:30 PM	4	18	5	0	8	69	6	0	6	20	10	0	2	32	4	0
5:45 PM	5	14	8	0	10	60	5	0	1	23	9	0	2	31	2	0

Study Name **Shiloh & Broadwater**
Start Date **3/7/2024**
Start Time **7:00 AM**
Type **Road**
Classification **Totals**

	Shiloh Road Southbound				Broadwater Avenue Westbound				Shiloh Road Northbound				Eastbound Approach Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	0	111	22	0	17	0	8	0	23	52	0	0	0	1	0	0
7:15 AM	0	147	52	0	21	0	25	0	35	102	0	6	0	3	0	0
7:30 AM	0	182	63	0	18	0	33	0	28	122	0	2	0	4	0	0
7:45 AM	0	170	34	0	23	0	39	0	38	140	0	4	0	4	0	0
8:00 AM	0	131	22	0	26	0	29	0	39	143	0	6	0	6	0	0
8:15 AM	0	139	21	0	24	0	36	0	32	130	0	6	0	4	0	0
8:30 AM	0	133	23	0	18	0	28	0	42	137	0	5	0	3	0	0
8:45 AM	0	150	49	0	18	0	28	0	34	124	0	3	0	4	0	0
4:00 PM	0	143	17	0	33	0	42	0	27	244	0	5	0	2	0	0
4:15 PM	0	151	25	0	20	0	46	0	36	226	0	2	0	0	1	0
4:30 PM	0	151	31	0	21	0	38	0	50	238	2	2	0	0	0	0
4:45 PM	0	177	21	0	24	0	37	0	35	201	1	3	0	0	0	0
5:00 PM	0	169	23	0	40	0	56	0	56	281	0	8	0	3	0	0
5:15 PM	0	193	32	1	44	0	52	0	63	283	4	8	0	0	0	0
5:30 PM	0	179	35	1	20	0	43	0	57	202	1	1	0	0	0	0
5:45 PM	0	160	33	2	20	1	35	0	43	200	0	0	0	0	0	0

Study Name **Shiloh & Central**
Start Date **3/21/2024**
Start Time **7:00 AM**
Type **Road**
Classification **Totals**

	Shiloh Road Southbound				Central Avenue Westbound				Shiloh Road Northbound				Central Avenue Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	6	74	22	0	7	13	15	0	19	66	9	1	19	51	15	0
7:15 AM	8	118	48	0	7	18	28	0	32	84	14	0	25	90	17	0
7:30 AM	16	128	69	1	18	25	29	0	41	96	15	0	22	112	36	0
7:45 AM	17	135	67	0	26	19	34	0	36	130	19	0	20	91	42	0
8:00 AM	7	116	32	0	29	25	17	0	33	114	10	0	21	76	37	0
8:15 AM	15	135	31	1	12	29	19	0	27	127	9	0	22	41	38	0
8:30 AM	9	98	29	0	15	30	21	0	26	146	10	0	16	30	31	0
8:45 AM	10	102	31	1	20	22	24	0	17	119	20	0	22	40	30	0
4:00 PM	19	127	37	0	23	51	45	0	35	168	24	0	21	29	27	0
4:15 PM	20	100	34	0	35	41	58	0	26	156	45	0	20	39	25	0
4:30 PM	23	127	35	0	38	50	62	0	30	163	47	0	21	26	27	0
4:45 PM	19	153	33	0	41	45	49	0	26	174	41	0	15	36	23	0
5:00 PM	26	152	34	0	38	63	48	0	31	235	32	0	21	46	23	0
5:15 PM	24	154	43	0	35	67	35	0	35	233	35	0	26	26	28	0
5:30 PM	17	142	35	0	40	74	46	0	32	148	35	0	14	32	27	0
5:45 PM	21	148	30	0	31	46	41	0	32	162	26	0	24	22	30	0

Study Name Shiloh & Bell
Start Date 5/18/2023
Start Time 7:00 AM
Type Road
Classification Totals

	Shiloh Road Southbound				n/a Westbound				Shiloh Road Northbound				Bell Avenue Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	1	126		0						103	0	0	1		0	0
7:15 AM	0	186		0						111	0	0	2		0	0
7:30 AM	2	181		0						228	0	0	7		0	0
7:45 AM	2	239		0						213	0	0	7		0	0
8:00 AM	1	184		0						169	0	0	7		0	0
8:15 AM	3	233		0						167	0	0	1		0	0
8:30 AM	2	163		0						180	0	0	3		0	0
8:45 AM	6	174		0						169	0	0	5		0	0
4:00 PM	2	225		0						272	0	0	6		0	0
4:15 PM	4	224		0						262	0	0	3		0	0
4:30 PM	3	212		0						311	0	0	2		0	0
4:45 PM	5	212		0						307	0	0	7		0	0
5:00 PM	4	241		0						357	0	0	8		0	0
5:15 PM	5	243		0						324	0	0	4		0	0
5:30 PM	6	213		0						263	0	0	7		0	0
5:45 PM	6	219		0						254	0	0	2		0	0

Study Name Shiloh & Monad
Start Date 10/24/2023
Start Time 7:00 AM
Type Road
Classification Totals

	Shiloh Road Southbound				Monad Road Westbound				Shiloh Road Northbound				Monad Road Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	6	126	12	0	8	7	12	0	16	67	5	0	10	5	12	0
7:15 AM	12	129	36	0	11	9	15	0	22	113	1	0	13	3	25	0
7:30 AM	9	138	32	0	24	3	22	0	29	175	5	0	17	14	33	0
7:45 AM	16	215	49	0	29	8	21	0	21	190	8	0	12	7	36	0
8:00 AM	23	181	23	0	18	2	22	0	23	142	1	0	9	10	24	0
8:15 AM	26	128	38	0	22	7	17	0	17	123	3	0	2	1	34	0
8:30 AM	12	150	42	5	17	1	15	0	16	111	2	1	5	2	24	0
8:45 AM	10	135	20	0	20	5	9	0	14	109	1	0	10	3	16	0
4:00 PM	16	166	26	0	30	6	21	0	33	210	10	0	12	8	23	0
4:15 PM	15	162	23	0	25	10	20	0	30	203	7	0	6	15	23	0
4:30 PM	21	174	35	0	37	12	29	0	22	233	9	0	8	9	41	0
4:45 PM	18	154	27	1	29	8	32	0	28	236	18	0	6	0	35	0
5:00 PM	16	138	44	0	29	15	27	0	35	277	12	0	9	10	31	0
5:15 PM	30	160	25	0	38	6	25	0	40	266	16	0	11	9	20	0
5:30 PM	19	180	23	0	37	8	34	0	34	183	13	0	9	7	31	0
5:45 PM	24	156	28	0	37	10	16	0	25	176	13	0	11	12	21	0

Appendix B: Intersection Analysis Software Output

Scenario sequence:

Existing

2027 Background

2027 Phase 1A

2029 Without Phase 1B

2029 Phase 1B

2031 Without Phase 1C

2031 Phase 1C

2033 Without Phase 2

2033 Phase 2 (Full project buildout)

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	188	33	18	83	12	6	47	46	66	75	12
Future Vol, veh/h	8	188	33	18	83	12	6	47	46	66	75	12
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	1	1	1
Mvmt Flow	9	211	37	20	93	13	7	53	52	74	84	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	10.2	9.1	8.8	9.7
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	6%	3%	16%	43%
Vol Thru, %	47%	82%	73%	49%
Vol Right, %	46%	14%	11%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	99	229	113	153
LT Vol	6	8	18	66
Through Vol	47	188	83	75
RT Vol	46	33	12	12
Lane Flow Rate	111	257	127	172
Geometry Grp	1	1	1	1
Degree of Util (X)	0.151	0.337	0.175	0.24
Departure Headway (Hd)	4.871	4.715	4.972	5.018
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	730	756	716	710
Service Time	2.946	2.777	3.045	3.088
HCM Lane V/C Ratio	0.152	0.34	0.177	0.242
HCM Control Delay, s/veh	8.8	10.2	9.1	9.7
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.5	1.5	0.6	0.9

Intersection	
Intersection Delay, s/veh	6.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	241	728	803
Demand Flow Rate, veh/h	0	243	742	811
Vehicles Circulating, veh/h	957	594	149	165
Vehicles Exiting, veh/h	19	297	808	672
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	6.1	5.7	6.1
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.601	0.399	0.470	0.530	0.470	0.530
Follow-Up Headway, s	1.000	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	3600	1420	1350	1420	1420	1420	1420	1420
B (Slope)	1.151e-3	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	146	97	349	393	381	430
Cap Entry Lane, veh/h	1196	629	782	857	1240	1240	1222	1222
Entry HV Adj Factor	1.000	1.000	0.993	0.990	0.980	0.981	0.991	0.990
Flow Entry, veh/h	0	0	145	96	342	386	378	426
Cap Entry, veh/h	1196	629	776	848	1215	1217	1211	1210
V/C Ratio	0.000	0.000	0.187	0.113	0.281	0.317	0.312	0.352
Control Delay, s/veh	3.0	5.7	6.6	5.4	5.5	5.9	5.9	6.3
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	0	1	1	1	2

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	620	313	730	857
Demand Flow Rate, veh/h	632	322	753	866
Vehicles Circulating, veh/h	917	768	762	285
Vehicles Exiting, veh/h	234	747	787	805
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.6	8.0	13.7	7.6
Approach LOS	B	A	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.469	0.531	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	297	335	151	171	354	399	407	459
Cap Entry Lane, veh/h	581	651	666	739	670	743	1039	1115
Entry HV Adj Factor	0.981	0.981	0.973	0.969	0.970	0.970	0.990	0.990
Flow Entry, veh/h	291	329	147	166	343	387	403	454
Cap Entry, veh/h	570	639	648	717	649	721	1028	1103
V/C Ratio	0.511	0.514	0.227	0.231	0.529	0.537	0.392	0.412
Control Delay, s/veh	15.3	14.0	8.3	7.7	14.2	13.3	7.7	7.6
LOS	C	B	A	A	B	B	A	A
95th %tile Queue, veh	3	3	1	1	3	3	2	2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	22	0	766	825	8
Future Vol, veh/h	0	22	0	766	825	8
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	25	0	861	927	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	468	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	547	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	547	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	11.89	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	547	-	-
HCM Lane V/C Ratio	-	0.045	-	-
HCM Ctrl Dly (s/v)	-	11.9	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-

Intersection	
Intersection Delay, s/veh	9.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	251	244	924	1100
Demand Flow Rate, veh/h	259	251	933	1111
Vehicles Circulating, veh/h	1122	985	386	154
Vehicles Exiting, veh/h	143	334	995	1082
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.0	9.3	9.2	7.6
Approach LOS	B	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.795	0.205	0.526	0.474	0.471	0.529	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	206	53	132	119	439	494	522	589
Cap Entry Lane, veh/h	481	547	545	615	999	999	1234	1234
Entry HV Adj Factor	0.970	0.962	0.971	0.975	0.989	0.991	0.990	0.990
Flow Entry, veh/h	200	51	128	116	434	490	517	583
Cap Entry, veh/h	466	526	530	599	989	991	1222	1221
V/C Ratio	0.428	0.097	0.242	0.194	0.439	0.494	0.423	0.477
Control Delay, s/veh	15.5	8.1	10.2	8.4	8.7	9.6	7.2	8.0
LOS	C	A	B	A	A	A	A	A
95th %tile Queue, veh	2	0	1	1	2	3	2	3

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	143	15	30	264	50	48	98	20	31	67	13
Future Vol, veh/h	9	143	15	30	264	50	48	98	20	31	67	13
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	10	166	17	35	307	58	56	114	23	36	78	15
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	10.7	14.6	11.2	10.4
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	29%	5%	9%	28%
Vol Thru, %	59%	86%	77%	60%
Vol Right, %	12%	9%	15%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	166	167	344	111
LT Vol	48	9	30	31
Through Vol	98	143	264	67
RT Vol	20	15	50	13
Lane Flow Rate	193	194	400	129
Geometry Grp	1	1	1	1
Degree of Util (X)	0.305	0.293	0.567	0.209
Departure Headway (Hd)	5.692	5.44	5.099	5.82
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	629	658	708	614
Service Time	3.742	3.488	3.138	3.873
HCM Lane V/C Ratio	0.307	0.295	0.565	0.21
HCM Control Delay, s/veh	11.2	10.7	14.6	10.4
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.3	1.2	3.6	0.8

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	360	1370	946
Demand Flow Rate, veh/h	0	360	1370	955
Vehicles Circulating, veh/h	1169	1130	130	244
Vehicles Exiting, veh/h	30	370	1039	1246
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	13.6	9.0	7.6
Approach LOS	-	B	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.594	0.406	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	214	146	644	726	449	506
Cap Entry Lane, veh/h	461	526	477	543	1262	1262	1137	1137
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	0	0	214	146	644	726	445	501
Cap Entry, veh/h	461	526	477	543	1261	1262	1126	1127
V/C Ratio	0.000	0.000	0.448	0.269	0.510	0.575	0.395	0.445
Control Delay, s/veh	7.8	6.8	15.8	10.4	8.3	9.5	7.2	8.0
LOS	A	A	C	B	A	A	A	A
95th %tile Queue, veh	0	0	2	1	3	4	2	2

Intersection	
Intersection Delay, s/veh	13.6
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	339	607	1152	877
Demand Flow Rate, veh/h	339	607	1152	886
Vehicles Circulating, veh/h	993	1130	408	611
Vehicles Exiting, veh/h	504	430	924	1126
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.3	19.9	12.1	12.6
Approach LOS	B	C	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.469	0.531	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	159	180	285	322	541	611	416	470
Cap Entry Lane, veh/h	541	611	477	543	927	1004	769	845
Entry HV Adj Factor	1.002	0.998	1.001	0.999	1.001	0.999	0.991	0.989
Flow Entry, veh/h	159	180	285	322	541	611	412	465
Cap Entry, veh/h	543	609	478	543	928	1003	762	835
V/C Ratio	0.294	0.295	0.597	0.593	0.583	0.609	0.541	0.556
Control Delay, s/veh	10.8	9.8	21.1	18.8	12.1	12.0	12.8	12.4
LOS	B	A	C	C	B	B	B	B
95th %tile Queue, veh	1	1	4	4	4	4	3	3

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	21	0	1280	896	17
Future Vol, veh/h	0	21	0	1280	896	17
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	23	0	1391	974	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	496	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	525	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	525	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

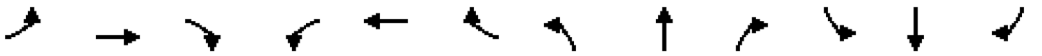
Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.18	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	525	-	-
HCM Lane V/C Ratio	-	0.044	-	-
HCM Ctrl Dly (s/v)	-	12.2	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-

Intersection	
Intersection Delay, s/veh	10.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	201	305	1263	893
Demand Flow Rate, veh/h	206	305	1263	902
Vehicles Circulating, veh/h	931	1268	310	222
Vehicles Exiting, veh/h	193	305	827	1351
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.8	14.1	11.1	7.1
Approach LOS	A	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.820	0.180	0.538	0.462	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	169	37	164	141	594	669	424	478
Cap Entry Lane, veh/h	573	644	420	483	1071	1071	1160	1160
Entry HV Adj Factor	0.979	0.973	1.000	1.000	0.999	1.001	0.990	0.991
Flow Entry, veh/h	165	36	164	141	594	669	420	473
Cap Entry, veh/h	561	626	420	483	1070	1072	1149	1149
V/C Ratio	0.295	0.057	0.390	0.292	0.555	0.625	0.365	0.412
Control Delay, s/veh	10.6	6.4	15.9	11.9	10.2	11.9	6.8	7.4
LOS	B	A	C	B	B	B	A	A
95th %tile Queue, veh	1	0	2	1	4	5	2	2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	210	37	20	93	13	7	53	51	74	84	13
Future Volume (veh/h)	9	210	37	20	93	13	7	53	51	74	84	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	10	236	42	22	104	15	8	60	57	83	94	15
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	197	404	70	250	371	49	207	200	178	395	228	31
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	28	1398	243	133	1285	169	50	787	702	526	899	121
Grp Volume(v), veh/h	288	0	0	141	0	0	125	0	0	192	0	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1587	0	0	1538	0	0	1546	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	1.3	0.0	0.0	1.3	0.0	0.0	2.0	0.0	0.0
Prop In Lane	0.03		0.15	0.16		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	671	0	0	670	0	0	585	0	0	654	0	0
V/C Ratio(X)	0.43	0.00	0.00	0.21	0.00	0.00	0.21	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	2341	0	0	2198	0	0	2171	0	0	2205	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	6.0	0.0	0.0	5.4	0.0	0.0	6.0	0.0	0.0	6.2	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.2	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	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.4	0.0	0.0	5.6	0.0	0.0	6.1	0.0	0.0	6.4	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		288			141			125			192	
Approach Delay, s/veh		6.4			5.6			6.1			6.4	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.5	10.2	9.5	10.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.3	4.9	4.0	3.3
Green Ext Time (p_c), s	0.5	1.4	0.9	0.6

Intersection Summary	
HCM 7th Control Delay, s/veh	6.2
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	6.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	269	813	862
Demand Flow Rate, veh/h	0	272	829	871
Vehicles Circulating, veh/h	1035	664	167	185
Vehicles Exiting, veh/h	21	332	868	751
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	6.9	6.3	6.6
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.603	0.397	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	164	108	390	439	409	462
Cap Entry Lane, veh/h	521	589	733	808	1220	1220	1200	1200
Entry HV Adj Factor	1.000	1.000	0.988	0.991	0.980	0.982	0.991	0.989
Flow Entry, veh/h	0	0	162	107	382	431	405	457
Cap Entry, veh/h	521	589	724	800	1196	1198	1189	1187
V/C Ratio	0.000	0.000	0.224	0.134	0.320	0.360	0.341	0.385
Control Delay, s/veh	6.9	6.1	7.5	5.9	6.0	6.5	6.3	6.8
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	0	1	2	2	2

Intersection	
Intersection Delay, s/veh	14.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	694	349	816	955
Demand Flow Rate, veh/h	708	360	840	964
Vehicles Circulating, veh/h	1022	858	851	318
Vehicles Exiting, veh/h	260	833	879	900
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	20.2	9.3	18.5	8.7
Approach LOS	C	A	C	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.469	0.531	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	333	375	169	191	395	445	453	511
Cap Entry Lane, veh/h	527	596	613	685	617	689	1007	1084
Entry HV Adj Factor	0.980	0.981	0.972	0.969	0.970	0.971	0.990	0.990
Flow Entry, veh/h	326	368	164	185	383	432	449	506
Cap Entry, veh/h	516	584	596	664	599	669	998	1073
V/C Ratio	0.632	0.630	0.276	0.279	0.640	0.646	0.450	0.472
Control Delay, s/veh	21.3	19.2	9.7	8.9	19.3	17.9	8.8	8.7
LOS	C	C	A	A	C	C	A	A
95th %tile Queue, veh	4	4	1	1	5	5	2	3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	25	0	856	922	9
Future Vol, veh/h	0	25	0	856	922	9
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	28	0	962	1036	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	523	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	504	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	504	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.57	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	504	-	-
HCM Lane V/C Ratio	-	0.056	-	-
HCM Ctrl Dly (s/v)	-	12.6	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	10.8
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	280	272	1033	1230
Demand Flow Rate, veh/h	288	280	1043	1242
Vehicles Circulating, veh/h	1255	1099	430	171
Vehicles Exiting, veh/h	158	374	1113	1208
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	18.7	11.1	11.0	8.7
Approach LOS	C	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.795	0.205	0.525	0.475	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	229	59	147	133	490	553	584	658
Cap Entry Lane, veh/h	426	489	491	558	960	960	1215	1215
Entry HV Adj Factor	0.972	0.966	0.974	0.970	0.991	0.990	0.990	0.991
Flow Entry, veh/h	223	57	143	129	486	548	578	652
Cap Entry, veh/h	414	472	478	541	952	951	1203	1204
V/C Ratio	0.538	0.121	0.299	0.238	0.510	0.576	0.480	0.541
Control Delay, s/veh	21.1	9.3	12.2	9.9	10.2	11.7	8.1	9.2
LOS	C	A	B	A	B	B	A	A
95th %tile Queue, veh	3	0	1	1	3	4	3	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	160	17	34	295	56	54	109	22	35	75	15
Future Volume (veh/h)	10	160	17	34	295	56	54	109	22	35	75	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	12	186	20	40	343	65	63	127	26	41	87	17
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	168	587	61	190	530	95	270	255	46	259	270	45
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	33	1484	153	76	1341	241	340	1075	194	298	1139	191
Grp Volume(v), veh/h	218	0	0	448	0	0	216	0	0	145	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1658	0	0	1608	0	0	1628	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.7	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.2	0.0	0.0	5.4	0.0	0.0	2.8	0.0	0.0	1.7	0.0	0.0
Prop In Lane	0.06		0.09	0.09		0.15	0.29		0.12	0.28		0.12
Lane Grp Cap(c), veh/h	815	0	0	816	0	0	571	0	0	574	0	0
V/C Ratio(X)	0.27	0.00	0.00	0.55	0.00	0.00	0.38	0.00	0.00	0.25	0.00	0.00
Avail Cap(c_a), veh/h	1867	0	0	1866	0	0	1828	0	0	1817	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	5.1	0.0	0.0	6.1	0.0	0.0	8.2	0.0	0.0	7.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.6	0.0	0.0	0.4	0.0	0.0	0.2	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	0.1	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.3	0.0	0.0	6.7	0.0	0.0	8.6	0.0	0.0	8.0	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		218			448			216			145	
Approach Delay, s/veh		5.3			6.7			8.6			8.0	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.3		14.2		10.3		14.2				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		4.8		4.2		3.7		7.4				
Green Ext Time (p_c), s		1.0		1.0		0.7		2.4				

Intersection Summary												
HCM 7th Control Delay, s/veh			7.0									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	11.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	402	1531	1057
Demand Flow Rate, veh/h	0	402	1531	1067
Vehicles Circulating, veh/h	1306	1262	145	272
Vehicles Exiting, veh/h	33	414	1161	1392
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	18.2	10.6	8.7
Approach LOS	-	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.595	0.405	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	239	163	720	811	501	566
Cap Entry Lane, veh/h	406	468	423	486	1245	1245	1109	1109
Entry HV Adj Factor	1.000	1.000	1.000	1.000	0.999	1.001	0.991	0.990
Flow Entry, veh/h	0	0	239	163	720	811	497	560
Cap Entry, veh/h	406	468	423	486	1244	1245	1099	1097
V/C Ratio	0.000	0.000	0.565	0.336	0.579	0.652	0.452	0.511
Control Delay, s/veh	8.9	7.7	21.8	12.8	9.7	11.4	8.2	9.2
LOS	A	A	C	B	A	B	A	A
95th %tile Queue, veh	0	0	3	1	4	5	2	3

Intersection	
Intersection Delay, s/veh	18.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	379	680	1287	980
Demand Flow Rate, veh/h	379	680	1287	990
Vehicles Circulating, veh/h	1110	1262	455	683
Vehicles Exiting, veh/h	563	480	1034	1259
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	12.7	31.8	15.7	16.6
Approach LOS	B	D	C	C

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	178	201	320	360	605	682	465	525
Cap Entry Lane, veh/h	486	553	423	486	888	965	720	795
Entry HV Adj Factor	1.001	0.999	0.999	1.001	1.000	1.000	0.991	0.989
Flow Entry, veh/h	178	201	320	360	605	682	461	519
Cap Entry, veh/h	487	552	422	486	888	965	713	786
V/C Ratio	0.366	0.364	0.757	0.741	0.681	0.707	0.646	0.661
Control Delay, s/veh	13.4	12.0	34.4	29.4	15.7	15.7	17.0	16.3
LOS	B	B	D	D	C	C	C	C
95th %tile Queue, veh	2	2	6	6	6	6	5	5

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	23	0	1430	1001	19
Future Vol, veh/h	0	23	0	1430	1001	19
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	25	0	1554	1088	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	554	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	481	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	481	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

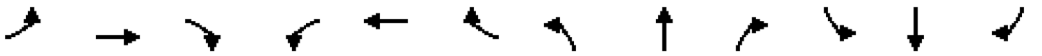
Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	481	-	-
HCM Lane V/C Ratio	-	0.052	-	-
HCM Ctrl Dly (s/v)	-	12.9	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	224	341	1411	997
Demand Flow Rate, veh/h	229	341	1411	1007
Vehicles Circulating, veh/h	1040	1417	347	248
Vehicles Exiting, veh/h	215	341	922	1510
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.8	18.7	14.2	8.0
Approach LOS	B	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.821	0.179	0.537	0.463	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	188	41	183	158	663	748	473	534
Cap Entry Lane, veh/h	519	587	367	426	1036	1036	1133	1133
Entry HV Adj Factor	0.980	0.976	1.000	1.000	1.000	1.000	0.990	0.989
Flow Entry, veh/h	184	40	183	158	663	748	468	528
Cap Entry, veh/h	508	572	367	426	1036	1035	1122	1121
V/C Ratio	0.363	0.070	0.499	0.371	0.640	0.722	0.417	0.471
Control Delay, s/veh	12.9	7.1	21.7	15.2	12.6	15.6	7.6	8.4
LOS	B	A	C	C	B	C	A	A
95th %tile Queue, veh	2	0	3	2	5	7	2	3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	211	37	21	97	14	7	53	51	74	84	13
Future Volume (veh/h)	9	211	37	21	97	14	7	53	51	74	84	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	10	237	42	24	109	16	8	60	57	83	94	15
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	197	407	71	252	371	49	207	199	178	395	228	31
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	27	1399	243	139	1275	170	50	787	702	526	899	121
Grp Volume(v), veh/h	289	0	0	149	0	0	125	0	0	192	0	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1584	0	0	1538	0	0	1546	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	1.4	0.0	0.0	1.3	0.0	0.0	2.0	0.0	0.0
Prop In Lane	0.03		0.15	0.16		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	674	0	0	672	0	0	584	0	0	653	0	0
V/C Ratio(X)	0.43	0.00	0.00	0.22	0.00	0.00	0.21	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	2335	0	0	2189	0	0	2166	0	0	2200	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	6.0	0.0	0.0	5.5	0.0	0.0	6.0	0.0	0.0	6.2	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.2	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	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.4	0.0	0.0	5.6	0.0	0.0	6.2	0.0	0.0	6.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		289			149			125			192	
Approach Delay, s/veh		6.4			5.6			6.2			6.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.5	10.2	9.5	10.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.3	4.9	4.0	3.4
Green Ext Time (p_c), s	0.5	1.4	0.9	0.7

Intersection Summary	
HCM 7th Control Delay, s/veh	6.2
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	6.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	270	831	902
Demand Flow Rate, veh/h	0	273	847	911
Vehicles Circulating, veh/h	1076	679	167	186
Vehicles Exiting, veh/h	21	335	909	766
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	7.0	6.4	6.8
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.604	0.396	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	165	108	398	449	428	483
Cap Entry Lane, veh/h	502	569	723	797	1220	1220	1199	1199
Entry HV Adj Factor	1.000	1.000	0.988	0.991	0.981	0.981	0.990	0.989
Flow Entry, veh/h	0	0	163	107	391	440	424	478
Cap Entry, veh/h	502	569	714	790	1197	1197	1187	1186
V/C Ratio	0.000	0.000	0.228	0.135	0.326	0.368	0.357	0.403
Control Delay, s/veh	7.2	6.3	7.7	5.9	6.1	6.6	6.5	7.1
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	0	1	2	2	2

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	751	356	823	962
Demand Flow Rate, veh/h	766	367	847	971
Vehicles Circulating, veh/h	1022	884	889	332
Vehicles Exiting, veh/h	281	852	899	919
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	22.8	9.7	20.3	8.9
Approach LOS	C	A	C	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.469	0.531	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	360	406	172	195	398	449	456	515
Cap Entry Lane, veh/h	527	596	599	670	596	667	995	1071
Entry HV Adj Factor	0.980	0.980	0.973	0.968	0.971	0.971	0.991	0.990
Flow Entry, veh/h	353	398	167	189	387	436	452	510
Cap Entry, veh/h	517	584	583	648	579	648	986	1060
V/C Ratio	0.683	0.682	0.287	0.291	0.668	0.673	0.458	0.481
Control Delay, s/veh	24.1	21.7	10.1	9.3	21.2	19.6	9.0	8.9
LOS	C	C	B	A	C	C	A	A
95th %tile Queue, veh	5	5	1	1	5	5	2	3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	25	0	862	939	9
Future Vol, veh/h	0	25	0	862	939	9
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	28	0	969	1055	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	533	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	497	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	497	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.68	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	497	-	-
HCM Lane V/C Ratio	-	0.057	-	-
HCM Ctrl Dly (s/v)	-	12.7	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	280	273	1039	1250
Demand Flow Rate, veh/h	288	281	1049	1262
Vehicles Circulating, veh/h	1275	1105	433	171
Vehicles Exiting, veh/h	158	377	1130	1215
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	19.3	11.2	11.1	8.8
Approach LOS	C	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.795	0.205	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	229	59	147	134	493	556	593	669
Cap Entry Lane, veh/h	418	480	488	555	958	958	1215	1215
Entry HV Adj Factor	0.972	0.966	0.974	0.970	0.991	0.991	0.990	0.990
Flow Entry, veh/h	223	57	143	130	488	551	587	662
Cap Entry, veh/h	406	464	476	538	949	948	1204	1203
V/C Ratio	0.548	0.123	0.301	0.241	0.515	0.581	0.488	0.550
Control Delay, s/veh	21.8	9.5	12.3	10.0	10.3	11.8	8.2	9.3
LOS	C	A	B	B	B	B	A	A
95th %tile Queue, veh	3	0	1	1	3	4	3	3

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	477	1	9	178	4	26
Future Vol, veh/h	477	1	9	178	4	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	536	1	10	200	4	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	537	0	757	537
Stage 1	-	-	-	-	537	-
Stage 2	-	-	-	-	220	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1031	-	376	544
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	816	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1031	-	371	544
Mov Cap-2 Maneuver	-	-	-	-	371	-
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	807	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.41	12.52
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	512	-	-	87	-
HCM Lane V/C Ratio	0.066	-	-	0.01	-
HCM Ctrl Dly (s/v)	12.5	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	502	1	9	185	2	26
Future Vol, veh/h	502	1	9	185	2	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	564	1	10	208	2	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	565	0	793	565
Stage 1	-	-	-	-	565	-
Stage 2	-	-	-	-	228	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1007	-	358	525
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	810	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1007	-	354	525
Mov Cap-2 Maneuver	-	-	-	-	354	-
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	801	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.4	12.57
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	507	-	-	84	-
HCM Lane V/C Ratio	0.062	-	-	0.01	-
HCM Ctrl Dly (s/v)	12.6	-	-	8.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	165	17	34	298	57	54	109	23	36	75	15
Future Volume (veh/h)	10	165	17	34	298	57	54	109	23	36	75	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	12	192	20	40	347	66	63	127	27	42	87	17
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	167	593	59	189	534	96	268	254	47	260	269	45
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	32	1490	149	75	1341	241	338	1070	200	304	1134	189
Grp Volume(v), veh/h	224	0	0	453	0	0	217	0	0	146	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1658	0	0	1608	0	0	1627	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.8	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.3	0.0	0.0	5.5	0.0	0.0	2.8	0.0	0.0	1.8	0.0	0.0
Prop In Lane	0.05		0.09	0.09		0.15	0.29		0.12	0.29		0.12
Lane Grp Cap(c), veh/h	819	0	0	819	0	0	569	0	0	574	0	0
V/C Ratio(X)	0.27	0.00	0.00	0.55	0.00	0.00	0.38	0.00	0.00	0.25	0.00	0.00
Avail Cap(c_a), veh/h	1855	0	0	1852	0	0	1814	0	0	1802	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	5.1	0.0	0.0	6.1	0.0	0.0	8.2	0.0	0.0	7.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.6	0.0	0.0	0.4	0.0	0.0	0.2	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	0.1	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.3	0.0	0.0	6.7	0.0	0.0	8.7	0.0	0.0	8.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		224			453			217			146	
Approach Delay, s/veh		5.3			6.7			8.7			8.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.3		14.3		10.3		14.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		4.8		4.3		3.8		7.5				
Green Ext Time (p_c), s		1.0		1.1		0.7		2.4				

Intersection Summary												
HCM 7th Control Delay, s/veh			7.0									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	406	1544	1075
Demand Flow Rate, veh/h	0	406	1544	1085
Vehicles Circulating, veh/h	1328	1273	145	276
Vehicles Exiting, veh/h	33	416	1183	1403
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	18.8	10.7	8.9
Approach LOS	-	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.599	0.401	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	243	163	726	818	510	575
Cap Entry Lane, veh/h	398	459	419	481	1245	1245	1105	1105
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	0	0	243	163	726	818	505	570
Cap Entry, veh/h	398	459	419	481	1244	1245	1094	1094
V/C Ratio	0.000	0.000	0.581	0.339	0.583	0.657	0.462	0.521
Control Delay, s/veh	9.0	7.8	22.7	13.0	9.8	11.5	8.4	9.4
LOS	A	A	C	B	A	B	A	A
95th %tile Queue, veh	0	0	4	1	4	5	2	3

Intersection	
Intersection Delay, s/veh	21.8
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	418	713	1307	1000
Demand Flow Rate, veh/h	418	713	1307	1010
Vehicles Circulating, veh/h	1110	1295	481	736
Vehicles Exiting, veh/h	636	493	1047	1272
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	13.5	38.6	17.2	19.3
Approach LOS	B	E	C	C

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.469	0.531	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	196	222	335	378	614	693	475	535
Cap Entry Lane, veh/h	486	553	410	472	867	943	686	760
Entry HV Adj Factor	1.002	0.998	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	196	222	335	378	614	693	470	530
Cap Entry, veh/h	487	552	410	472	868	943	679	753
V/C Ratio	0.403	0.402	0.817	0.800	0.708	0.735	0.693	0.704
Control Delay, s/veh	14.3	12.8	41.8	35.7	17.1	17.3	19.8	18.9
LOS	B	B	E	E	C	C	C	C
95th %tile Queue, veh	2	2	7	7	6	7	6	6

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	23	0	1449	1013	19
Future Vol, veh/h	0	23	0	1449	1013	19
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	25	0	1575	1101	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	561	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	476	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	476	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.98	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	476	-	-
HCM Lane V/C Ratio	-	0.052	-	-
HCM Ctrl Dly (s/v)	-	13	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	224	344	1427	1010
Demand Flow Rate, veh/h	229	344	1427	1021
Vehicles Circulating, veh/h	1054	1433	349	248
Vehicles Exiting, veh/h	215	343	934	1529
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	12.1	19.2	14.5	8.1
Approach LOS	B	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.821	0.179	0.532	0.468	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	188	41	183	161	671	756	480	541
Cap Entry Lane, veh/h	512	580	361	420	1034	1034	1133	1133
Entry HV Adj Factor	0.980	0.976	1.000	1.000	1.000	1.000	0.989	0.990
Flow Entry, veh/h	184	40	183	161	671	756	475	536
Cap Entry, veh/h	502	566	361	420	1033	1034	1121	1122
V/C Ratio	0.367	0.071	0.507	0.383	0.649	0.731	0.424	0.477
Control Delay, s/veh	13.1	7.2	22.3	15.7	12.9	16.0	7.7	8.5
LOS	B	A	C	C	B	C	A	A
95th %tile Queue, veh	2	0	3	2	5	7	2	3

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	287	4	28	455	3	17
Future Vol, veh/h	287	4	28	455	3	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	322	4	31	511	3	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	327	0	899	325
Stage 1	-	-	-	-	325	-
Stage 2	-	-	-	-	574	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1233	-	310	716
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	563	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1233	-	298	716
Mov Cap-2 Maneuver	-	-	-	-	298	-
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	543	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.46	11.32
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	592	-	-	104	-
HCM Lane V/C Ratio	0.038	-	-	0.026	-
HCM Ctrl Dly (s/v)	11.3	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

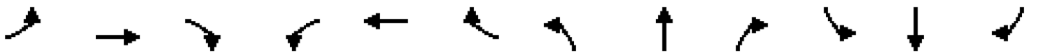
Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	302	2	28	482	1	17
Future Vol, veh/h	302	2	28	482	1	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	339	2	31	542	1	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	342	0	945	340
Stage 1	-	-	-	-	340	-
Stage 2	-	-	-	-	604	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1217	-	291	702
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	545	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1217	-	280	702
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	525	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.44	10.74
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	648	-	-	99	-
HCM Lane V/C Ratio	0.031	-	-	0.026	-
HCM Ctrl Dly (s/v)	10.7	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	227	40	23	104	15	7	57	55	79	90	14
Future Volume (veh/h)	10	227	40	23	104	15	7	57	55	79	90	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	11	255	45	26	117	17	8	64	62	89	101	16
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	190	430	74	245	392	52	197	199	181	386	228	31
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	27	1401	242	135	1278	168	45	781	711	529	897	120
Grp Volume(v), veh/h	311	0	0	160	0	0	134	0	0	206	0	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1582	0	0	1538	0	0	1546	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Cycle Q Clear(g_c), s	3.2	0.0	0.0	1.5	0.0	0.0	1.4	0.0	0.0	2.2	0.0	0.0
Prop In Lane	0.04		0.14	0.16		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	694	0	0	689	0	0	577	0	0	645	0	0
V/C Ratio(X)	0.45	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	2245	0	0	2100	0	0	2083	0	0	2111	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	6.1	0.0	0.0	5.5	0.0	0.0	6.2	0.0	0.0	6.5	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	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	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.5	0.0	0.0	5.6	0.0	0.0	6.4	0.0	0.0	6.8	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		311			160			134			206	
Approach Delay, s/veh		6.5			5.6			6.4			6.8	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.7	10.8	9.7	10.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.4	5.2	4.2	3.5
Green Ext Time (p_c), s	0.6	1.5	1.0	0.8

Intersection Summary	
HCM 7th Control Delay, s/veh	6.4
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	291	895	972
Demand Flow Rate, veh/h	0	294	913	982
Vehicles Circulating, veh/h	1160	731	180	201
Vehicles Exiting, veh/h	23	362	980	824
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	7.6	6.8	7.3
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.605	0.395	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	178	116	429	484	462	520
Cap Entry Lane, veh/h	464	530	689	763	1206	1206	1183	1183
Entry HV Adj Factor	1.000	1.000	0.989	0.991	0.981	0.980	0.989	0.991
Flow Entry, veh/h	0	0	176	115	421	474	457	515
Cap Entry, veh/h	464	530	681	756	1182	1182	1170	1172
V/C Ratio	0.000	0.000	0.258	0.152	0.356	0.401	0.391	0.440
Control Delay, s/veh	7.8	6.8	8.4	6.4	6.5	7.1	7.0	7.7
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	2	2	2

Intersection	
Intersection Delay, s/veh	20.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	804	384	887	1037
Demand Flow Rate, veh/h	820	395	914	1048
Vehicles Circulating, veh/h	1104	952	956	359
Vehicles Exiting, veh/h	303	918	968	988
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	32.0	10.9	27.7	10.0
Approach LOS	D	B	D	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	385	435	186	209	430	484	493	555
Cap Entry Lane, veh/h	489	556	562	632	560	630	970	1047
Entry HV Adj Factor	0.982	0.980	0.970	0.973	0.970	0.972	0.989	0.990
Flow Entry, veh/h	378	426	180	203	417	470	487	550
Cap Entry, veh/h	480	544	545	615	543	612	959	1037
V/C Ratio	0.787	0.783	0.331	0.331	0.768	0.768	0.508	0.530
Control Delay, s/veh	33.9	30.4	11.5	10.4	29.0	26.5	10.1	10.0
LOS	D	D	B	B	D	D	B	A
95th %tile Queue, veh	7	7	1	1	7	7	3	3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	26	0	928	1010	10
Future Vol, veh/h	0	26	0	928	1010	10
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	29	0	1043	1135	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	573	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	468	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	468	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.21	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	468	-	-
HCM Lane V/C Ratio	-	0.062	-	-
HCM Ctrl Dly (s/v)	-	13.2	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	12.8
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	304	293	1119	1344
Demand Flow Rate, veh/h	313	302	1130	1357
Vehicles Circulating, veh/h	1372	1193	469	185
Vehicles Exiting, veh/h	170	406	1216	1310
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	25.6	12.9	13.0	9.8
Approach LOS	D	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.796	0.204	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	249	64	158	144	531	599	638	719
Cap Entry Lane, veh/h	382	442	450	515	927	927	1200	1200
Entry HV Adj Factor	0.970	0.969	0.969	0.972	0.991	0.990	0.990	0.991
Flow Entry, veh/h	242	62	153	140	526	593	632	712
Cap Entry, veh/h	371	429	437	501	918	918	1188	1189
V/C Ratio	0.652	0.145	0.351	0.280	0.573	0.646	0.532	0.599
Control Delay, s/veh	29.4	10.5	14.4	11.4	11.9	14.0	9.1	10.4
LOS	D	B	B	B	B	B	A	B
95th %tile Queue, veh	4	1	2	1	4	5	3	4

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	514	1	9	192	4	26
Future Vol, veh/h	514	1	9	192	4	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	578	1	10	216	4	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	579	0	814	578
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	236	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	995	-	347	515
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	803	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	995	-	343	515
Mov Cap-2 Maneuver	-	-	-	-	343	-
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	794	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.39	13.01
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	483	-	-	81	-
HCM Lane V/C Ratio	0.07	-	-	0.01	-
HCM Ctrl Dly (s/v)	13	-	-	8.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

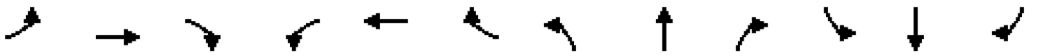
Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	539	1	9	199	2	26
Future Vol, veh/h	539	1	9	199	2	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	606	1	10	224	2	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	607	0	850	606
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	244	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	971	-	331	497
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	797	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	971	-	327	497
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	787	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.38	13.04
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	479	-	-	78	-
HCM Lane V/C Ratio	0.066	-	-	0.01	-
HCM Ctrl Dly (s/v)	13	-	-	8.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	177	18	36	321	61	58	118	25	38	81	16
Future Volume (veh/h)	11	177	18	36	321	61	58	118	25	38	81	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	13	206	21	42	373	71	67	137	29	44	94	19
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	158	617	60	180	555	100	258	261	49	247	276	48
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	32	1492	146	73	1342	242	333	1075	200	293	1140	197
Grp Volume(v), veh/h	240	0	0	486	0	0	233	0	0	157	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1657	0	0	1608	0	0	1630	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.5	0.0	0.0	6.2	0.0	0.0	3.2	0.0	0.0	2.0	0.0	0.0
Prop In Lane	0.05		0.09	0.09		0.15	0.29		0.12	0.28		0.12
Lane Grp Cap(c), veh/h	836	0	0	835	0	0	567	0	0	571	0	0
V/C Ratio(X)	0.29	0.00	0.00	0.58	0.00	0.00	0.41	0.00	0.00	0.27	0.00	0.00
Avail Cap(c_a), veh/h	1747	0	0	1746	0	0	1709	0	0	1698	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	5.2	0.0	0.0	6.3	0.0	0.0	8.7	0.0	0.0	8.3	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.3	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	0.2	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.4	0.0	0.0	7.0	0.0	0.0	9.2	0.0	0.0	8.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		240			486			233			157	
Approach Delay, s/veh		5.4			7.0			9.2			8.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.8		15.3		10.8		15.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		5.2		4.5		4.0		8.2				
Green Ext Time (p_c), s		1.1		1.1		0.7		2.6				

Intersection Summary												
HCM 7th Control Delay, s/veh			7.3									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	13.1
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	437	1661	1155
Demand Flow Rate, veh/h	0	437	1661	1167
Vehicles Circulating, veh/h	1428	1370	156	297
Vehicles Exiting, veh/h	36	447	1272	1510
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	24.5	12.3	10.0
Approach LOS	-	C	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.597	0.403	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	261	176	781	880	548	619
Cap Entry Lane, veh/h	363	422	383	443	1232	1232	1084	1084
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.991	0.989
Flow Entry, veh/h	0	0	261	176	781	880	543	612
Cap Entry, veh/h	363	422	383	443	1232	1233	1074	1072
V/C Ratio	0.000	0.000	0.682	0.397	0.634	0.714	0.506	0.571
Control Delay, s/veh	9.9	8.5	30.7	15.4	11.0	13.4	9.3	10.6
LOS	A	A	D	C	B	B	A	B
95th %tile Queue, veh	0	0	5	2	5	7	3	4

Intersection	
Intersection Delay, s/veh	31.1
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	446	764	1406	1075
Demand Flow Rate, veh/h	446	764	1406	1086
Vehicles Circulating, veh/h	1195	1391	515	788
Vehicles Exiting, veh/h	679	530	1126	1367
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	16.1	63.5	22.3	25.7
Approach LOS	C	F	C	D

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	210	236	359	405	661	745	510	576
Cap Entry Lane, veh/h	450	514	375	435	841	917	654	727
Entry HV Adj Factor	0.998	1.002	1.000	1.000	1.000	1.000	0.991	0.990
Flow Entry, veh/h	210	236	359	405	661	745	505	570
Cap Entry, veh/h	449	515	376	435	840	917	648	719
V/C Ratio	0.467	0.459	0.956	0.930	0.786	0.813	0.780	0.793
Control Delay, s/veh	17.2	15.1	69.5	58.2	22.0	22.5	26.3	25.3
LOS	C	C	F	F	C	C	D	D
95th %tile Queue, veh	2	2	11	11	8	9	7	8

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	25	0	1559	1090	20
Future Vol, veh/h	0	25	0	1559	1090	20
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	27	0	1695	1185	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	603	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	447	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	447	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.58	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	447	-	-
HCM Lane V/C Ratio	-	0.061	-	-
HCM Ctrl Dly (s/v)	-	13.6	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	242	371	1535	1086
Demand Flow Rate, veh/h	247	371	1535	1097
Vehicles Circulating, veh/h	1132	1541	375	267
Vehicles Exiting, veh/h	232	369	1004	1645
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.1	24.7	18.2	8.9
Approach LOS	B	C	C	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.822	0.178	0.534	0.466	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	203	44	198	173	721	814	516	581
Cap Entry Lane, veh/h	476	542	327	383	1009	1009	1114	1114
Entry HV Adj Factor	0.982	0.977	1.000	1.000	1.001	0.999	0.989	0.991
Flow Entry, veh/h	199	43	198	173	721	814	510	576
Cap Entry, veh/h	468	530	327	383	1010	1009	1102	1103
V/C Ratio	0.426	0.081	0.605	0.452	0.714	0.806	0.463	0.522
Control Delay, s/veh	15.4	7.8	29.6	19.2	15.5	20.5	8.4	9.4
LOS	C	A	D	C	C	C	A	A
95th %tile Queue, veh	2	0	4	2	6	9	3	3

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	309	4	28	489	3	17
Future Vol, veh/h	309	4	28	489	3	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	347	4	31	549	3	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	352	0	962	349
Stage 1	-	-	-	-	349	-
Stage 2	-	-	-	-	612	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1207	-	284	694
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	541	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1207	-	273	694
Mov Cap-2 Maneuver	-	-	-	-	273	-
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	521	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.44	11.65
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	564	-	-	97	-
HCM Lane V/C Ratio	0.04	-	-	0.026	-
HCM Ctrl Dly (s/v)	11.7	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	324	2	28	516	1	17
Future Vol, veh/h	324	2	28	516	1	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	364	2	31	580	1	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	366	0	1008	365
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	643	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1192	-	267	680
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	524	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1192	-	256	680
Mov Cap-2 Maneuver	-	-	-	-	256	-
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	503	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.42	10.98
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	623	-	-	93	-
HCM Lane V/C Ratio	0.032	-	-	0.026	-
HCM Ctrl Dly (s/v)	11	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	228	40	23	106	16	7	57	55	79	90	14
Future Volume (veh/h)	10	228	40	23	106	16	7	57	55	79	90	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	11	256	45	26	119	18	8	64	62	89	101	16
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	190	431	74	244	392	54	197	199	181	385	228	31
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	27	1402	241	132	1274	175	45	781	712	529	897	120
Grp Volume(v), veh/h	312	0	0	163	0	0	134	0	0	206	0	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1582	0	0	1538	0	0	1546	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Cycle Q Clear(g_c), s	3.2	0.0	0.0	1.6	0.0	0.0	1.4	0.0	0.0	2.2	0.0	0.0
Prop In Lane	0.04		0.14	0.16		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	695	0	0	690	0	0	577	0	0	644	0	0
V/C Ratio(X)	0.45	0.00	0.00	0.24	0.00	0.00	0.23	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	2242	0	0	2097	0	0	2079	0	0	2107	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	6.0	0.0	0.0	5.5	0.0	0.0	6.3	0.0	0.0	6.5	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	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	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.5	0.0	0.0	5.6	0.0	0.0	6.5	0.0	0.0	6.8	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		312			163			134			206	
Approach Delay, s/veh		6.5			5.6			6.5			6.8	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.7	10.8	9.7	10.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.4	5.2	4.2	3.6
Green Ext Time (p_c), s	0.6	1.5	1.0	0.8

Intersection Summary	
HCM 7th Control Delay, s/veh	6.4
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	291	903	974
Demand Flow Rate, veh/h	0	294	921	984
Vehicles Circulating, veh/h	1162	738	180	201
Vehicles Exiting, veh/h	23	363	982	831
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	7.7	6.8	7.4
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.605	0.395	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	178	116	433	488	462	522
Cap Entry Lane, veh/h	464	529	685	758	1206	1206	1183	1183
Entry HV Adj Factor	1.000	1.000	0.989	0.991	0.980	0.981	0.991	0.989
Flow Entry, veh/h	0	0	176	115	424	479	458	516
Cap Entry, veh/h	464	529	677	752	1182	1182	1172	1170
V/C Ratio	0.000	0.000	0.260	0.153	0.359	0.405	0.391	0.441
Control Delay, s/veh	7.8	6.8	8.5	6.4	6.5	7.1	7.0	7.7
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	2	2	2

Intersection	
Intersection Delay, s/veh	22.4
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	834	388	890	1040
Demand Flow Rate, veh/h	851	399	917	1051
Vehicles Circulating, veh/h	1104	966	977	366
Vehicles Exiting, veh/h	313	928	978	999
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	35.1	11.1	29.6	10.2
Approach LOS	E	B	D	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	400	451	188	211	431	486	494	557
Cap Entry Lane, veh/h	489	556	555	625	550	619	964	1040
Entry HV Adj Factor	0.980	0.980	0.969	0.974	0.971	0.971	0.990	0.990
Flow Entry, veh/h	392	442	182	206	418	472	489	551
Cap Entry, veh/h	479	544	538	608	533	601	954	1030
V/C Ratio	0.818	0.812	0.339	0.338	0.784	0.785	0.512	0.535
Control Delay, s/veh	37.3	33.2	11.8	10.6	31.0	28.3	10.2	10.1
LOS	E	D	B	B	D	D	B	B
95th %tile Queue, veh	8	8	1	1	7	7	3	3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	26	0	931	1019	10
Future Vol, veh/h	0	26	0	931	1019	10
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	29	0	1046	1145	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	578	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	464	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	464	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.28	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	464	-	-
HCM Lane V/C Ratio	-	0.063	-	-
HCM Ctrl Dly (s/v)	-	13.3	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	13.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	304	293	1122	1354
Demand Flow Rate, veh/h	313	302	1133	1367
Vehicles Circulating, veh/h	1382	1196	471	185
Vehicles Exiting, veh/h	170	408	1224	1313
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	26.1	13.0	13.1	9.9
Approach LOS	D	B	B	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.796	0.204	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	249	64	158	144	533	600	642	725
Cap Entry Lane, veh/h	379	439	449	514	925	925	1200	1200
Entry HV Adj Factor	0.970	0.969	0.969	0.972	0.990	0.991	0.991	0.990
Flow Entry, veh/h	242	62	153	140	528	595	636	717
Cap Entry, veh/h	367	425	435	499	916	917	1189	1188
V/C Ratio	0.658	0.146	0.352	0.280	0.576	0.649	0.535	0.604
Control Delay, s/veh	30.1	10.6	14.4	11.4	12.0	14.1	9.1	10.6
LOS	D	B	B	B	B	B	A	B
95th %tile Queue, veh	4	1	2	1	4	5	3	4

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	514	1	9	193	5	26
Future Vol, veh/h	514	1	9	193	5	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	578	1	10	217	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	579	0	815	578
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	237	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	995	-	347	515
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	802	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	995	-	343	515
Mov Cap-2 Maneuver	-	-	-	-	343	-
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	793	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.39	13.14
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	477	-	-	80	-
HCM Lane V/C Ratio	0.073	-	-	0.01	-
HCM Ctrl Dly (s/v)	13.1	-	-	8.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	539	1	18	199	3	53
Future Vol, veh/h	539	1	18	199	3	53
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	606	1	20	224	3	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	607	0	870	606
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	264	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	971	-	322	497
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	780	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	971	-	314	497
Mov Cap-2 Maneuver	-	-	-	-	314	-
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	762	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.73	13.59
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	482	-	-	149	-
HCM Lane V/C Ratio	0.131	-	-	0.021	-
HCM Ctrl Dly (s/v)	13.6	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	179	18	36	322	61	58	118	25	39	81	16
Future Volume (veh/h)	11	179	18	36	322	61	58	118	25	39	81	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	13	208	21	42	374	71	67	137	29	45	94	19
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	158	619	60	179	556	100	258	261	49	249	275	47
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	32	1494	145	73	1342	242	333	1076	200	299	1134	196
Grp Volume(v), veh/h	242	0	0	487	0	0	233	0	0	158	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1657	0	0	1609	0	0	1629	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.6	0.0	0.0	6.3	0.0	0.0	3.3	0.0	0.0	2.0	0.0	0.0
Prop In Lane	0.05		0.09	0.09		0.15	0.29		0.12	0.28		0.12
Lane Grp Cap(c), veh/h	837	0	0	835	0	0	567	0	0	571	0	0
V/C Ratio(X)	0.29	0.00	0.00	0.58	0.00	0.00	0.41	0.00	0.00	0.28	0.00	0.00
Avail Cap(c_a), veh/h	1746	0	0	1744	0	0	1707	0	0	1694	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	5.2	0.0	0.0	6.3	0.0	0.0	8.7	0.0	0.0	8.3	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.3	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	0.2	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.4	0.0	0.0	7.0	0.0	0.0	9.2	0.0	0.0	8.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		242			487			233			158	
Approach Delay, s/veh		5.4			7.0			9.2			8.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.8		15.4		10.8		15.4				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		5.3		4.6		4.0		8.3				
Green Ext Time (p_c), s		1.1		1.2		0.7		2.6				

Intersection Summary												
HCM 7th Control Delay, s/veh			7.3									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	13.3
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	439	1668	1164
Demand Flow Rate, veh/h	0	439	1668	1176
Vehicles Circulating, veh/h	1439	1376	156	299
Vehicles Exiting, veh/h	36	448	1283	1516
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	25.1	12.4	10.1
Approach LOS	-	D	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.599	0.401	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	263	176	784	884	553	623
Cap Entry Lane, veh/h	359	418	381	441	1232	1232	1082	1082
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.989	0.990
Flow Entry, veh/h	0	0	263	176	784	884	547	617
Cap Entry, veh/h	359	418	381	441	1232	1232	1070	1071
V/C Ratio	0.000	0.000	0.691	0.399	0.636	0.717	0.511	0.576
Control Delay, s/veh	10.0	8.6	31.5	15.5	11.1	13.5	9.4	10.7
LOS	B	A	D	C	B	B	A	B
95th %tile Queue, veh	0	0	5	2	5	7	3	4

Intersection	
Intersection Delay, s/veh	33.7
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	465	775	1416	1084
Demand Flow Rate, veh/h	465	775	1416	1095
Vehicles Circulating, veh/h	1195	1407	527	809
Vehicles Exiting, veh/h	709	536	1133	1373
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	16.7	70.2	23.6	28.0
Approach LOS	C	F	C	D

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	219	246	364	411	666	750	515	580
Cap Entry Lane, veh/h	450	514	370	429	831	907	641	714
Entry HV Adj Factor	0.998	1.002	1.001	0.999	0.999	1.001	0.990	0.991
Flow Entry, veh/h	219	246	364	411	666	750	510	575
Cap Entry, veh/h	449	515	370	429	831	908	635	707
V/C Ratio	0.487	0.478	0.984	0.957	0.801	0.827	0.803	0.812
Control Delay, s/veh	17.8	15.6	76.7	64.4	23.3	23.8	28.7	27.3
LOS	C	C	F	F	C	C	D	D
95th %tile Queue, veh	3	3	11	11	9	10	8	9

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	25	0	1568	1096	20
Future Vol, veh/h	0	25	0	1568	1096	20
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	27	0	1704	1191	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	607	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	445	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	445	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.62	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	445	-	-
HCM Lane V/C Ratio	-	0.061	-	-
HCM Ctrl Dly (s/v)	-	13.6	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	15.7
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	242	373	1543	1092
Demand Flow Rate, veh/h	247	373	1543	1103
Vehicles Circulating, veh/h	1138	1549	376	267
Vehicles Exiting, veh/h	232	370	1009	1655
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.2	25.1	18.5	9.0
Approach LOS	B	D	C	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.822	0.178	0.531	0.469	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	203	44	198	175	725	818	518	585
Cap Entry Lane, veh/h	474	540	325	381	1009	1009	1114	1114
Entry HV Adj Factor	0.982	0.977	1.000	1.000	1.000	1.000	0.991	0.989
Flow Entry, veh/h	199	43	198	175	725	818	513	579
Cap Entry, veh/h	465	527	325	381	1009	1008	1103	1102
V/C Ratio	0.428	0.082	0.610	0.460	0.719	0.811	0.465	0.525
Control Delay, s/veh	15.6	7.8	30.0	19.6	15.7	20.9	8.4	9.4
LOS	C	A	D	C	C	C	A	A
95th %tile Queue, veh	2	0	4	2	6	9	3	3

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	311	6	28	490	4	17
Future Vol, veh/h	311	6	28	490	4	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	349	7	31	551	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	356	0	966	353
Stage 1	-	-	-	-	353	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1203	-	282	691
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	540	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1203	-	272	691
Mov Cap-2 Maneuver	-	-	-	-	272	-
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	520	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.44	12.05
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	534	-	-	97	-
HCM Lane V/C Ratio	0.044	-	-	0.026	-
HCM Ctrl Dly (s/v)	12.1	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

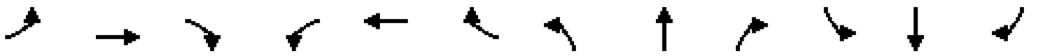
Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	324	4	56	516	2	35
Future Vol, veh/h	324	4	56	516	2	35
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	364	4	63	580	2	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	369	0	1072	366
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	706	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1190	-	244	679
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	490	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1190	-	225	679
Mov Cap-2 Maneuver	-	-	-	-	225	-
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	451	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.8	11.31
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	612	-	-	176	-
HCM Lane V/C Ratio	0.068	-	-	0.053	-
HCM Ctrl Dly (s/v)	11.3	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	246	43	24	114	18	8	61	60	86	97	16
Future Volume (veh/h)	10	246	43	24	114	18	8	61	60	86	97	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	11	276	48	27	128	20	9	69	67	97	109	18
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	179	453	77	232	411	58	189	205	186	377	234	32
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	23	1408	239	124	1276	181	45	782	710	528	891	124
Grp Volume(v), veh/h	335	0	0	175	0	0	145	0	0	224	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1581	0	0	1537	0	0	1543	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
Cycle Q Clear(g_c), s	3.7	0.0	0.0	1.7	0.0	0.0	1.6	0.0	0.0	2.6	0.0	0.0
Prop In Lane	0.03		0.14	0.15		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	710	0	0	701	0	0	580	0	0	643	0	0
V/C Ratio(X)	0.47	0.00	0.00	0.25	0.00	0.00	0.25	0.00	0.00	0.35	0.00	0.00
Avail Cap(c_a), veh/h	2130	0	0	1989	0	0	1973	0	0	1995	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	6.2	0.0	0.0	5.6	0.0	0.0	6.5	0.0	0.0	6.8	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	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	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.7	0.0	0.0	5.7	0.0	0.0	6.7	0.0	0.0	7.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		335			175			145			224	
Approach Delay, s/veh		6.7			5.7			6.7			7.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	10.2	11.5	10.2	11.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.6	5.7	4.6	3.7
Green Ext Time (p_c), s	0.7	1.7	1.1	0.8

Intersection Summary	
HCM 7th Control Delay, s/veh	6.6
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	312	968	1047
Demand Flow Rate, veh/h	0	315	987	1058
Vehicles Circulating, veh/h	1248	792	193	214
Vehicles Exiting, veh/h	24	388	1055	893
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	8.4	7.3	8.0
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.603	0.397	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	190	125	464	523	497	561
Cap Entry Lane, veh/h	428	492	651	724	1191	1191	1169	1169
Entry HV Adj Factor	1.000	1.000	0.989	0.992	0.980	0.981	0.991	0.990
Flow Entry, veh/h	0	0	188	124	455	513	492	555
Cap Entry, veh/h	428	492	645	718	1168	1169	1158	1157
V/C Ratio	0.000	0.000	0.292	0.173	0.389	0.439	0.425	0.480
Control Delay, s/veh	8.4	7.3	9.3	6.9	7.0	7.7	7.5	8.4
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	2	2	3

Intersection	
Intersection Delay, s/veh	32.8
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	892	417	956	1116
Demand Flow Rate, veh/h	910	430	985	1127
Vehicles Circulating, veh/h	1184	1035	1045	392
Vehicles Exiting, veh/h	335	995	1049	1073
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	55.8	12.8	44.8	11.5
Approach LOS	F	B	E	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	428	482	202	228	463	522	530	597
Cap Entry Lane, veh/h	454	519	521	589	516	584	941	1018
Entry HV Adj Factor	0.980	0.981	0.971	0.970	0.970	0.970	0.989	0.990
Flow Entry, veh/h	419	473	196	221	449	507	524	591
Cap Entry, veh/h	445	509	506	572	501	567	931	1008
V/C Ratio	0.942	0.929	0.388	0.387	0.897	0.894	0.563	0.587
Control Delay, s/veh	59.8	52.3	13.5	12.2	47.1	42.8	11.5	11.4
LOS	F	F	B	B	E	E	B	B
95th %tile Queue, veh	11	11	2	2	10	11	4	4

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	29	0	1001	1095	10
Future Vol, veh/h	0	29	0	1001	1095	10
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	33	0	1125	1230	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	621	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	435	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	435	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.94	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	435	-	-
HCM Lane V/C Ratio	-	0.075	-	-
HCM Ctrl Dly (s/v)	-	13.9	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	15.8
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	325	317	1205	1455
Demand Flow Rate, veh/h	335	327	1216	1469
Vehicles Circulating, veh/h	1485	1283	504	199
Vehicles Exiting, veh/h	183	437	1316	1411
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	37.1	15.2	15.7	11.2
Approach LOS	E	C	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.797	0.203	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	267	68	171	156	572	644	690	779
Cap Entry Lane, veh/h	344	402	415	477	898	898	1185	1185
Entry HV Adj Factor	0.972	0.971	0.971	0.968	0.990	0.991	0.991	0.990
Flow Entry, veh/h	259	66	166	151	566	638	684	771
Cap Entry, veh/h	335	390	403	462	889	890	1174	1173
V/C Ratio	0.775	0.169	0.412	0.327	0.637	0.717	0.582	0.657
Control Delay, s/veh	43.5	11.9	17.1	13.2	14.1	17.2	10.2	12.0
LOS	E	B	C	B	B	C	B	B
95th %tile Queue, veh	6	1	2	1	5	6	4	5

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	553	1	9	208	5	26
Future Vol, veh/h	553	1	9	208	5	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	621	1	10	234	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	622	0	876	622
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	254	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	958	-	319	487
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	958	-	316	487
Mov Cap-2 Maneuver	-	-	-	-	316	-
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	779	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.36	13.72
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	448	-	-	75	-
HCM Lane V/C Ratio	0.078	-	-	0.011	-
HCM Ctrl Dly (s/v)	13.7	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

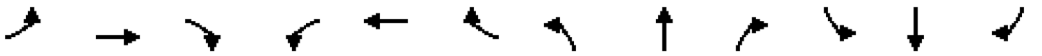
Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	578	1	18	214	3	53
Future Vol, veh/h	578	1	18	214	3	53
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	649	1	20	240	3	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	651	0	931	650
Stage 1	-	-	-	-	650	-
Stage 2	-	-	-	-	281	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	936	-	296	469
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	767	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	936	-	289	469
Mov Cap-2 Maneuver	-	-	-	-	289	-
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	748	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.69	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	454	-	-	140	-
HCM Lane V/C Ratio	0.139	-	-	0.022	-
HCM Ctrl Dly (s/v)	14.2	-	-	8.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	192	19	39	346	66	62	127	27	42	87	17
Future Volume (veh/h)	12	192	19	39	346	66	62	127	27	42	87	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	14	223	22	45	402	77	72	148	31	49	101	20
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	149	644	61	171	576	105	248	268	49	241	282	48
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	31	1496	142	73	1339	243	333	1078	199	303	1136	192
Grp Volume(v), veh/h	259	0	0	524	0	0	251	0	0	170	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1655	0	0	1609	0	0	1631	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.5	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	7.3	0.0	0.0	3.8	0.0	0.0	2.3	0.0	0.0
Prop In Lane	0.05		0.08	0.09		0.15	0.29		0.12	0.29		0.12
Lane Grp Cap(c), veh/h	854	0	0	852	0	0	565	0	0	571	0	0
V/C Ratio(X)	0.30	0.00	0.00	0.62	0.00	0.00	0.44	0.00	0.00	0.30	0.00	0.00
Avail Cap(c_a), veh/h	1631	0	0	1629	0	0	1595	0	0	1582	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	5.4	0.0	0.0	6.6	0.0	0.0	9.3	0.0	0.0	8.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.7	0.0	0.0	0.5	0.0	0.0	0.3	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	0.2	0.0	0.0	0.8	0.0	0.0	0.7	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.6	0.0	0.0	7.3	0.0	0.0	9.8	0.0	0.0	9.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		259			524			251			170	
Approach Delay, s/veh		5.6			7.3			9.8			9.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.5		16.6		11.5		16.6				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		5.8		4.9		4.3		9.3				
Green Ext Time (p_c), s		1.2		1.2		0.8		2.8				

Intersection Summary	
HCM 7th Control Delay, s/veh	7.7
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	16.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	473	1797	1254
Demand Flow Rate, veh/h	0	473	1797	1267
Vehicles Circulating, veh/h	1550	1482	170	322
Vehicles Exiting, veh/h	39	485	1380	1633
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	36.4	14.8	11.5
Approach LOS	-	E	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.598	0.402	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	283	190	845	952	595	672
Cap Entry Lane, veh/h	324	380	345	403	1217	1217	1059	1059
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.991	0.989
Flow Entry, veh/h	0	0	283	190	845	952	589	665
Cap Entry, veh/h	324	380	345	403	1216	1217	1049	1048
V/C Ratio	0.000	0.000	0.820	0.472	0.695	0.783	0.562	0.634
Control Delay, s/veh	11.1	9.5	48.0	19.0	12.9	16.6	10.5	12.4
LOS	B	A	E	C	B	C	B	B
95th %tile Queue, veh	0	0	7	2	6	9	4	5

Intersection	
Intersection Delay, s/veh	54.2
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	496	833	1522	1166
Demand Flow Rate, veh/h	496	833	1522	1178
Vehicles Circulating, veh/h	1287	1512	566	867
Vehicles Exiting, veh/h	758	576	1217	1478
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	20.7	125.6	34.6	42.9
Approach LOS	C	F	D	E

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	233	263	392	441	715	807	554	624
Cap Entry Lane, veh/h	413	475	336	393	802	878	608	680
Entry HV Adj Factor	1.001	1.000	0.999	1.001	1.000	1.000	0.989	0.990
Flow Entry, veh/h	233	263	392	441	715	807	548	618
Cap Entry, veh/h	413	475	336	393	802	877	601	673
V/C Ratio	0.564	0.553	1.167	1.123	0.892	0.919	0.911	0.918
Control Delay, s/veh	22.2	19.3	137.2	115.3	33.5	35.6	44.0	42.0
LOS	C	C	F	F	D	E	E	E
95th %tile Queue, veh	3	3	16	16	12	14	11	12

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	27	0	1686	1179	22
Future Vol, veh/h	0	27	0	1686	1179	22
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	29	0	1833	1282	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	653	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	415	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	415	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14.34	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	415	-	-
HCM Lane V/C Ratio	-	0.071	-	-
HCM Ctrl Dly (s/v)	-	14.3	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	20.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	260	401	1660	1175
Demand Flow Rate, veh/h	266	401	1660	1187
Vehicles Circulating, veh/h	1225	1666	405	288
Vehicles Exiting, veh/h	250	399	1085	1780
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	17.2	34.8	25.2	10.0
Approach LOS	C	D	D	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.823	0.177	0.531	0.469	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	219	47	213	188	780	880	558	629
Cap Entry Lane, veh/h	437	501	292	345	982	982	1093	1093
Entry HV Adj Factor	0.978	0.979	1.000	1.000	1.000	1.000	0.990	0.990
Flow Entry, veh/h	214	46	213	188	780	880	552	623
Cap Entry, veh/h	428	491	292	345	983	982	1082	1082
V/C Ratio	0.501	0.094	0.731	0.546	0.794	0.896	0.511	0.576
Control Delay, s/veh	19.1	8.6	43.3	25.0	20.1	29.7	9.3	10.6
LOS	C	A	E	D	C	D	A	B
95th %tile Queue, veh	3	0	5	3	9	13	3	4

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	334	6	28	528	4	17
Future Vol, veh/h	334	6	28	528	4	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	375	7	31	593	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	382	0	1035	379
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	656	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1176	-	257	668
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1176	-	247	668
Mov Cap-2 Maneuver	-	-	-	-	247	-
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	496	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.41	12.49
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	504	-	-	91	-
HCM Lane V/C Ratio	0.047	-	-	0.027	-
HCM Ctrl Dly (s/v)	12.5	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

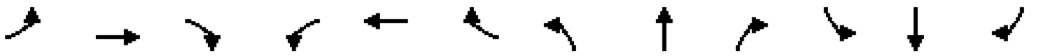
Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	347	4	56	554	2	35
Future Vol, veh/h	347	4	56	554	2	35
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	390	4	63	622	2	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	394	0	1140	392
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	748	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1164	-	222	657
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	468	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1164	-	204	657
Mov Cap-2 Maneuver	-	-	-	-	204	-
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	429	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.76	11.61
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	586	-	-	165	-
HCM Lane V/C Ratio	0.071	-	-	0.054	-
HCM Ctrl Dly (s/v)	11.6	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	247	43	24	116	18	8	61	60	86	97	16
Future Volume (veh/h)	10	247	43	24	116	18	8	61	60	86	97	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	11	278	48	27	130	20	9	69	67	97	109	18
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	179	456	77	231	414	58	188	205	186	376	233	32
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	23	1410	238	122	1281	179	45	782	710	528	891	124
Grp Volume(v), veh/h	337	0	0	177	0	0	145	0	0	224	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1581	0	0	1537	0	0	1543	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
Cycle Q Clear(g_c), s	3.7	0.0	0.0	1.8	0.0	0.0	1.7	0.0	0.0	2.6	0.0	0.0
Prop In Lane	0.03		0.14	0.15		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	712	0	0	703	0	0	579	0	0	642	0	0
V/C Ratio(X)	0.47	0.00	0.00	0.25	0.00	0.00	0.25	0.00	0.00	0.35	0.00	0.00
Avail Cap(c_a), veh/h	2125	0	0	1985	0	0	1968	0	0	1990	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	6.2	0.0	0.0	5.6	0.0	0.0	6.5	0.0	0.0	6.8	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	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	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.7	0.0	0.0	5.7	0.0	0.0	6.7	0.0	0.0	7.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		337			177			145			224	
Approach Delay, s/veh		6.7			5.7			6.7			7.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	10.2	11.5	10.2	11.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	3.7	5.7	4.6	3.8
Green Ext Time (p_c), s	0.7	1.7	1.1	0.9

Intersection Summary	
HCM 7th Control Delay, s/veh	6.6
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	312	977	1050
Demand Flow Rate, veh/h	0	315	996	1061
Vehicles Circulating, veh/h	1251	799	193	214
Vehicles Exiting, veh/h	24	390	1058	900
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	8.4	7.4	8.0
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.603	0.397	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	190	125	468	528	499	562
Cap Entry Lane, veh/h	427	490	647	720	1191	1191	1169	1169
Entry HV Adj Factor	1.000	1.000	0.989	0.992	0.981	0.981	0.989	0.991
Flow Entry, veh/h	0	0	188	124	459	518	494	557
Cap Entry, veh/h	427	490	640	714	1169	1168	1156	1158
V/C Ratio	0.000	0.000	0.294	0.174	0.393	0.443	0.427	0.481
Control Delay, s/veh	8.4	7.3	9.4	7.0	7.0	7.7	7.5	8.4
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	2	2	3

Intersection	
Intersection Delay, s/veh	35.3
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	916	419	959	1118
Demand Flow Rate, veh/h	934	432	988	1129
Vehicles Circulating, veh/h	1184	1046	1061	397
Vehicles Exiting, veh/h	342	1003	1057	1081
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	61.1	13.0	47.9	11.6
Approach LOS	F	B	E	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	439	495	203	229	464	524	531	598
Cap Entry Lane, veh/h	454	519	516	584	509	576	937	1013
Entry HV Adj Factor	0.981	0.981	0.971	0.971	0.971	0.970	0.989	0.991
Flow Entry, veh/h	431	485	197	222	451	508	525	592
Cap Entry, veh/h	445	509	501	566	494	559	927	1004
V/C Ratio	0.966	0.954	0.394	0.392	0.912	0.909	0.567	0.590
Control Delay, s/veh	65.1	57.5	13.7	12.4	50.2	45.8	11.7	11.6
LOS	F	F	B	B	F	E	B	B
95th %tile Queue, veh	12	12	2	2	11	11	4	4

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	29	0	1003	1102	10
Future Vol, veh/h	0	29	0	1003	1102	10
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	33	0	1127	1238	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	625	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	433	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	433	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	433	-	-
HCM Lane V/C Ratio	-	0.075	-	-
HCM Ctrl Dly (s/v)	-	14	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	325	317	1207	1464
Demand Flow Rate, veh/h	335	327	1218	1478
Vehicles Circulating, veh/h	1494	1285	506	199
Vehicles Exiting, veh/h	183	439	1323	1413
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	38.0	15.3	15.9	11.2
Approach LOS	E	C	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.797	0.203	0.523	0.477	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	267	68	171	156	572	646	695	783
Cap Entry Lane, veh/h	342	399	414	476	896	896	1185	1185
Entry HV Adj Factor	0.972	0.971	0.971	0.968	0.991	0.990	0.990	0.991
Flow Entry, veh/h	259	66	166	151	567	640	688	776
Cap Entry, veh/h	332	387	402	461	888	887	1173	1174
V/C Ratio	0.782	0.171	0.413	0.328	0.638	0.721	0.587	0.661
Control Delay, s/veh	44.6	12.1	17.2	13.2	14.1	17.4	10.3	12.1
LOS	E	B	C	B	B	C	B	B
95th %tile Queue, veh	6	1	2	1	5	6	4	5

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	554	1	9	210	5	26
Future Vol, veh/h	554	1	9	210	5	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	622	1	10	236	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	624	0	879	623
Stage 1	-	-	-	-	623	-
Stage 2	-	-	-	-	256	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	958	-	318	486
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	787	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	958	-	314	486
Mov Cap-2 Maneuver	-	-	-	-	314	-
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	777	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.36	13.74
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	447	-	-	74	-
HCM Lane V/C Ratio	0.078	-	-	0.011	-
HCM Ctrl Dly (s/v)	13.7	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	578	2	25	214	5	75
Future Vol, veh/h	578	2	25	214	5	75
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	649	2	28	240	6	84

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	652	0	947	651
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	297	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	935	-	290	469
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	754	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	935	-	280	469
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	728	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.94	14.99
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	450	-	-	188	-
HCM Lane V/C Ratio	0.2	-	-	0.03	-
HCM Ctrl Dly (s/v)	15	-	-	9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	194	19	39	347	66	62	127	27	42	87	17
Future Volume (veh/h)	12	194	19	39	347	66	62	127	27	42	87	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	14	226	22	45	403	77	72	148	31	49	101	20
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	149	646	60	171	577	105	248	268	49	241	282	48
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	31	1499	140	73	1339	243	333	1078	199	303	1136	192
Grp Volume(v), veh/h	262	0	0	525	0	0	251	0	0	170	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1655	0	0	1609	0	0	1631	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	7.3	0.0	0.0	3.8	0.0	0.0	2.3	0.0	0.0
Prop In Lane	0.05		0.08	0.09		0.15	0.29		0.12	0.29		0.12
Lane Grp Cap(c), veh/h	855	0	0	853	0	0	565	0	0	570	0	0
V/C Ratio(X)	0.31	0.00	0.00	0.62	0.00	0.00	0.44	0.00	0.00	0.30	0.00	0.00
Avail Cap(c_a), veh/h	1630	0	0	1627	0	0	1593	0	0	1580	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	5.4	0.0	0.0	6.6	0.0	0.0	9.3	0.0	0.0	8.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0	0.3	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	0.2	0.0	0.0	0.8	0.0	0.0	0.7	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.6	0.0	0.0	7.3	0.0	0.0	9.9	0.0	0.0	9.1	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		262			525			251			170	
Approach Delay, s/veh		5.6			7.3			9.9			9.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	11.5	16.6	11.5	16.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	25.5	25.5	25.5
Max Q Clear Time (g_c+I1), s	5.8	4.9	4.3	9.3
Green Ext Time (p_c), s	1.2	1.3	0.8	2.8

Intersection Summary	
HCM 7th Control Delay, s/veh	7.7
HCM 7th LOS	A

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	474	1802	1261
Demand Flow Rate, veh/h	0	474	1802	1274
Vehicles Circulating, veh/h	1558	1486	170	323
Vehicles Exiting, veh/h	39	486	1388	1637
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	37.0	14.9	11.6
Approach LOS	-	E	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.599	0.401	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	284	190	847	955	599	675
Cap Entry Lane, veh/h	322	378	344	401	1217	1217	1058	1058
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.989	0.990
Flow Entry, veh/h	0	0	284	190	847	955	593	668
Cap Entry, veh/h	322	378	344	401	1216	1217	1047	1048
V/C Ratio	0.000	0.000	0.825	0.473	0.696	0.785	0.566	0.638
Control Delay, s/veh	11.2	9.5	49.0	19.1	12.9	16.7	10.7	12.5
LOS	B	A	E	C	B	C	B	B
95th %tile Queue, veh	0	0	7	2	6	9	4	5

Intersection	
Intersection Delay, s/veh	58.6
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	514	842	1531	1175
Demand Flow Rate, veh/h	514	842	1531	1187
Vehicles Circulating, veh/h	1287	1527	578	885
Vehicles Exiting, veh/h	785	582	1223	1484
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	21.6	135.9	37.2	47.4
Approach LOS	C	F	E	E

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	242	272	396	446	720	811	558	629
Cap Entry Lane, veh/h	413	475	331	388	793	869	598	669
Entry HV Adj Factor	0.998	1.002	0.999	1.001	0.999	1.001	0.990	0.990
Flow Entry, veh/h	242	272	396	446	720	811	552	623
Cap Entry, veh/h	412	476	331	388	793	869	592	663
V/C Ratio	0.586	0.572	1.195	1.150	0.908	0.933	0.933	0.940
Control Delay, s/veh	23.3	20.0	148.0	125.2	36.1	38.2	48.4	46.4
LOS	C	C	F	F	E	E	E	E
95th %tile Queue, veh	4	4	17	17	12	14	12	13

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	27	0	1694	1184	22
Future Vol, veh/h	0	27	0	1694	1184	22
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	29	0	1841	1287	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	655	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	413	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	413	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14.38	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	413	-	-
HCM Lane V/C Ratio	-	0.071	-	-
HCM Ctrl Dly (s/v)	-	14.4	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	20.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	260	402	1667	1180
Demand Flow Rate, veh/h	266	402	1667	1192
Vehicles Circulating, veh/h	1230	1673	406	288
Vehicles Exiting, veh/h	250	400	1089	1788
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	17.3	35.3	25.7	10.0
Approach LOS	C	E	D	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.823	0.177	0.530	0.470	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	219	47	213	189	783	884	560	632
Cap Entry Lane, veh/h	435	499	290	342	981	981	1093	1093
Entry HV Adj Factor	0.978	0.979	1.000	1.000	1.001	0.999	0.991	0.990
Flow Entry, veh/h	214	46	213	189	783	884	555	626
Cap Entry, veh/h	426	488	290	342	982	981	1082	1081
V/C Ratio	0.503	0.094	0.735	0.552	0.798	0.901	0.513	0.578
Control Delay, s/veh	19.2	8.6	44.1	25.5	20.4	30.4	9.3	10.7
LOS	C	A	E	D	C	D	A	B
95th %tile Queue, veh	3	0	5	3	9	13	3	4

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	336	7	28	529	4	17
Future Vol, veh/h	336	7	28	529	4	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	378	8	31	594	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	385	0	1039	381
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	657	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1173	-	256	666
Stage 1	-	-	-	-	690	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1173	-	245	666
Mov Cap-2 Maneuver	-	-	-	-	245	-
Stage 1	-	-	-	-	690	-
Stage 2	-	-	-	-	495	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.41	12.53
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	502	-	-	90	-
HCM Lane V/C Ratio	0.047	-	-	0.027	-
HCM Ctrl Dly (s/v)	12.5	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	347	6	79	554	3	49
Future Vol, veh/h	347	6	79	554	3	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	390	7	89	622	3	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	397	0	1193	393
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	800	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1162	-	206	656
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	442	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1162	-	182	656
Mov Cap-2 Maneuver	-	-	-	-	182	-
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	391	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.04	12.03
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	570	-	-	225	-
HCM Lane V/C Ratio	0.102	-	-	0.076	-
HCM Ctrl Dly (s/v)	12	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.2	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	11	265	46	26	124	19	8	66	64	92	105	17
Future Volume (veh/h)	11	265	46	26	124	19	8	66	64	92	105	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	12	298	52	29	139	21	9	74	72	103	118	19
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	171	476	81	222	434	59	178	210	191	365	241	33
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	23	1408	240	120	1285	176	41	783	714	522	899	122
Grp Volume(v), veh/h	362	0	0	189	0	0	155	0	0	240	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1580	0	0	1538	0	0	1543	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Cycle Q Clear(g_c), s	4.2	0.0	0.0	2.0	0.0	0.0	1.9	0.0	0.0	2.9	0.0	0.0
Prop In Lane	0.03		0.14	0.15		0.11	0.06		0.46	0.43		0.08
Lane Grp Cap(c), veh/h	727	0	0	716	0	0	579	0	0	639	0	0
V/C Ratio(X)	0.50	0.00	0.00	0.26	0.00	0.00	0.27	0.00	0.00	0.38	0.00	0.00
Avail Cap(c_a), veh/h	2018	0	0	1882	0	0	1870	0	0	1887	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	6.4	0.0	0.0	5.7	0.0	0.0	6.8	0.0	0.0	7.1	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4	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	0.3	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.9	0.0	0.0	5.8	0.0	0.0	7.0	0.0	0.0	7.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		362			189			155			240	
Approach Delay, s/veh		6.9			5.8			7.0			7.5	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.6		12.2		10.6		12.2				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		3.9		6.2		4.9		4.0				
Green Ext Time (p_c), s		0.7		1.8		1.2		0.9				

Intersection Summary												
HCM 7th Control Delay, s/veh			6.9									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	337	1049	1129
Demand Flow Rate, veh/h	0	340	1070	1140
Vehicles Circulating, veh/h	1345	859	208	233
Vehicles Exiting, veh/h	28	419	1137	966
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	9.4	8.0	8.8
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.603	0.397	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	205	135	503	567	536	604
Cap Entry Lane, veh/h	392	453	613	684	1175	1175	1149	1149
Entry HV Adj Factor	1.000	1.000	0.990	0.993	0.980	0.980	0.990	0.990
Flow Entry, veh/h	0	0	203	134	493	556	531	598
Cap Entry, veh/h	392	453	607	679	1152	1152	1137	1138
V/C Ratio	0.000	0.000	0.335	0.197	0.428	0.482	0.467	0.526
Control Delay, s/veh	9.2	8.0	10.6	7.6	7.6	8.4	8.2	9.2
LOS	A	A	B	A	A	A	A	A
95th %tile Queue, veh	0	0	1	1	2	3	3	3

Intersection	
Intersection Delay, s/veh	58.5
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	977	449	1031	1207
Demand Flow Rate, veh/h	996	463	1062	1219
Vehicles Circulating, veh/h	1280	1122	1139	425
Vehicles Exiting, veh/h	364	1079	1137	1160
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	107.9	15.3	83.1	13.6
Approach LOS	F	C	F	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	468	528	218	245	499	563	573	646
Cap Entry Lane, veh/h	416	478	481	547	473	539	913	989
Entry HV Adj Factor	0.981	0.981	0.968	0.971	0.971	0.971	0.990	0.990
Flow Entry, veh/h	459	518	211	238	485	547	567	640
Cap Entry, veh/h	408	469	466	531	460	524	904	980
V/C Ratio	1.125	1.104	0.453	0.448	1.054	1.044	0.628	0.653
Control Delay, s/veh	114.6	102.0	16.3	14.4	87.1	79.5	13.6	13.6
LOS	F	F	C	B	F	F	B	B
95th %tile Queue, veh	17	17	2	2	15	16	5	5

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	31	0	1080	1184	11
Future Vol, veh/h	0	31	0	1080	1184	11
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	35	0	1213	1330	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	671	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	403	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	403	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14.77	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	403	-	-
HCM Lane V/C Ratio	-	0.086	-	-
HCM Ctrl Dly (s/v)	-	14.8	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-

Intersection	
Intersection Delay, s/veh	21.1
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	351	341	1299	1574
Demand Flow Rate, veh/h	362	351	1312	1590
Vehicles Circulating, veh/h	1607	1384	546	213
Vehicles Exiting, veh/h	196	474	1423	1522
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	62.4	18.4	20.5	13.0
Approach LOS	F	C	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.796	0.204	0.521	0.479	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	288	74	183	168	617	695	747	843
Cap Entry Lane, veh/h	308	362	378	438	864	864	1170	1170
Entry HV Adj Factor	0.970	0.973	0.972	0.970	0.989	0.991	0.990	0.990
Flow Entry, veh/h	279	72	178	163	610	688	740	834
Cap Entry, veh/h	299	352	367	425	855	856	1159	1158
V/C Ratio	0.936	0.204	0.484	0.384	0.714	0.804	0.639	0.721
Control Delay, s/veh	75.0	13.8	21.1	15.6	17.6	23.0	11.6	14.3
LOS	F	B	C	C	C	C	B	B
95th %tile Queue, veh	9	1	3	2	6	9	5	7

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	596	1	9	225	5	26
Future Vol, veh/h	596	1	9	225	5	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	670	1	10	253	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	671	0	943	670
Stage 1	-	-	-	-	670	-
Stage 2	-	-	-	-	273	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	920	-	291	457
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	773	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	920	-	288	457
Mov Cap-2 Maneuver	-	-	-	-	288	-
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	763	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.34	14.41
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	417	-	-	69	-
HCM Lane V/C Ratio	0.083	-	-	0.011	-
HCM Ctrl Dly (s/v)	14.4	-	-	9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	620	2	25	229	5	75
Future Vol, veh/h	620	2	25	229	5	75
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	697	2	28	257	6	84

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	699	0	1011	698
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	313	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	898	-	265	441
Stage 1	-	-	-	-	494	-
Stage 2	-	-	-	-	741	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	898	-	256	441
Mov Cap-2 Maneuver	-	-	-	-	256	-
Stage 1	-	-	-	-	494	-
Stage 2	-	-	-	-	714	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.9	15.84
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	422	-	-	177	-
HCM Lane V/C Ratio	0.213	-	-	0.031	-
HCM Ctrl Dly (s/v)	15.8	-	-	9.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	13	208	21	42	373	71	67	137	29	45	93	18
Future Volume (veh/h)	13	208	21	42	373	71	67	137	29	45	93	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	15	242	24	49	434	83	78	159	34	52	108	21
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	139	670	64	163	598	109	239	273	51	230	292	48
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	31	1495	142	75	1334	242	336	1070	202	302	1144	190
Grp Volume(v), veh/h	281	0	0	566	0	0	271	0	0	181	0	0
Grp Sat Flow(s),veh/h/ln	1668	0	0	1652	0	0	1608	0	0	1635	0	0
Q Serve(g_s), s	0.0	0.0	0.0	2.3	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.3	0.0	0.0	8.6	0.0	0.0	4.4	0.0	0.0	2.7	0.0	0.0
Prop In Lane	0.05		0.09	0.09		0.15	0.29		0.13	0.29		0.12
Lane Grp Cap(c), veh/h	872	0	0	869	0	0	563	0	0	570	0	0
V/C Ratio(X)	0.32	0.00	0.00	0.65	0.00	0.00	0.48	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	1507	0	0	1504	0	0	1472	0	0	1462	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	5.5	0.0	0.0	7.0	0.0	0.0	10.0	0.0	0.0	9.4	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.8	0.0	0.0	0.6	0.0	0.0	0.3	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	0.3	0.0	0.0	1.1	0.0	0.0	0.9	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.7	0.0	0.0	7.8	0.0	0.0	10.7	0.0	0.0	9.7	0.0	0.0
LnGrp LOS	A			A			B			A		
Approach Vol, veh/h		281			566			271			181	
Approach Delay, s/veh		5.7			7.8			10.7			9.7	
Approach LOS		A			A			B			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.2		18.1		12.2		18.1				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		6.4		5.3		4.7		10.6				
Green Ext Time (p_c), s		1.3		1.4		0.9		3.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			8.2									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	22.3
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	508	1937	1354
Demand Flow Rate, veh/h	0	508	1937	1368
Vehicles Circulating, veh/h	1673	1597	181	346
Vehicles Exiting, veh/h	41	521	1492	1759
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	60.2	18.6	13.5
Approach LOS	-	F	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.600	0.400	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	305	203	910	1027	643	725
Cap Entry Lane, veh/h	290	342	311	365	1204	1204	1036	1036
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.990	0.990
Flow Entry, veh/h	0	0	305	203	910	1027	636	718
Cap Entry, veh/h	290	342	311	365	1205	1204	1026	1026
V/C Ratio	0.000	0.000	0.982	0.556	0.756	0.853	0.620	0.699
Control Delay, s/veh	12.4	10.5	84.1	24.3	15.3	21.5	12.2	14.7
LOS	B	B	F	C	C	C	B	B
95th %tile Queue, veh	0	0	10	3	8	11	4	6

Intersection	
Intersection Delay, s/veh	96.1
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	546	903	1646	1261
Demand Flow Rate, veh/h	546	903	1646	1274
Vehicles Circulating, veh/h	1385	1638	617	946
Vehicles Exiting, veh/h	835	625	1314	1595
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	28.4	222.9	61.1	80.2
Approach LOS	D	F	F	F

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	257	289	424	479	774	872	599	675
Cap Entry Lane, veh/h	378	437	299	353	765	840	565	635
Entry HV Adj Factor	0.999	1.001	1.001	0.999	1.000	1.000	0.990	0.990
Flow Entry, veh/h	257	289	424	479	774	872	593	668
Cap Entry, veh/h	377	438	299	353	765	841	560	629
V/C Ratio	0.681	0.661	1.417	1.358	1.011	1.038	1.059	1.062
Control Delay, s/veh	31.0	26.1	239.3	208.4	58.6	63.2	81.8	78.9
LOS	D	D	F	F	F	F	F	F
95th %tile Queue, veh	5	5	23	23	18	20	17	18

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	29	0	1821	1273	24
Future Vol, veh/h	0	29	0	1821	1273	24
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	32	0	1979	1384	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	705	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	384	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	384	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	15.22	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	384	-	-
HCM Lane V/C Ratio	-	0.082	-	-
HCM Ctrl Dly (s/v)	-	15.2	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-

Intersection	
Intersection Delay, s/veh	30.4
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	281	432	1793	1268
Demand Flow Rate, veh/h	287	432	1793	1280
Vehicles Circulating, veh/h	1321	1800	436	309
Vehicles Exiting, veh/h	268	429	1172	1923
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	21.7	54.7	39.3	11.4
Approach LOS	C	F	E	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.819	0.181	0.530	0.470	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	235	52	229	203	843	950	602	678
Cap Entry Lane, veh/h	400	462	258	307	955	955	1072	1072
Entry HV Adj Factor	0.979	0.981	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	230	51	229	203	843	950	596	672
Cap Entry, veh/h	392	453	258	307	955	955	1061	1062
V/C Ratio	0.587	0.113	0.888	0.660	0.883	0.995	0.562	0.632
Control Delay, s/veh	24.3	9.5	72.1	35.1	28.6	48.7	10.5	12.2
LOS	C	A	F	E	D	E	B	B
95th %tile Queue, veh	4	0	8	4	12	19	4	5

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	362	7	28	569	4	17
Future Vol, veh/h	362	7	28	569	4	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	407	8	31	639	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	415	0	1113	411
Stage 1	-	-	-	-	411	-
Stage 2	-	-	-	-	702	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1144	-	231	641
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	491	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1144	-	221	641
Mov Cap-2 Maneuver	-	-	-	-	221	-
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.39	13.05
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	471	-	-	84	-
HCM Lane V/C Ratio	0.05	-	-	0.027	-
HCM Ctrl Dly (s/v)	13.1	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

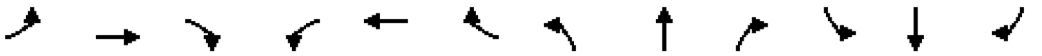
Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	373	6	79	594	3	49
Future Vol, veh/h	373	6	79	594	3	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	419	7	89	667	3	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	426	0	1267	422
Stage 1	-	-	-	-	422	-
Stage 2	-	-	-	-	845	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1133	-	186	631
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	421	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1133	-	163	631
Mov Cap-2 Maneuver	-	-	-	-	163	-
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	369	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.99	12.45
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	542	-	-	211	-
HCM Lane V/C Ratio	0.108	-	-	0.078	-
HCM Ctrl Dly (s/v)	12.5	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.3	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	268	46	27	130	20	8	66	65	93	105	17
Future Volume (veh/h)	11	268	46	27	130	20	8	66	65	93	105	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1682	1682	1682	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	12	301	52	30	146	22	9	74	73	104	118	19
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	5	5	5	5	5	5	1	1	1
Cap, veh/h	170	479	81	221	437	60	177	208	193	365	240	33
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	23	1410	238	119	1286	176	40	778	719	525	895	122
Grp Volume(v), veh/h	365	0	0	198	0	0	156	0	0	241	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1581	0	0	1537	0	0	1542	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0
Cycle Q Clear(g_c), s	4.2	0.0	0.0	2.1	0.0	0.0	1.9	0.0	0.0	2.9	0.0	0.0
Prop In Lane	0.03		0.14	0.15		0.11	0.06		0.47	0.43		0.08
Lane Grp Cap(c), veh/h	730	0	0	718	0	0	578	0	0	638	0	0
V/C Ratio(X)	0.50	0.00	0.00	0.28	0.00	0.00	0.27	0.00	0.00	0.38	0.00	0.00
Avail Cap(c_a), veh/h	2007	0	0	1872	0	0	1859	0	0	1876	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	6.4	0.0	0.0	5.7	0.0	0.0	6.8	0.0	0.0	7.2	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4	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	0.3	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.9	0.0	0.0	5.9	0.0	0.0	7.1	0.0	0.0	7.6	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		365			198			156			241	
Approach Delay, s/veh		6.9			5.9			7.1			7.6	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.7		12.3		10.7		12.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		3.9		6.2		4.9		4.1				
Green Ext Time (p_c), s		0.7		1.8		1.2		1.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			6.9									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	340	1078	1143
Demand Flow Rate, veh/h	0	343	1100	1154
Vehicles Circulating, veh/h	1362	883	208	236
Vehicles Exiting, veh/h	28	425	1154	990
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	9.7	8.2	8.9
Approach LOS	-	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.606	0.394	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	208	135	517	583	542	612
Cap Entry Lane, veh/h	386	446	599	670	1175	1175	1146	1146
Entry HV Adj Factor	1.000	1.000	0.990	0.993	0.980	0.980	0.991	0.990
Flow Entry, veh/h	0	0	206	134	507	571	537	606
Cap Entry, veh/h	386	446	593	665	1152	1152	1135	1134
V/C Ratio	0.000	0.000	0.347	0.201	0.440	0.496	0.473	0.534
Control Delay, s/veh	9.3	8.1	11.0	7.8	7.8	8.6	8.4	9.4
LOS	A	A	B	A	A	A	A	A
95th %tile Queue, veh	0	0	2	1	2	3	3	3

Intersection	
Intersection Delay, s/veh	74.9
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1041	466	1049	1223
Demand Flow Rate, veh/h	1062	480	1080	1235
Vehicles Circulating, veh/h	1287	1170	1198	460
Vehicles Exiting, veh/h	408	1108	1151	1190
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	137.0	16.9	108.8	14.9
Approach LOS	F	C	F	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	499	563	226	254	508	572	580	655
Cap Entry Lane, veh/h	413	475	460	525	448	513	884	960
Entry HV Adj Factor	0.980	0.980	0.968	0.972	0.971	0.972	0.991	0.990
Flow Entry, veh/h	489	552	219	247	493	556	575	648
Cap Entry, veh/h	405	466	446	510	435	499	876	950
V/C Ratio	1.208	1.184	0.491	0.484	1.133	1.115	0.656	0.682
Control Delay, s/veh	144.4	130.5	18.1	15.9	114.6	103.7	14.9	14.9
LOS	F	F	C	C	F	F	B	B
95th %tile Queue, veh	20	21	3	3	18	18	5	6

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	51	0	1095	1190	21
Future Vol, veh/h	0	51	0	1095	1190	21
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	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	57	0	1230	1337	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	680	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	398	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	398	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	15.56	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	398	-	-
HCM Lane V/C Ratio	-	0.144	-	-
HCM Ctrl Dly (s/v)	-	15.6	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.5	-	-

Intersection	
Intersection Delay, s/veh	22.3
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	351	345	1315	1607
Demand Flow Rate, veh/h	362	355	1328	1623
Vehicles Circulating, veh/h	1640	1400	552	213
Vehicles Exiting, veh/h	196	480	1450	1542
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	69.0	19.0	21.5	13.5
Approach LOS	F	C	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.796	0.204	0.515	0.485	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	288	74	183	172	624	704	763	860
Cap Entry Lane, veh/h	299	352	372	432	859	859	1170	1170
Entry HV Adj Factor	0.970	0.973	0.972	0.971	0.990	0.990	0.990	0.990
Flow Entry, veh/h	279	72	178	167	618	697	755	852
Cap Entry, veh/h	290	343	362	419	851	850	1158	1158
V/C Ratio	0.964	0.210	0.491	0.398	0.726	0.819	0.652	0.735
Control Delay, s/veh	83.1	14.3	21.6	16.1	18.2	24.4	12.0	14.9
LOS	F	B	C	C	C	C	B	B
95th %tile Queue, veh	10	1	3	2	7	9	5	7

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	597	6	39	228	12	62
Future Vol, veh/h	597	6	39	228	12	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	671	7	44	256	13	70

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	678	0	1018	674
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	344	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	914	-	263	454
Stage 1	-	-	-	-	506	-
Stage 2	-	-	-	-	718	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	914	-	248	454
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	506	-
Stage 2	-	-	-	-	678	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.33	16.33
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	401	-	-	263	-
HCM Lane V/C Ratio	0.208	-	-	0.048	-
HCM Ctrl Dly (s/v)	16.3	-	-	9.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-

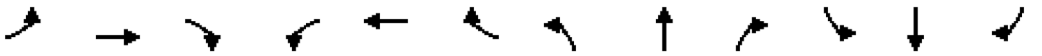
Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	656	3	30	259	8	94
Future Vol, veh/h	656	3	30	259	8	94
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	737	3	34	291	9	106

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	740	0	1097	739
Stage 1	-	-	-	-	739	-
Stage 2	-	-	-	-	358	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	866	-	236	417
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	866	-	225	417
Mov Cap-2 Maneuver	-	-	-	-	225	-
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	674	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.97	17.97
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	391	-	-	187	-
HCM Lane V/C Ratio	0.293	-	-	0.039	-
HCM Ctrl Dly (s/v)	18	-	-	9.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.2	-	-	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	218	21	44	381	73	67	137	31	47	93	18
Future Volume (veh/h)	13	218	21	44	381	73	67	137	31	47	93	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1736	1736	1736	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	15	253	24	51	443	85	78	159	36	55	108	21
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	136	683	62	162	604	110	235	271	54	232	287	47
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	29	1503	137	77	1330	242	333	1063	212	319	1128	186
Grp Volume(v), veh/h	292	0	0	579	0	0	273	0	0	184	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1649	0	0	1608	0	0	1633	0	0
Q Serve(g_s), s	0.0	0.0	0.0	2.5	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.5	0.0	0.0	9.0	0.0	0.0	4.6	0.0	0.0	2.8	0.0	0.0
Prop In Lane	0.05		0.08	0.09		0.15	0.29		0.13	0.30		0.11
Lane Grp Cap(c), veh/h	881	0	0	876	0	0	559	0	0	567	0	0
V/C Ratio(X)	0.33	0.00	0.00	0.66	0.00	0.00	0.49	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	1480	0	0	1474	0	0	1444	0	0	1431	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	7.0	0.0	0.0	10.2	0.0	0.0	9.6	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.9	0.0	0.0	0.7	0.0	0.0	0.3	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	0.4	0.0	0.0	1.2	0.0	0.0	1.0	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.8	0.0	0.0	7.9	0.0	0.0	10.9	0.0	0.0	9.9	0.0	0.0
LnGrp LOS	A			A			B			A		
Approach Vol, veh/h		292			579			273			184	
Approach Delay, s/veh		5.8			7.9			10.9			9.9	
Approach LOS		A			A			B			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.4		18.5		12.4		18.5				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		25.5		25.5		25.5				
Max Q Clear Time (g_c+I1), s		6.6		5.5		4.8		11.0				
Green Ext Time (p_c), s		1.3		1.4		0.9		3.1				

Intersection Summary												
HCM 7th Control Delay, s/veh			8.3									
HCM 7th LOS			A									

Intersection	
Intersection Delay, s/veh	24.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	0	516	1974	1394
Demand Flow Rate, veh/h	0	516	1974	1408
Vehicles Circulating, veh/h	1721	1628	181	354
Vehicles Exiting, veh/h	41	527	1540	1790
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	70.8	19.7	14.5
Approach LOS	-	F	C	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.500	0.500	0.607	0.393	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	0	0	313	203	928	1046	662	746
Cap Entry Lane, veh/h	277	329	302	356	1204	1204	1029	1029
Entry HV Adj Factor	1.000	1.000	1.000	1.000	1.000	1.000	0.990	0.990
Flow Entry, veh/h	0	0	313	203	928	1046	655	739
Cap Entry, veh/h	277	329	302	356	1204	1205	1018	1019
V/C Ratio	0.000	0.000	1.037	0.570	0.770	0.868	0.643	0.725
Control Delay, s/veh	13.0	10.9	100.2	25.6	16.1	22.9	12.9	15.9
LOS	B	B	F	D	C	C	B	C
95th %tile Queue, veh	0	0	12	3	8	12	5	7

Intersection	
Intersection Delay, s/veh	144.6
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	636	969	1691	1306
Demand Flow Rate, veh/h	636	969	1691	1319
Vehicles Circulating, veh/h	1431	1718	686	1057
Vehicles Exiting, veh/h	945	659	1381	1630
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	43.0	313.7	92.6	136.1
Approach LOS	E	F	F	F

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	299	337	455	514	795	896	620	699
Cap Entry Lane, veh/h	362	421	278	330	718	793	511	578
Entry HV Adj Factor	1.000	1.000	1.001	0.999	1.000	1.000	0.990	0.990
Flow Entry, veh/h	299	337	455	514	795	896	614	692
Cap Entry, veh/h	362	421	278	329	718	793	505	573
V/C Ratio	0.826	0.801	1.637	1.559	1.107	1.130	1.214	1.209
Control Delay, s/veh	47.3	39.1	334.7	295.1	89.6	95.2	139.2	133.3
LOS	E	E	F	F	F	F	F	F
95th %tile Queue, veh	7	7	28	30	23	26	23	25

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	42	0	1863	1292	58
Future Vol, veh/h	0	42	0	1863	1292	58
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	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	2	2
Mvmt Flow	0	46	0	2025	1404	63

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	734	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	367	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	367	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	16.19	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	367	-	-
HCM Lane V/C Ratio	-	0.124	-	-
HCM Ctrl Dly (s/v)	-	16.2	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-

Intersection	
Intersection Delay, s/veh	33.5
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	281	439	1829	1301
Demand Flow Rate, veh/h	287	439	1829	1314
Vehicles Circulating, veh/h	1355	1836	441	309
Vehicles Exiting, veh/h	268	434	1201	1966
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	23.1	60.9	44.0	11.8
Approach LOS	C	F	E	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.819	0.181	0.522	0.478	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1350	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	235	52	229	210	860	969	618	696
Cap Entry Lane, veh/h	388	449	249	298	951	951	1072	1072
Entry HV Adj Factor	0.979	0.981	1.000	1.000	1.000	1.000	0.990	0.991
Flow Entry, veh/h	230	51	229	210	860	969	612	690
Cap Entry, veh/h	380	440	249	298	950	951	1061	1062
V/C Ratio	0.605	0.116	0.918	0.704	0.905	1.019	0.577	0.649
Control Delay, s/veh	26.0	9.8	80.1	39.9	31.6	55.0	10.8	12.7
LOS	D	A	F	E	D	F	B	B
95th %tile Queue, veh	4	0	8	5	13	20	4	5

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	366	16	84	573	11	69
Future Vol, veh/h	366	16	84	573	11	69
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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	411	18	94	644	12	78

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	429	0	1253	420
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	833	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1130	-	190	633
Stage 1	-	-	-	-	663	-
Stage 2	-	-	-	-	427	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1130	-	165	633
Mov Cap-2 Maneuver	-	-	-	-	165	-
Stage 1	-	-	-	-	663	-
Stage 2	-	-	-	-	371	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.08	14.83
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	456	-	-	230	-
HCM Lane V/C Ratio	0.197	-	-	0.084	-
HCM Ctrl Dly (s/v)	14.8	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.3	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	425	10	65	650	7	62
Future Vol, veh/h	425	10	65	650	7	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	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	478	11	73	730	8	70

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	489	0	1360	483
Stage 1	-	-	-	-	483	-
Stage 2	-	-	-	-	876	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1074	-	164	583
Stage 1	-	-	-	-	620	-
Stage 2	-	-	-	-	407	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1074	-	145	583
Mov Cap-2 Maneuver	-	-	-	-	145	-
Stage 1	-	-	-	-	620	-
Stage 2	-	-	-	-	361	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.78	14.75
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	446	-	-	164	-
HCM Lane V/C Ratio	0.174	-	-	0.068	-
HCM Ctrl Dly (s/v)	14.8	-	-	8.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Appendix C: Estimated Future Traffic Volume Maps

Exhibit C-1. 2027 Background Traffic

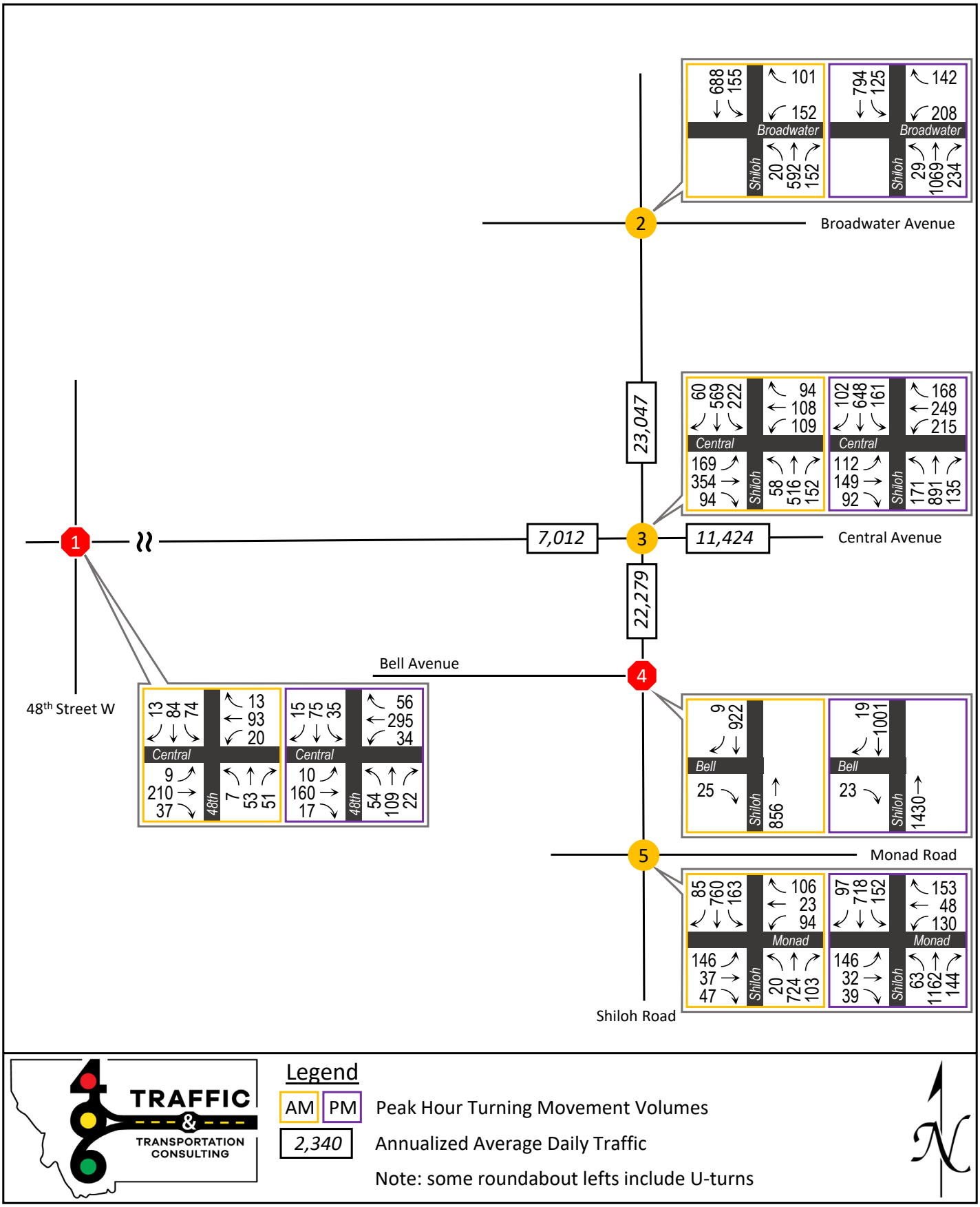


Exhibit C-2. 2027 Phase 1A Project Trips

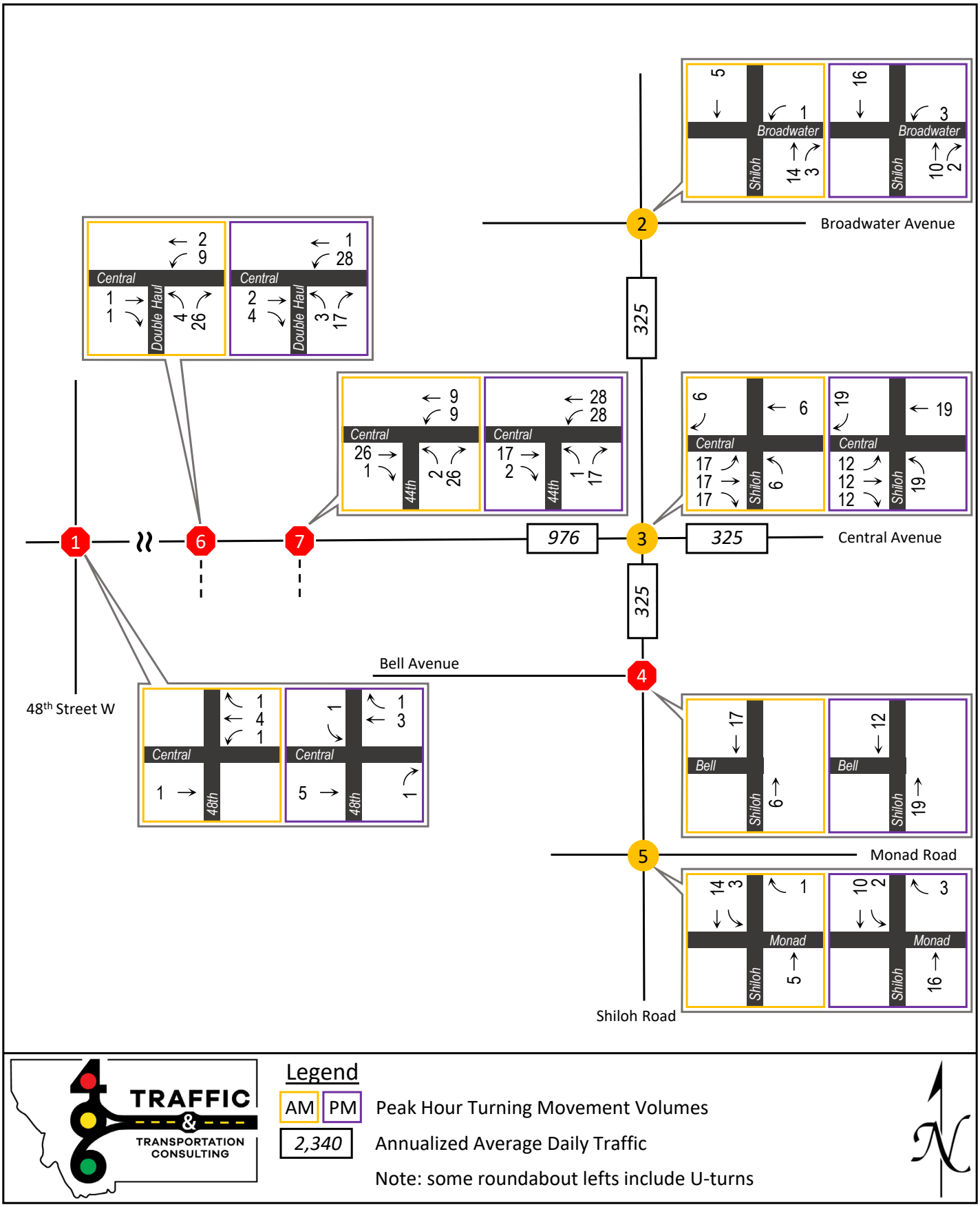


Exhibit C-3. 2027 Phase 1A Total Traffic

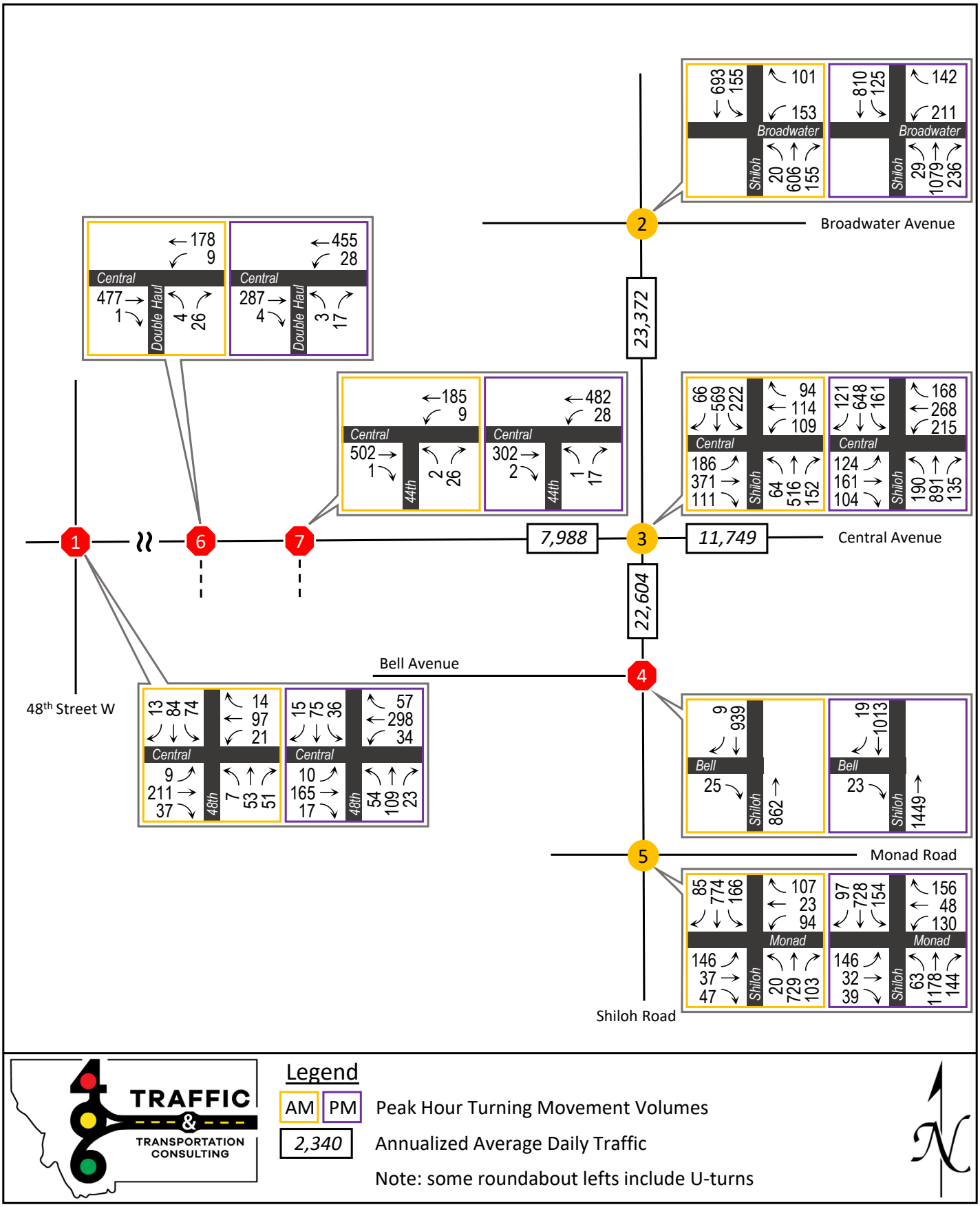


Exhibit C-4. 2029 Traffic Without Phase 1B

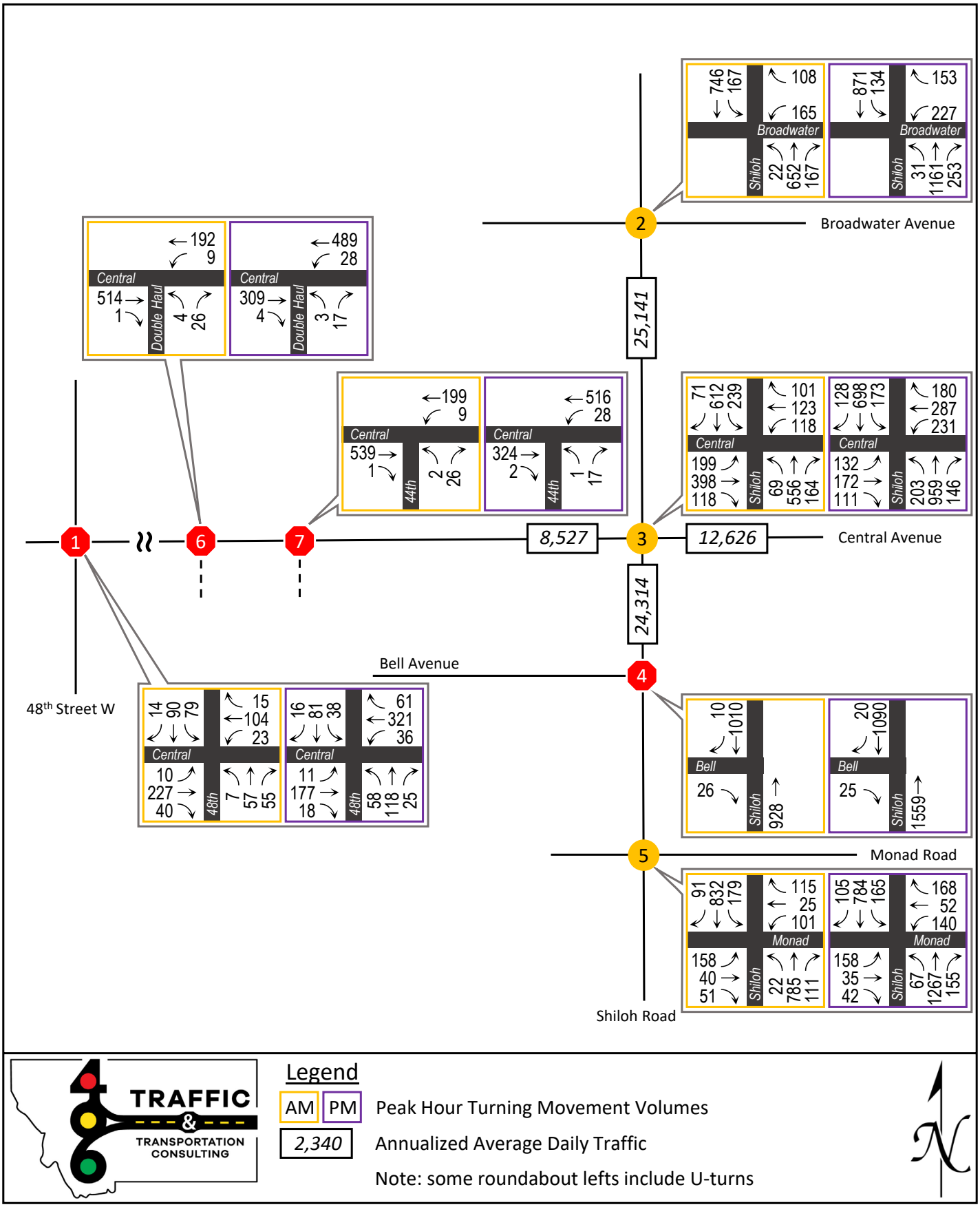


Exhibit C-5. 2029 Phase 1B Project Trips

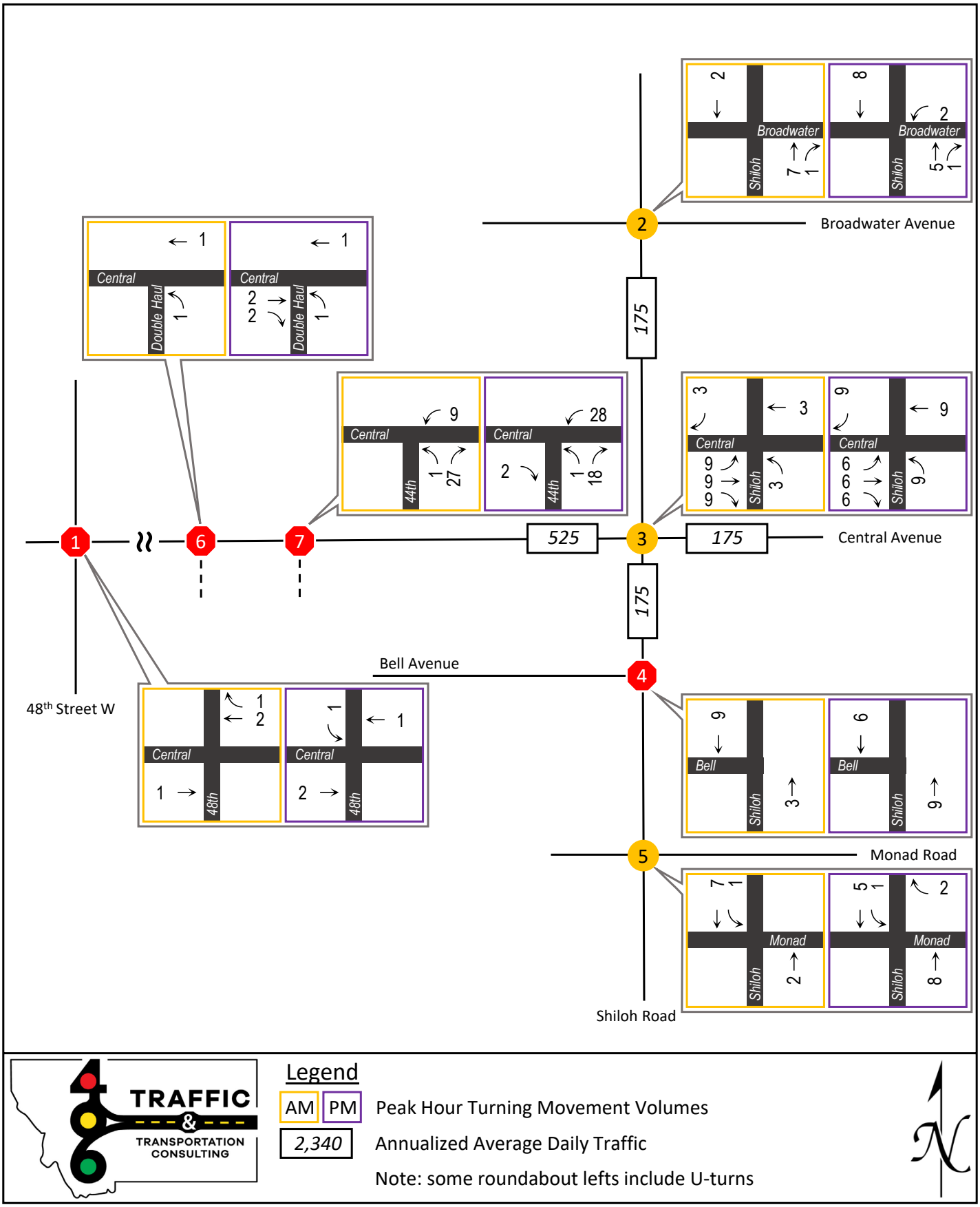


Exhibit C-6. 2029 Phase 1B Total Traffic

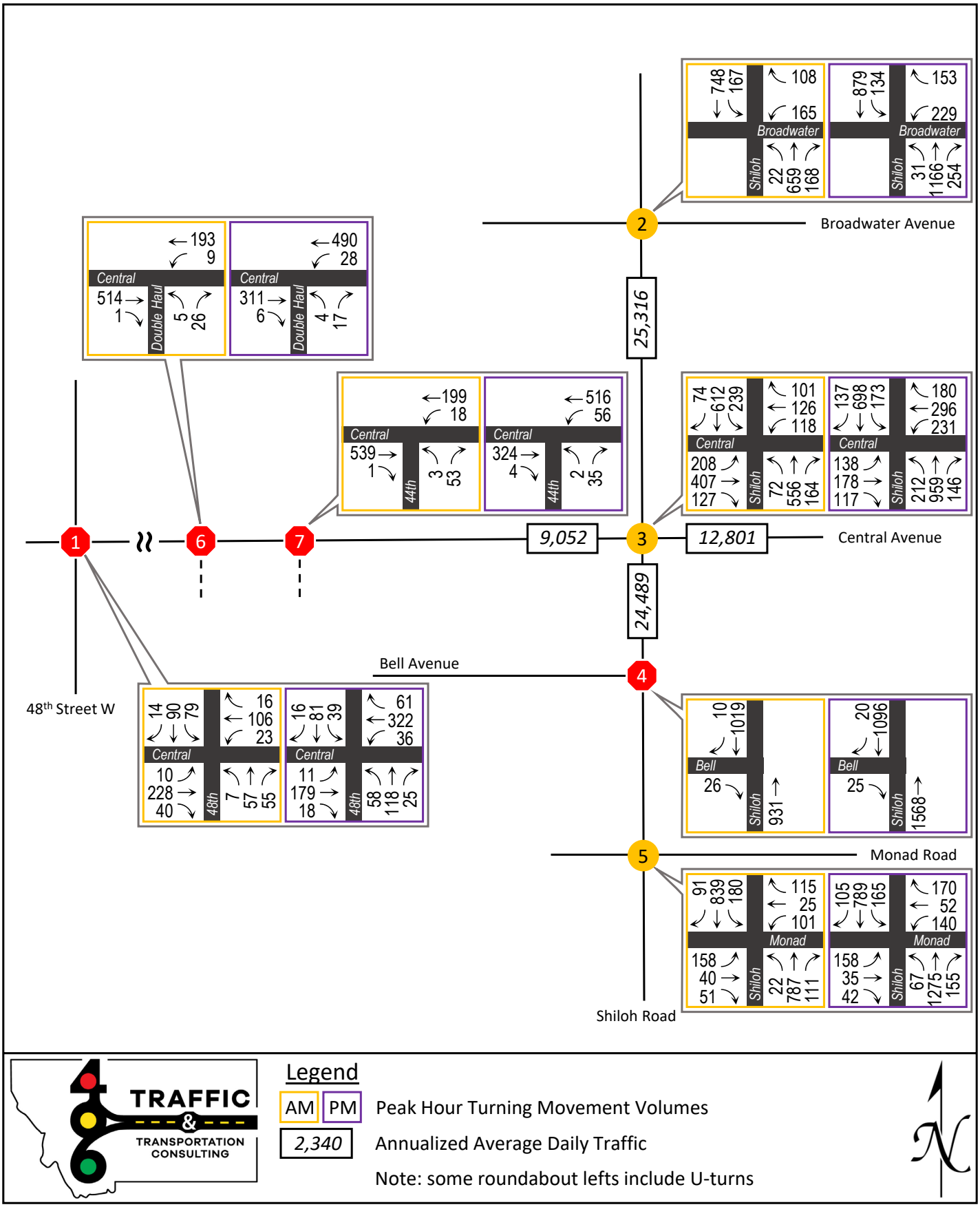


Exhibit C-7. 2031 Traffic Without Phase 1C

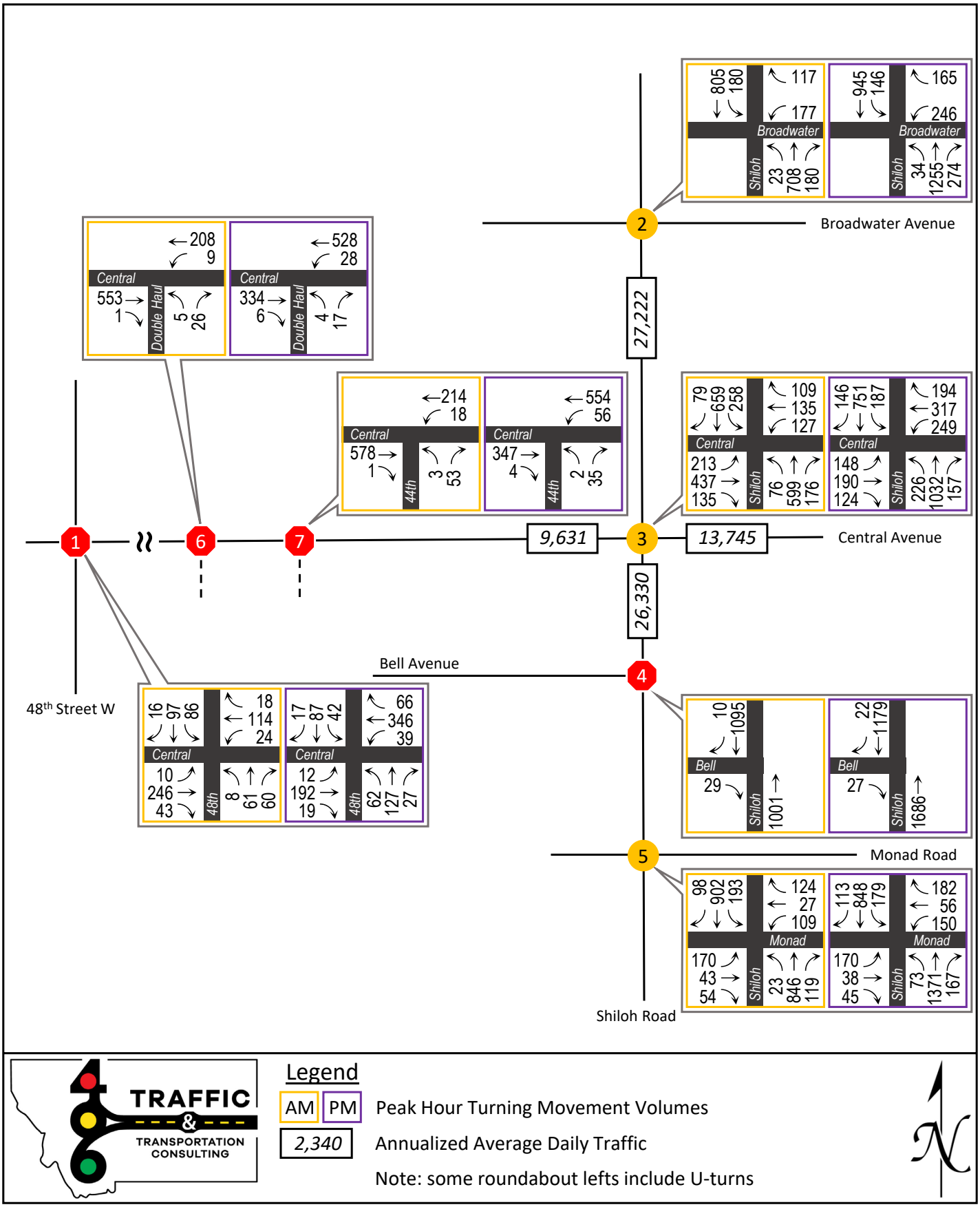


Exhibit C-8. 2031 Phase 1C Project Trips

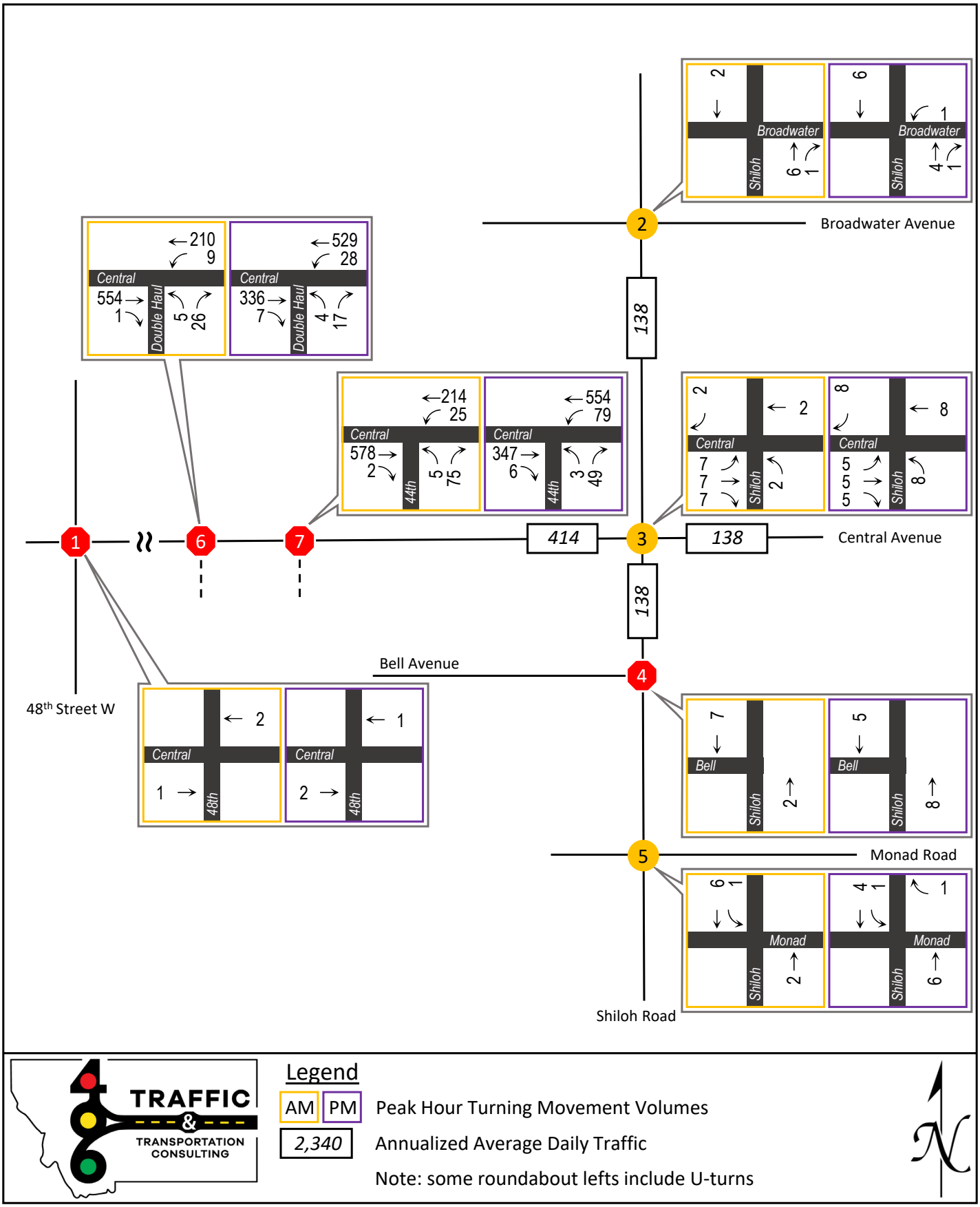
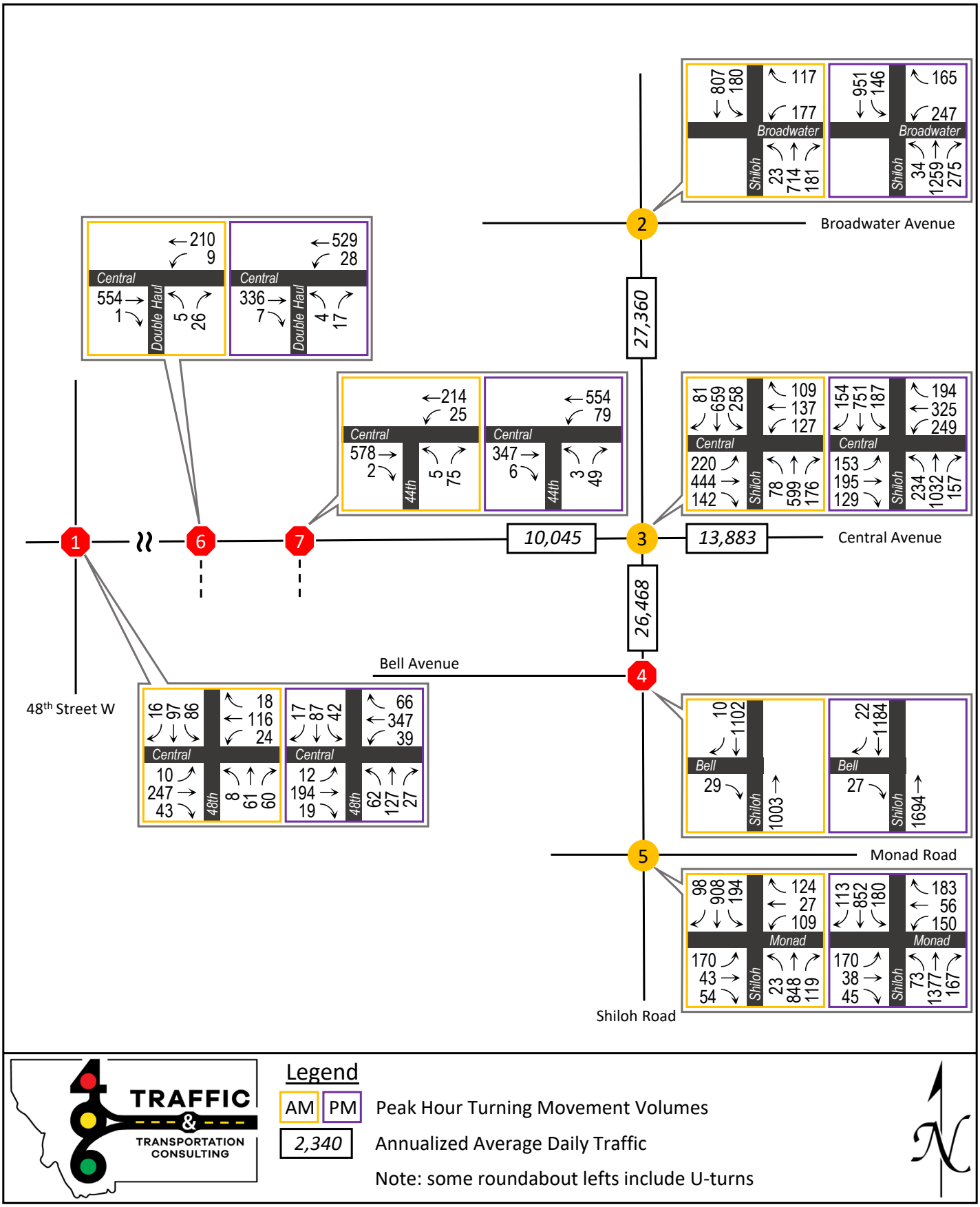


Exhibit C-9. 2031 Phase 1C Total Traffic



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Legend

AM | PM — Peak Hour Turning Movement Volumes

2,340 — Annualized Average Daily Traffic

Note: some roundabout lefts include U-turns

Exhibit C-10. 2033 Traffic Without Phase 2

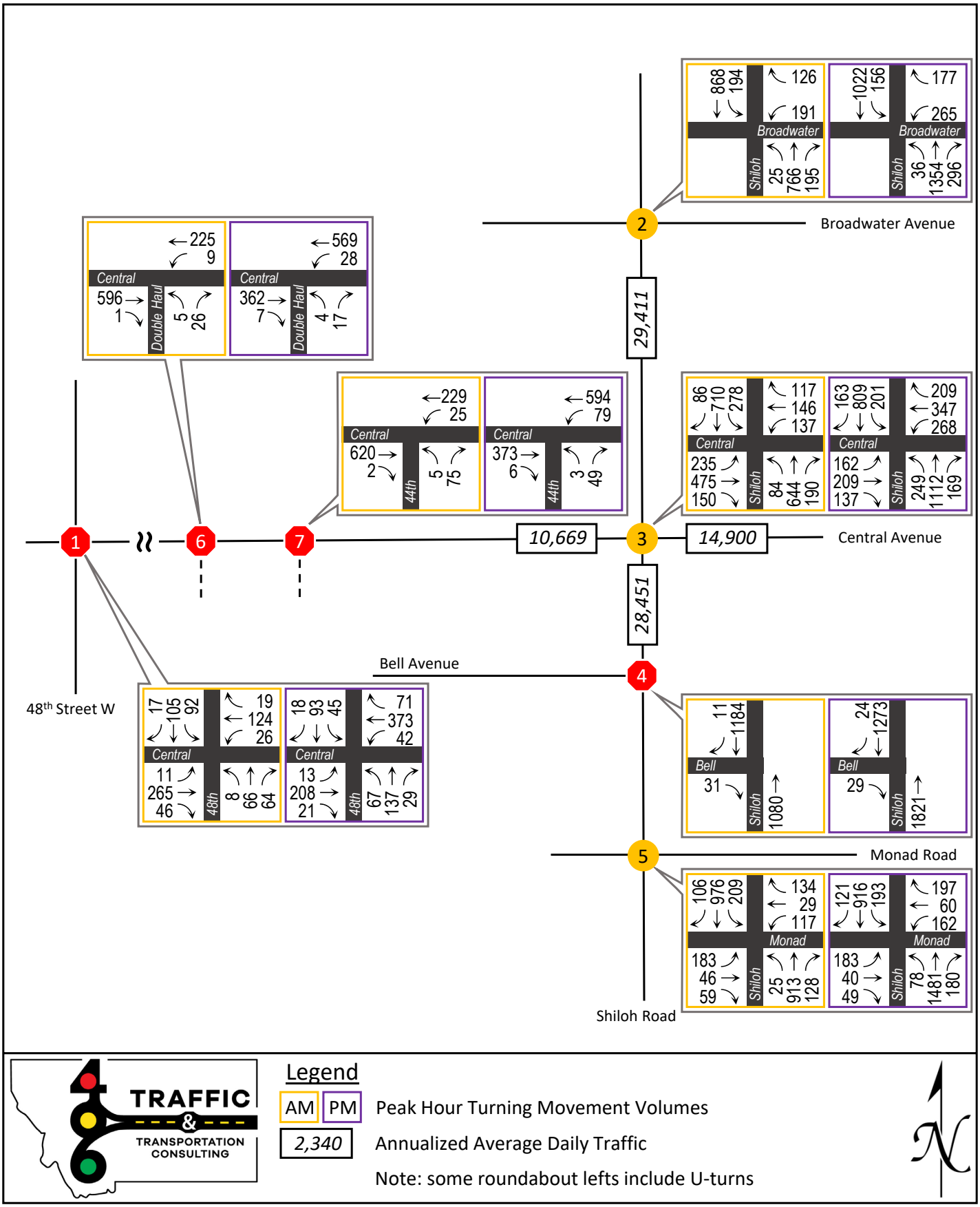


Exhibit C-11. 2033 Phase 2 Project Trips

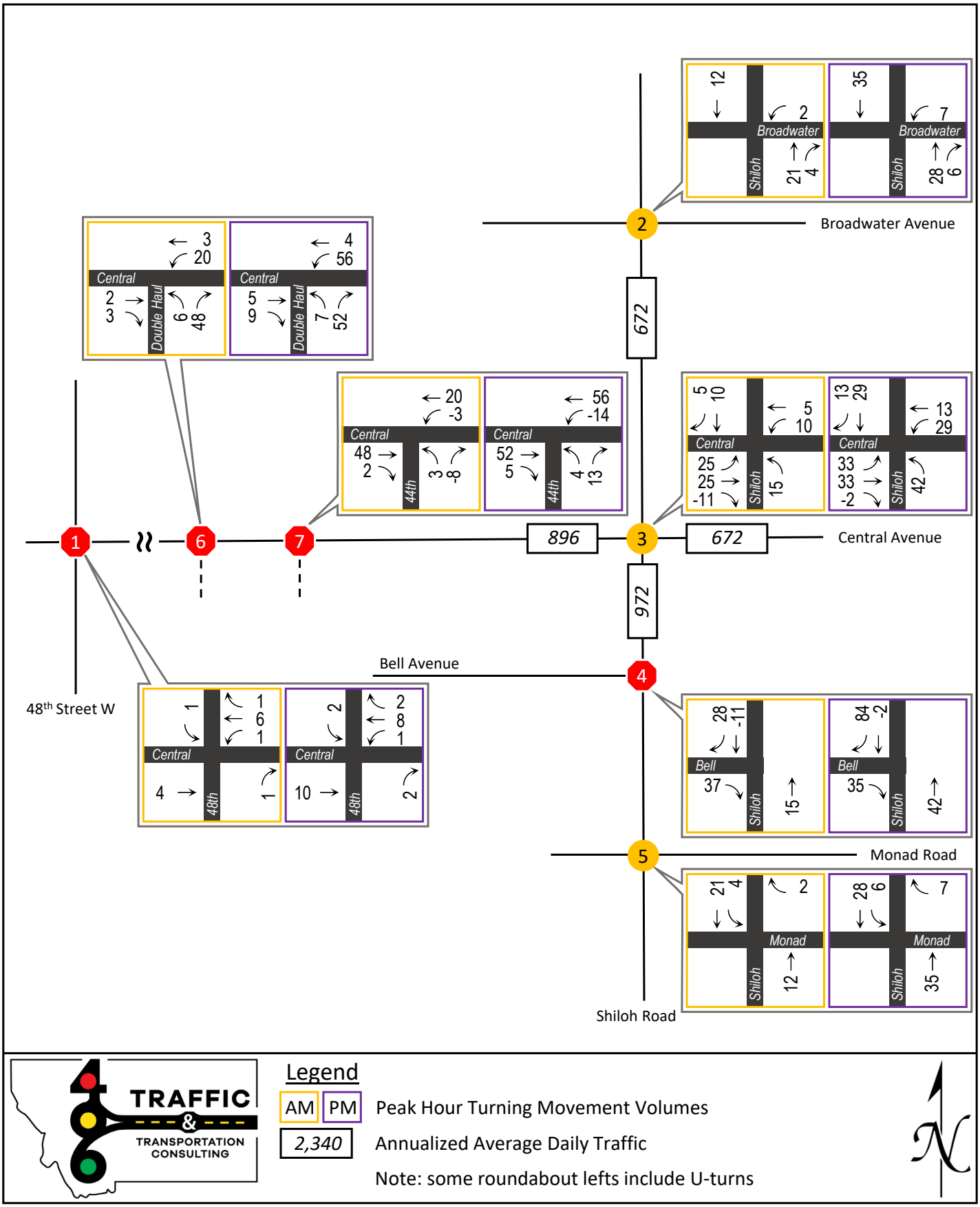
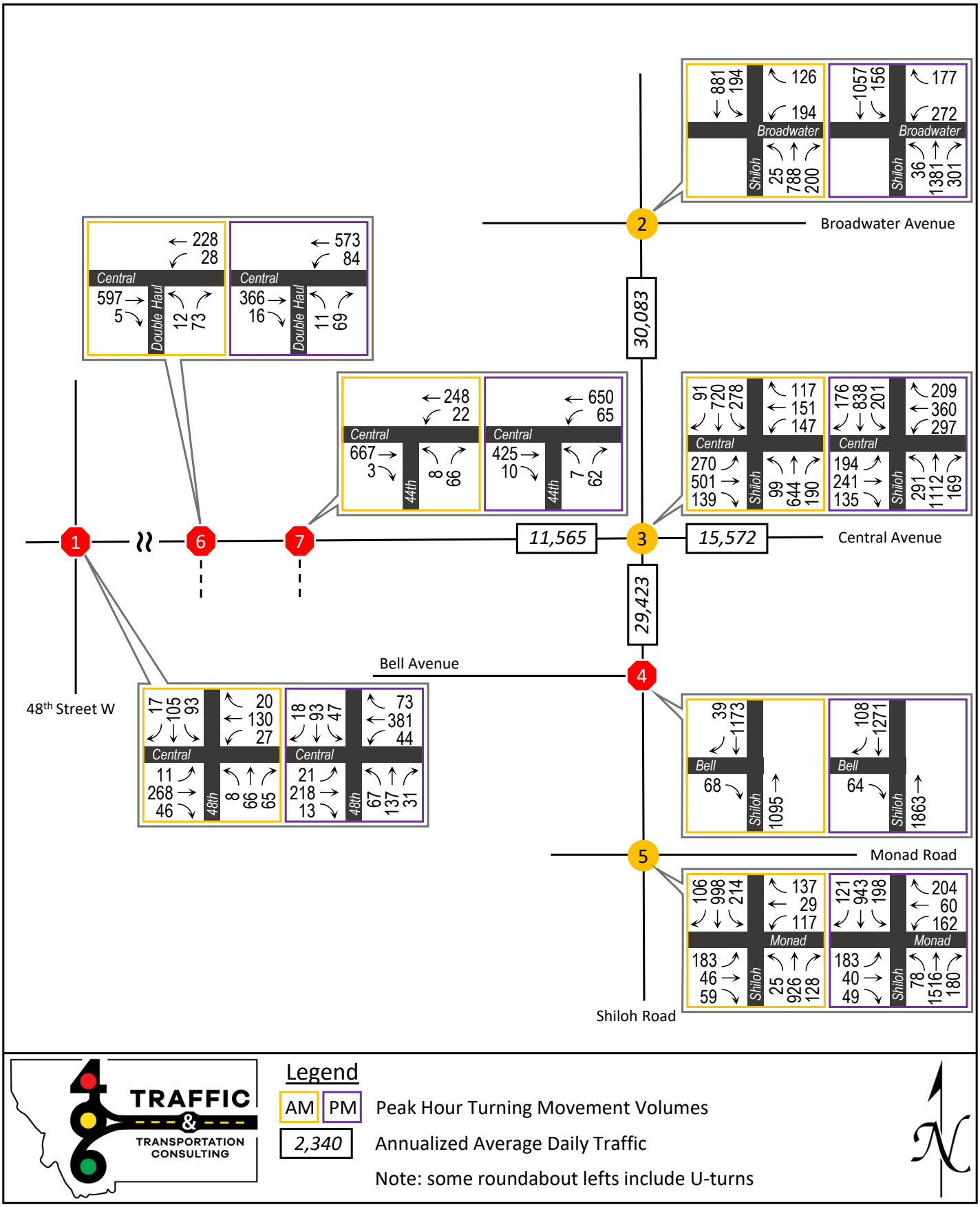
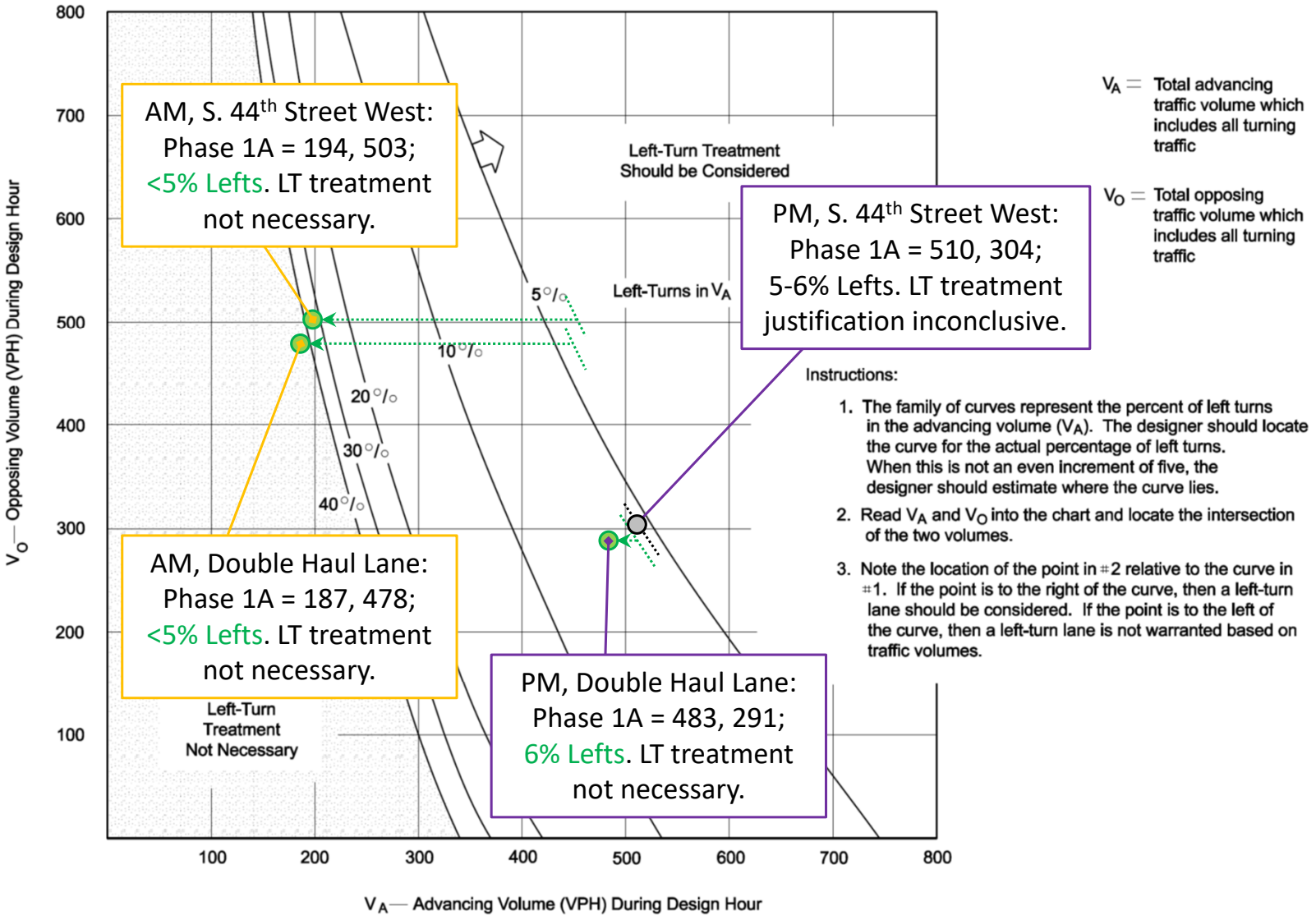


Exhibit C-12. 2033 Total Traffic with Phase 2 (Full project buildout)



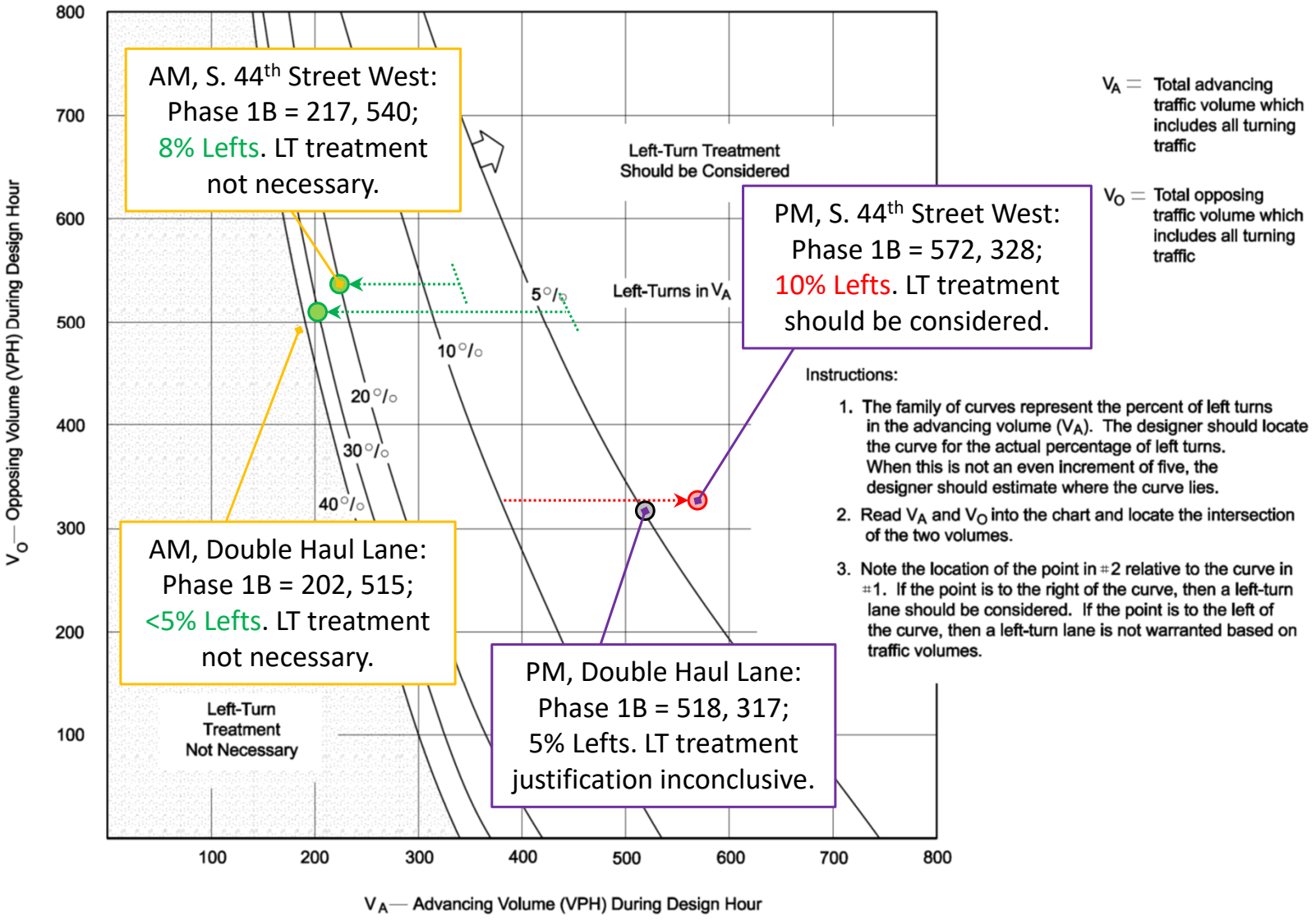
Appendix D: Auxiliary Turn Lane Analysis Charts

Exhibit D-1. 2027 Phase 1A Left Turn Lane Chart



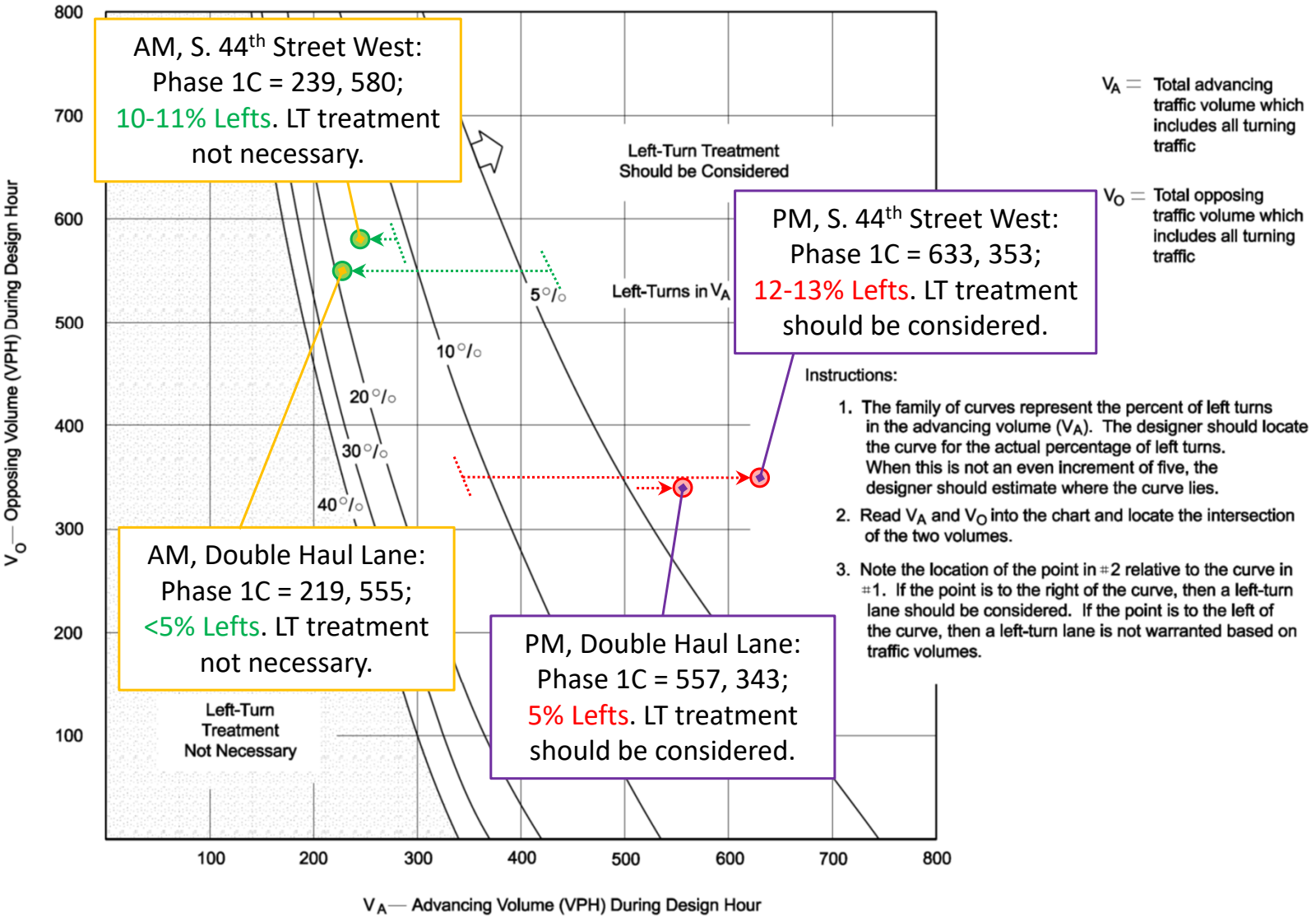
VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)

Exhibit D-2. 2029 Phase 1B Left Turn Lane Chart



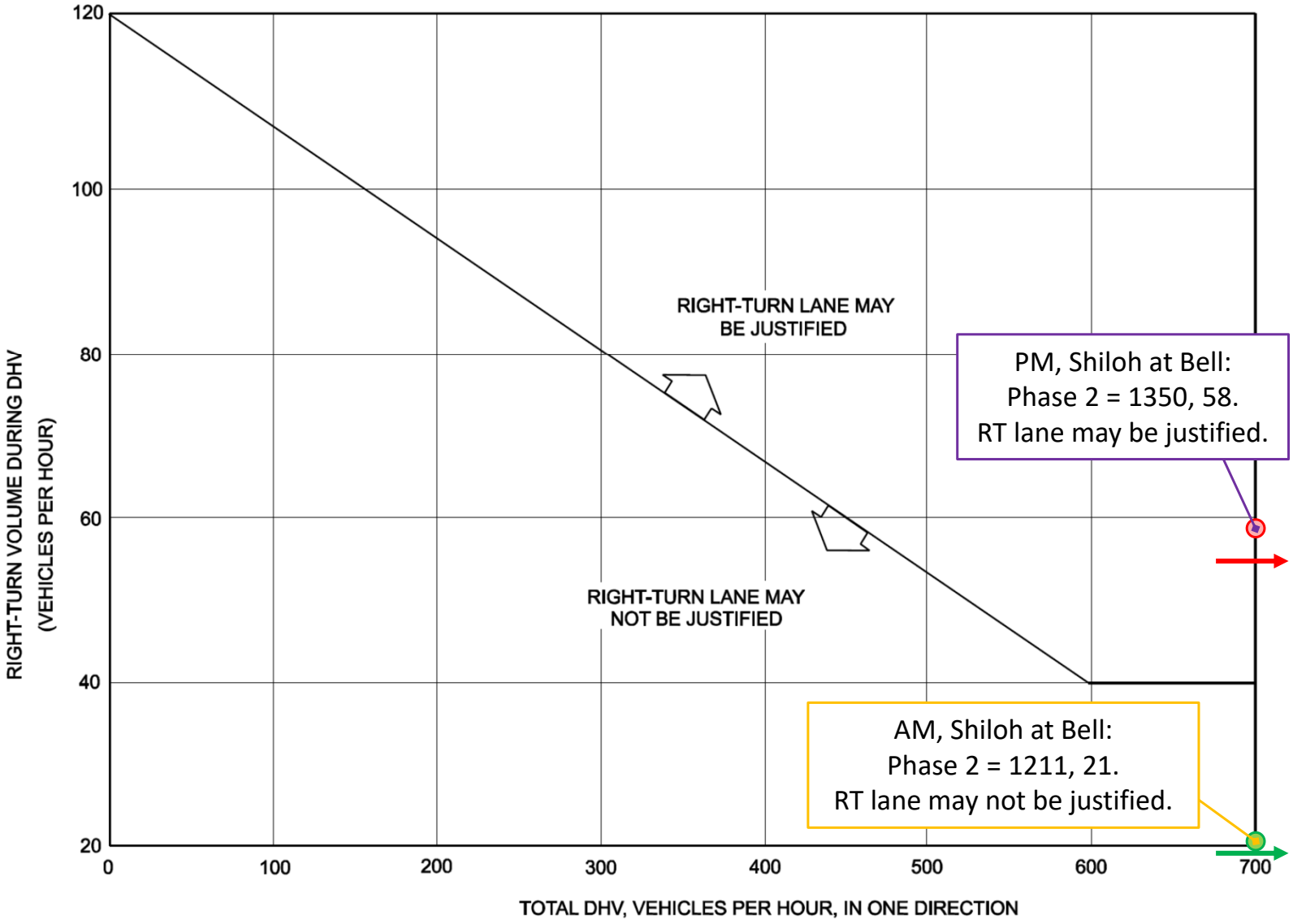
VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)

Exhibit D-3. 2031 Phase 1C Left Turn Lane Chart



VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)

Exhibit D-4. 2033 Phase 2 Right Turn Lane Chart



Note: For highways with a design speed below 50 mph (80 km/h) with a DHV < 300 and where right turns are > 40, an adjustment should be used. To read the vertical axis of the chart, subtract 20 from the actual number of right turns.

Appendix E: 44th at Central Avenue Intersection Signal Warrant Summaries

Traffic Signal Needs Analysis Summary: S 44th St W at Central Ave

Scenario: **Completion of Phase 1A in 2027**
Analysis Date: 8/13/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: S 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 3

Traffic Volumes

Hour:	1	2	3	4	5	6	7	8	9	10	11	12
Start Time:	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Central Ave Eastbound:	471	452	395	354	370	373	312	263	275	255	304	207
Central Ave Westbound:	179	178	194	215	272	323	317	316	391	425	502	345
S 44th St W Northbound:	28	23	16	14	14	14	15	16	15	18	19	16
Total Entering Volume:	678	653	605	583	656	710	644	595	681	698	825	568
TEV Rank:	5	7	9	11	6	2	**8**	10	**4**	3	**1**	12
Use for:							Warrant 1		Warrant 2		Warrant 3	
Major, Both Directions:	650	630	589	569	642	696	629	579	666	680	806	552
Minor, Higher Direction:	28	23	16	14	14	14	15	16	15	18	19	16

Warrants

			Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic* Major (Both Dir.) Value: 629; Minimum: 350[c] Minor (Higher Dir.) Value: 15; Minimum: 105[c] Met? No	*or Condition B: Interruption of Continuous Traffic* Major (Both Dir.) Value: 629; Minimum: 525[c] Minor (Higher Dir.) Value: 15; Minimum: 53[c] Met? No	**No**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph* Major (Both Dir.) Value: 666; Minimum: - Minor (Higher Dir.) Value: 15; Minimum: 60 Met? No		**No**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)* 1. Veh-Hrs of Delay — Value: 0.1; Minimum: 4; Met? No 2. Minor Volume — Value: 19; Minimum: 100; Met? No 3. Total Ent. Volume — Value: 825; Minimum: 650; Met? Yes	*or Condition B (MUTCD Figure 4C-4)* Major (Both Dir.) Value: 806; Minimum: N/A Minor (Higher Dir.) Value: 19; Minimum: 75 Met? No	**No**
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)* Major (Both Dir.) Value: 666; Minimum: Pedestrians Value: ; Minimum: Met? n/a	*or Criterion B: One Hour (MUTCD Figure 4C-8)* Major (Both Dir.) Value: 806; Minimum: Pedestrians Value: ; Minimum: Met? n/a	**Not Evaluated**
5 School Crossing	No students projected to cross the major street at this location.		**No**
6 Coordinated Signal System	Only one signal in the roadway network nearby.		**No**
7 Crash Experience ** Condition A not evaluated *(all conditions)*	*Condition B, 1-year Period (Table 4C-4)* Angle+Ped Crashes Value: n/a; Minimum: 4 or Fatal+Injury Angle+Ped Value: n/a; Minimum: 3 Met? n/a *or Condition B, 3-year Period (Table 4C-5)* Angle+Ped Crashes Value: n/a; Minimum: 6 or Fatal+Injury Angle+Ped Value: n/a; Minimum: 4 Met? n/a	***and*** *Condition C, 80% of Warrant 1 [Condition A]* Major (Both Dir.) Value: 629; Minimum: Minor (Higher Dir.) Value: 15; Minimum: Met? n/a *or Condition C, 80% of Warrant 1 [Condition B]* Major (Both Dir.) Value: 629; Minimum: Minor (Higher Dir.) Value: 15; Minimum: Met? n/a *or Condition C, 80% of Warrant 4* Four Hour Ped Value: ; Minimum: One Hour Ped Value: ; Minimum: Met? n/a	**Not Evaluated**
8 Roadway Network	Not an intersection of two or more major routes.		**No**
9 Intersection Near Grade Xing	No railroad grade crossing nearby.		**No**
		Warrants Met:	**0**
		Recommendation:	**No Signal**

Notes:

c: Warrant 1 minimum values used for "70%" to account to reflect major-street speed over 40 mph

* Warrant 3, Peak Hour, is indicated by the MUTCD as follows: "This signal warrant should be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."

** No trial of alternatives with observance and enforcement has been attempted for crash reduction at this location.

Traffic Signal Needs Analysis Summary: S 44th St W at Central Ave

Scenario: **Completion of Phase 1B in 2029**
Analysis Date: 8/13/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: S 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 3

Traffic Volumes

Hour:	1	2	3	4	5	6	7	8	9	10	11	12
Start Time:	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Central Ave Eastbound:	506	486	425	381	399	401	336	283	296	275	328	223
Central Ave Westbound:	199	200	217	241	304	360	353	353	440	480	566	392
S 44th St W Northbound:	62	48	34	27	29	29	29	33	30	34	38	33
Total Entering Volume:	767	734	676	649	732	790	718	669	766	789	932	648
TEV Rank:	**4**	6	9	11	7	2	**8**	10	5	3	**1**	12
Use for:	Warrant 2						Warrant 1				Warrant 3	
Major, Both Directions:	705	686	642	622	703	761	689	636	736	755	894	615
Minor, Higher Direction:	62	48	34	27	29	29	29	33	30	34	38	33

Warrants

													Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic*					*or Condition B: Interruption of Continuous Traffic*							
	Major (Both Dir.)		Minor (Higher Dir.)			Major (Both Dir.)		Minor (Higher Dir.)					
	Value	Minimum	Value	Minimum	Met?	Value	Minimum	Value	Minimum	Met?			
	689	350[c]	29	105[c]	No	689	525[c]	29	53[c]	No			**No**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph*												
	Major (Both Dir.)		Minor (Higher Dir.)										
	Value	Minimum	Value	Minimum	Met?								
	705	-	62	65	Yes								**No**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)*					*or Condition B (MUTCD Figure 4C-4)*							
			Value	Minimum	Met?	Major (Both Dir.)		Minor (Higher Dir.)					
						Value	Minimum	Value	Minimum	Met?			
	1. Veh-Hrs of Delay		0.1	4	No	894	N/A	38	75	No			
	2. Minor Volume		38	100	No								
	3. Total Ent. Volume		932	650	Yes								**No**
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)*					*or Criterion B: One Hour (MUTCD Figure 4C-8)*							
	Major (Both Dir.)		Pedestrians			Major (Both Dir.)		Pedestrians					
	Value	Minimum	Value	Minimum	Met?	Value	Minimum	Value	Minimum	Met?			
	705				n/a	894				n/a			**Not Evaluated**
5 School Crossing	No students projected to cross the major street at this location.												**No**
6 Coordinated Signal System	Only one signal in the roadway network nearby.												**No**
7 Crash Experience ** Condition A not evaluated *(all conditions)*	*Condition B, 1-year Period (Table 4C-4)*					***and*** *Condition C, 80% of Warrant 1 [Condition A]*							
	Angle+Ped Crashes		or Fatal+Injury Angle+Ped			Major (Both Dir.)		Minor (Higher Dir.)					
	Value	Minimum	Value	Minimum	Met?	Value	Minimum	Value	Minimum	Met?			
	n/a	4	n/a	3	n/a	689		29		n/a			
	or Condition B, 3-year Period (Table 4C-5)					*or Condition C, 80% of Warrant 1 [Condition B]*							
	Angle+Ped Crashes		or Fatal+Injury Angle+Ped			Major (Both Dir.)		Minor (Higher Dir.)					
	Value	Minimum	Value	Minimum	Met?	Value	Minimum	Value	Minimum	Met?			
	n/a	6	n/a	4	n/a	689		29		n/a			
						or Condition C, 80% of Warrant 4							
						Four Hour Ped		One Hour Ped					
						Value	Minimum	Value	Minimum	Met?			**Not Evaluated**
										n/a			
8 Roadway Network	Not an intersection of two or more major routes.												**No**
9 Intersection Near Grade Xing	No railroad grade crossing nearby.												**No**
												Warrants Met:	**0**
												Recommendation:	**No Signal**

Notes:

c: Warrant 1 minimum values used for "70%" to account to reflect major-street speed over 40 mph

* Warrant 3, Peak Hour, is indicated by the MUTCD as follows: "This signal warrant should be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."

** No trial of alternatives with observance and enforcement has been attempted for crash reduction at this location.

Traffic Signal Needs Analysis Summary: S 44th St W at Central Ave

Scenario: **Completion of Phase 1C in 2031**
Analysis Date: 8/13/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: S 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 3

Traffic Volumes

Hour:	1	2	3	4	5	6	7	8	9	10	11	12
Start Time:	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Central Ave Eastbound:	543	522	457	410	429	432	361	304	319	296	353	240
Central Ave Westbound:	219	221	239	266	335	396	388	390	487	532	626	436
S 44th St W Northbound:	87	68	48	38	41	41	41	46	42	48	54	47
Total Entering Volume:	849	811	744	714	805	869	790	740	848	876	1033	723
TEV Rank:	**4**	6	9	12	7	3	**8**	10	5	2	**1**	11
Use for:	Warrant 2						Warrant 1				Warrant 3	
Major, Both Directions:	762	743	696	676	764	828	749	694	806	828	979	676
Minor, Higher Direction:	87	68	48	38	41	41	41	46	42	48	54	47

Warrants

		Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic* — Major (Both Dir.) Value 749, Minimum 350[c]; Minor (Higher Dir.) Value 41, Minimum 105[c]; Met? No. *or Condition B: Interruption of Continuous Traffic* — Major (Both Dir.) Value 749, Minimum 525[c]; Minor (Higher Dir.) Value 41, Minimum 53[c]; Met? No	**No**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph* — Major (Both Dir.) Value 762, Minimum -; Minor (Higher Dir.) Value 87, Minimum 60; Met? Yes	**Yes**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)*: 1. Veh-Hrs of Delay — Value 0.2, Minimum 4, Met? No; 2. Minor Volume — Value 54, Minimum 100, Met? No; 3. Total Ent. Volume — Value 1033, Minimum 650, Met? Yes. *or Condition B (MUTCD Figure 4C-4)* — Major (Both Dir.) Value 979, Minimum -; Minor (Higher Dir.) Value 54, Minimum 75; Met? No	**No**
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)* — Major (Both Dir.) Value 762, Minimum; Pedestrians Value, Minimum; Met? n/a. *or Criterion B: One Hour (MUTCD Figure 4C-8)* — Major (Both Dir.) Value 979, Minimum; Pedestrians Value, Minimum; Met? n/a	**Not Evaluated**
5 School Crossing	No students projected to cross the major street at this location.	**No**
6 Coordinated Signal System	Only one signal in the roadway network nearby.	**No**
7 Crash Experience ** Condition A not evaluated *(all conditions)*	*Condition B, 1-year Period (Table 4C-4)* — Angle+Ped Crashes Value n/a, Minimum 4; or Fatal+Injury Angle+Ped Value n/a, Minimum 3; Met? n/a. *and Condition C, 80% of Warrant 1 [Condition A]* — Major (Both Dir.) Value 749, Minimum; Minor (Higher Dir.) Value 41, Minimum; Met? n/a. *or Condition B, 3-year Period (Table 4C-5)* — Angle+Ped Crashes Value n/a, Minimum 6; or Fatal+Injury Angle+Ped Value n/a, Minimum 4; Met? n/a. *or Condition C, 80% of Warrant 1 [Condition B]* — Major (Both Dir.) Value 749, Minimum; Minor (Higher Dir.) Value 41, Minimum; Met? n/a. *or Condition C, 80% of Warrant 4* — Four Hour Ped; One Hour Ped; Value, Minimum; Met? n/a	**Not Evaluated**
8 Roadway Network	Not an intersection of two or more major routes.	**No**
9 Intersection Near Grade Xing	No railroad grade crossing nearby.	**No**
	Warrants Met:	**1**
	Recommendation:	**No Signal**

Notes:

c: Warrant 1 minimum values used for "70%" to account to reflect major-street speed over 40 mph

* Warrant 3, Peak Hour, is indicated by the MUTCD as follows: "This signal warrant should be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."

** No trial of alternatives with observance and enforcement has been attempted for crash reduction at this location.

Traffic Signal Needs Analysis Summary: S 44th St W at Central Ave

Scenario: **Completion of Phase 2 in 2033**
Analysis Date: 8/13/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: S 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 3

Traffic Volumes

Hour:	1	2	3	4	5	6	7	8	9	10	11	12
Start Time:	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Central Ave Eastbound:	610	596	527	481	500	503	431	366	389	369	430	306
Central Ave Westbound:	251	266	258	264	301	325	461	461	574	628	728	521
S 44th St W Northbound:	106	83	59	48	50	52	52	58	54	62	67	58
Total Entering Volume:	967	945	844	793	851	880	944	885	1017	1059	1225	885
TEV Rank:	**4**	5	11	12	10	9	6	7	3	2	**1**	**8**
Use for:	Warrant 2										Warrant 3	Warrant 1
Major, Both Directions:	861	862	785	745	801	828	892	828	963	997	1158	827
Minor, Higher Direction:	106	83	59	48	50	52	52	58	54	62	67	58

Warrants

		Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic* — Major (Both Dir.) Value 827, Minimum 350[c]; Minor (Higher Dir.) Value 58, Minimum 105[c]; Met? No. *or Condition B: Interruption of Continuous Traffic* — Major (Both Dir.) Value 827, Minimum 525[c]; Minor (Higher Dir.) Value 58, Minimum 53[c]; Met? Yes	**Yes**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph* — Major (Both Dir.) Value 861, Minimum -; Minor (Higher Dir.) Value 106, Minimum 60; Met? Yes	**Yes**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)*: 1. Veh-Hrs of Delay — Value 0.3, Minimum 4; 2. Minor Volume — Value 67, Minimum 100; Met? No; 3. Total Ent. Volume — Value 1225, Minimum 650; Met? Yes. *or Condition B (MUTCD Figure 4C-4)* — Major (Both Dir.) Value 1158, Minimum -; Minor (Higher Dir.) Value 67, Minimum 75; Met? No	**No**
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)* — Major (Both Dir.) Value 861, Minimum; Pedestrians Value, Minimum; Met? n/a. *or Criterion B: One Hour (MUTCD Figure 4C-8)* — Major (Both Dir.) Value 1158, Minimum; Pedestrians Value, Minimum; Met? n/a	**Not Evaluated**
5 School Crossing	No students projected to cross the major street at this location.	**No**
6 Coordinated Signal System	Only one signal in the roadway network nearby.	**No**
7 Crash Experience ** Condition A not evaluated *(all conditions)*	*Condition B, 1-year Period (Table 4C-4)* — Angle+Ped Crashes Value n/a, Minimum 4; or Fatal+Injury Angle+Ped Value n/a, Minimum 3; Met? n/a. ***and*** *Condition C, 80% of Warrant 1 [Condition A]* — Major (Both Dir.) Value 827, Minimum; Minor (Higher Dir.) Value 58, Minimum; Met? n/a. *or Condition B, 3-year Period (Table 4C-5)* — Angle+Ped Crashes Value n/a, Minimum 6; or Fatal+Injury Angle+Ped Value n/a, Minimum 4; Met? n/a. *or Condition C, 80% of Warrant 1 [Condition B]* — Major (Both Dir.) Value 827, Minimum; Minor (Higher Dir.) Value 58, Minimum; Met? n/a. *or Condition C, 80% of Warrant 4* — Four Hour Ped; One Hour Ped Value, Minimum; Met? n/a	**Not Evaluated**
8 Roadway Network	Not an intersection of two or more major routes.	**No**
9 Intersection Near Grade Xing	No railroad grade crossing nearby.	**No**
	Warrants Met:	**2**
	Recommendation:	**Consider Signal**

Notes:

c: Warrant 1 minimum values used for "70%" to account to reflect major-street speed over 40 mph

* Warrant 3, Peak Hour, is indicated by the MUTCD as follows: "This signal warrant should be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."

** No trial of alternatives with observance and enforcement has been attempted for crash reduction at this location.

Appendix F: Intersection Cost Participation Calculations

City of Billings Intersection Cost Participation Worksheet: Clearwater/44 West Phase 1A + Phase 2 Retail

1: Central at 48th

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	3	3	**10**	**10**
WB L	1	1	1	**1**	**1**
WB T	1	**5**	**5**	8	8
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1	**0**	**0**	**2**	**2**
SB T	1	No project traffic			
NB L	1				
Project **Critical** Lane Volume			**5**		**13**
Critical Lane Capacity			1200		1200
% Increase			0.4%		1.1%
Max % Increase			1.1%		

2: Shiloh at Broadwater

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**2**	**2**	**6**	**6**
WB T	1	No project traffic			
EB L	1				
NB T	2	**19**	**10**	26	13
SB L	1	No project traffic			
SB T	2	12	6	**32**	**16**
NB L	1	No project traffic			
Project **Critical** Lane Volume			**12**		**22**
Critical Lane Capacity			1140		1140
% Increase			1.1%		1.9%
Max % Increase			1.9%		

3: Shiloh at Central

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	2	23	12	32	16
WB L	1	No project traffic			
WB T	2	**14**	**7**	**38**	**19**
EB L	1	**23**	**23**	**32**	**32**
NB T	2	No project traffic			
SB L	1				
SB T	2				
NB L	1	**14**	**14**	**38**	**38**
Project **Critical** Lane Volume			**44**		**89**
Critical Lane Capacity			1200		1200
% Increase			3.7%		7.4%
Max % Increase			7.4%		

5: Shiloh at Monad

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1				
WB T	1				
EB L	1				
NB T	2	**12**	**6**	**32**	**16**
SB L	1	**4**	**4**	**5**	**5**
SB T	2	19	10	26	13
NB L	1	No project traffic			
Project **Critical** Lane Volume			**10**		**21**
Critical Lane Capacity			1200		1200
% Increase			0.8%		1.8%
Max % Increase			1.8%		

6: West Central Ave Site Access (Double Haul Lane)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	**1**	**1**	**2**	**2**
WB L	1	**34**	**34**	**86**	**86**
WB T	1	2	2	1	1
EB L	0	No project traffic			
NB T	0	No project traffic			
SB L	0				
SB T	0				
NB L	1	**6**	**6**	**10**	**10**
Project **Critical** Lane Volume			**41**		**98**
Critical Lane Capacity			1140		1140
% Increase			3.6%		8.6%
Max % Increase			8.6%		

7:East Central Ave Site Access (S. 44th St W.)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	**43**	**43**	**76**	**76**
WB L	1	**9**	**9**	**28**	**28**
WB T	1	34	34	86	86
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1				
SB T	1				
NB L	1	**2**	**2**	**1**	**1**
Project **Critical** Lane Volume			**54**		**105**
Critical Lane Capacity			1140		1140
% Increase			4.7%		9.2%
Max % Increase			9.2%		

City of Billings Intersection Cost Participation Worksheet: Clearwater Phase 1B

1: Central at 48th

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	1	1	**2**	**2**
WB L	1	No project traffic			
WB T	1	**2**	**2**	1	1
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1	**0**	**0**	**1**	**1**
SB T	1	No project traffic			
NB L	1				
Project **Critical** Lane Volume			**2**		**3**
Critical Lane Capacity			1200		1200
% Increase			0.2%		0.3%
Max % Increase			0.3%		

2: Shiloh at Broadwater

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**0**	**0**	**2**	**2**
WB T	1	No project traffic			
EB L	1				
NB T	2	**7**	**4**	5	3
SB L	1	No project traffic			
SB T	2	2	1	**8**	**4**
NB L	1	No project traffic			
Project **Critical** Lane Volume			**4**		**6**
Critical Lane Capacity			1140		1140
% Increase			0.4%		0.5%
Max % Increase			0.5%		

3: Shiloh at Central

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	2	**9**	**5**	6	3
WB L	1	No project traffic			
WB T	2	3	2	**9**	**5**
EB L	1	9	9	**6**	**6**
NB T	2	No project traffic			
SB L	1				
SB T	2				
NB L	1	**3**	**3**	**9**	**9**
Project **Critical** Lane Volume			**14**		**20**
Critical Lane Capacity			1200		1200
% Increase			1.2%		1.7%
Max % Increase			1.7%		

5: Shiloh at Monad

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1				
WB T	1				
EB L	1				
NB T	2	2	1	**8**	**4**
SB L	1	1	1	**1**	**1**
SB T	2	**7**	**4**	5	3
NB L	1	No project traffic			
Project **Critical** Lane Volume			**4**		**5**
Critical Lane Capacity			1200		1200
% Increase			0.3%		0.4%
Max % Increase			0.4%		

6: West Central Ave Site Access (Double Haul Lane)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	0	0	**2**	**2**
WB L	1	No project traffic			
WB T	1	**1**	**1**	1	1
EB L	0	No project traffic			
NB T	0	No project traffic			
SB L	0				
SB T	0				
NB L	1	**1**	**1**	**1**	**1**
Project **Critical** Lane Volume			**2**		**3**
Critical Lane Capacity			1140		1140
% Increase			0.2%		0.3%
Max % Increase			0.3%		

7:East Central Ave Site Access (S. 44th St W.)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**9**	**9**	**28**	**28**
WB T	1	No project traffic			
EB L	1				
NB T	1	No project traffic			
SB L	1				
SB T	1				
NB L	1	**1**	**1**	**1**	**1**
Project **Critical** Lane Volume			**10**		**29**
Critical Lane Capacity			1140		1140
% Increase			0.9%		2.5%
Max % Increase			2.5%		

City of Billings Intersection Cost Participation Worksheet: Clearwater Phase 1C

1: Central at 48th

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	1	1	**2**	**2**
WB L	1	0	0	**0**	**0**
WB T	1	**2**	**2**	1	1
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1	**0**	**0**	**0**	**0**
SB T	1	No project traffic			
NB L	1				
Project **Critical** Lane Volume			**2**		**2**
Critical Lane Capacity			1200		1200
% Increase			0.2%		0.2%
Max % Increase			0.2%		

2: Shiloh at Broadwater

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**0**	**0**	**1**	**1**
WB T	1	No project traffic			
EB L	1				
NB T	2	**6**	**3**	4	2
SB L	1	No project traffic			
SB T	2	2	1	**6**	**3**
NB L	1	No project traffic			
Project **Critical** Lane Volume			**3**		**4**
Critical Lane Capacity			1140		1140
% Increase			0.3%		0.4%
Max % Increase			0.4%		

3: Shiloh at Central

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	2	7	4	5	3
WB L	1	No project traffic			
WB T	2	**2**	**1**	**8**	**4**
EB L	1	**7**	**7**	**5**	**5**
NB T	2	No project traffic			
SB L	1				
SB T	2				
NB L	1	**2**	**2**	**8**	**8**
Project **Critical** Lane Volume			**10**		**17**
Critical Lane Capacity			1200		1200
% Increase			0.8%		1.4%
Max % Increase			1.4%		

5: Shiloh at Monad

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1				
WB T	1				
EB L	1				
NB T	2	2	1	**6**	**3**
SB L	1	1	1	**1**	**1**
SB T	2	**6**	**3**	4	2
NB L	1	No project traffic			
Project **Critical** Lane Volume			**3**		**4**
Critical Lane Capacity			1200		1200
% Increase			0.3%		0.3%
Max % Increase			0.3%		

6: West Central Ave Site Access (Double Haul Lane)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	1	1	**2**	**2**
WB L	1	No project traffic			
WB T	1	**2**	**2**	1	1
EB L	0	No project traffic			
NB T	0	No project traffic			
SB L	0				
SB T	0				
NB L	1	**0**	**0**	**0**	**0**
Project **Critical** Lane Volume			**2**		**2**
Critical Lane Capacity			1140		1140
% Increase			0.2%		0.2%
Max % Increase			0.2%		

7:East Central Ave Site Access (S. 44th St W.)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**7**	**7**	**23**	**23**
WB T	1	No project traffic			
EB L	1				
NB T	1	No project traffic			
SB L	1				
SB T	1				
NB L	1	**2**	**2**	**1**	**1**
Project **Critical** Lane Volume			**9**		**24**
Critical Lane Capacity			1140		1140
% Increase			0.8%		2.1%
Max % Increase			2.1%		

City of Billings Intersection Cost Participation Worksheet: Clearwater Phase 2 (residential only, no retail)

1: Central at 48th

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	2	2	**5**	**5**
WB L	1	1	1	**1**	**1**
WB T	1	**5**	**5**	3	3
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1	**0**	**0**	**1**	**1**
SB T	1	No project traffic			
NB L	1				
Project **Critical** Lane Volume			**5**		**7**
Critical Lane Capacity			1200		1200
% Increase			0.4%		0.6%
Max % Increase			0.6%		

2: Shiloh at Broadwater

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1	**1**	**1**	**4**	**4**
WB T	1	No project traffic			
EB L	1				
NB T	2	**16**	**8**	11	6
SB L	1	No project traffic			
SB T	2	5	3	**19**	**10**
NB L	1	No project traffic			
Project **Critical** Lane Volume			**9**		**14**
Critical Lane Capacity			1140		1140
% Increase			0.8%		1.2%
Max % Increase			1.2%		

3: Shiloh at Central

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	2	20	10	13	7
WB L	1	3	3	11	11
WB T	2	**3**	**2**	**11**	**6**
EB L	1	**20**	**20**	**13**	**13**
NB T	2	No project traffic			
SB L	1				
SB T	2	**4**	**2**	**14**	**7**
NB L	1	**4**	**4**	**14**	**14**
Project **Critical** Lane Volume			**28**		**40**
Critical Lane Capacity			1200		1200
% Increase			2.3%		3.3%
Max % Increase			3.3%		

5: Shiloh at Monad

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	No project traffic			
WB L	1				
WB T	1				
EB L	1				
NB T	2	5	3	**19**	**10**
SB L	1	3	3	**2**	**2**
SB T	2	**16**	**8**	11	6
NB L	1	No project traffic			
Project **Critical** Lane Volume			**8**		**12**
Critical Lane Capacity			1200		1200
% Increase			0.7%		1.0%
Max % Increase			1.0%		

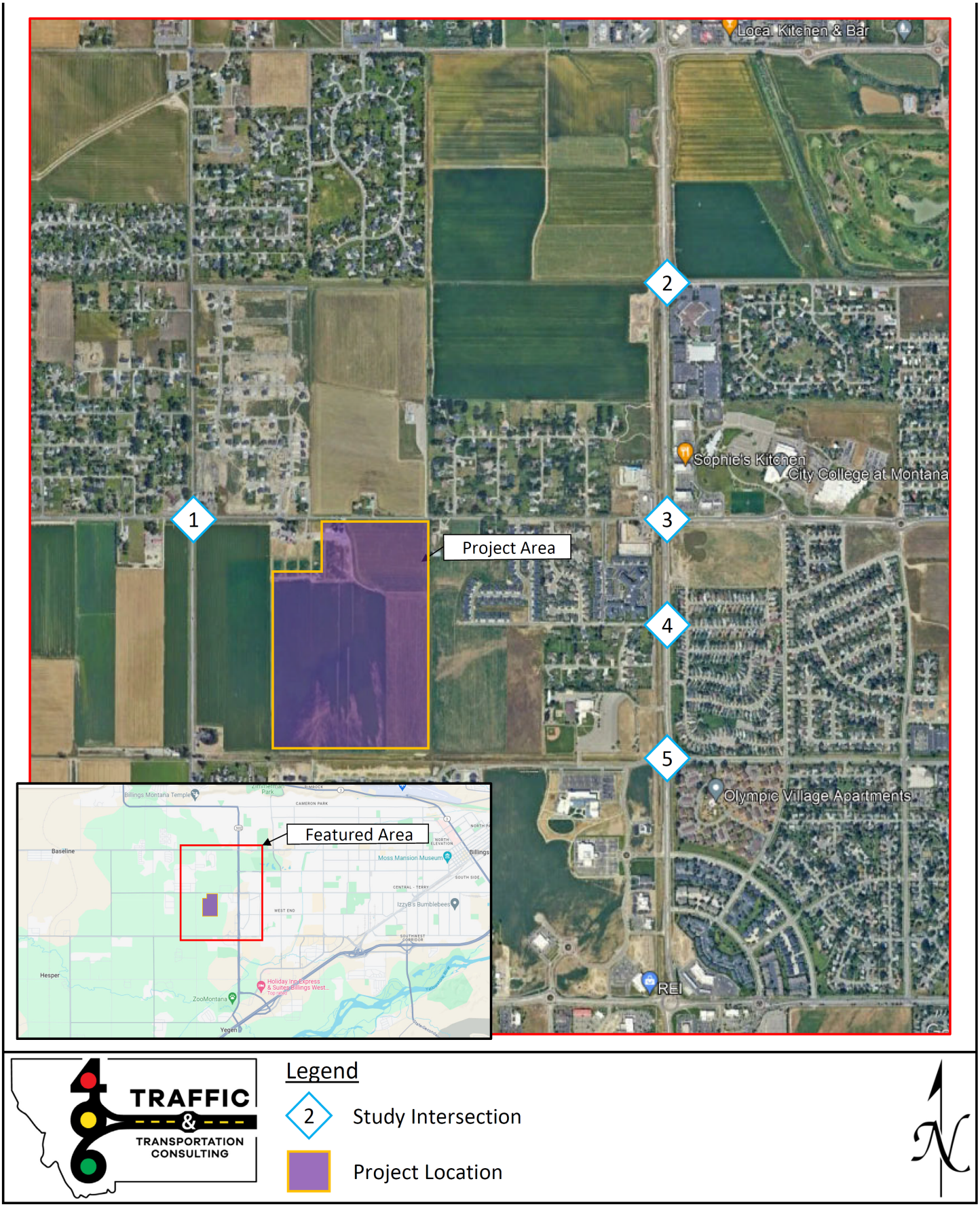
6: West Central Ave Site Access (Double Haul Lane)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	**1**	**1**	**3**	**3**
WB L	1	**5**	**5**	**17**	**17**
WB T	1	3	3	2	2
EB L	0	No project traffic			
NB T	0	No project traffic			
SB L	0				
SB T	0				
NB L	1	**4**	**4**	**3**	**3**
Project **Critical** Lane Volume			**10**		**23**
Critical Lane Capacity			1140		1140
% Increase			0.9%		2.0%
Max % Increase			2.0%		

7:East Central Ave Site Access (S. 44th St W.)

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	1	**20**	**20**	**13**	**13**
WB L	1	**5**	**5**	**17**	**17**
WB T	1	5	5	17	17
EB L	1	No project traffic			
NB T	1	No project traffic			
SB L	1				
SB T	1				
NB L	1	**3**	**3**	**2**	**2**
Project **Critical** Lane Volume			**28**		**32**
Critical Lane Capacity			1140		1140
% Increase			2.5%		2.8%
Max % Increase			2.8%		

Exhibit 1. Overall Site Location and Study Intersections



Planning Board

Date:	06/09/2026
Title:	Shop House Acres Subdivision, County Major Preliminary Plat Review
Presented by:	David Green
Department:	Planning & Community Services
Presentation:	Yes

Information

RECOMMENDATION

Staff recommends the Planning Board recommend to Board of County Commissioners that the preliminary plat of Shop House Acres Subdivision be conditionally approved, variances accepted, and the Findings of Fact adopted as presented in the staff report.

BACKGROUND (Consistency with Adopted Plans and Policies, if applicable)

On May 1, 2026, IMEG, for Levi Britton, applied for preliminary major plat approval of Shop House Acres Subdivision. The subdivision will create 49 lots for residential/commercial development. The subject property is generally located west of South 80th Street West, south of Wisner Avenue which is south of King Avenue West. Tax ID D00207. This parcel of land is outside county zoning. These lots will be for shop buildings for businesses and hobby shops. There will be cisterns and septic available at each lot should the lot purchaser want to include a single bedroom dwelling unit with the shop. Shop World 406 LLC, located south of Monad Road and east of Eggebrecht Lane is another example of shops with some of them having water and septic on the lot.

VARIANCES

One variance is requested:
The applicant has requested a variance from Section 4.6.B.1, of the Yellowstone County Subdivision Regulations, which outlines a connection to undeveloped / underdeveloped land surrounding proposed subdivisions. The maximum distance between those connections is 600 feet.

Staff is recommending approval of the variance request. Further explanation and analysis can be found in Attachment A.

PROPOSED CONDITIONS OF APPROVAL

1. To protect public health and safety, prior to final plat approval, the applicant will receive approval from the MDEQ for the proposed water systems, septic systems and the proposed storm water management.
2. To provide a maintenance mechanism for the new sections of public roads with the subdivision and to protect public health and safety, prior to final plat approval, the applicant will petition to create an RSID for the future maintenance of the public roads.
3. To protect public health and safety with proper consideration given to road conditions and site distance, prior to final plat approval, the applicant will provide analysis from a professional engineer that site distance, in accordance with AASHTO, has been met for the proposed access locations. Failure to obtain safe site distances per the engineering analysis will require relocation of the entrances to the subdivision. Public Works must review and approve the intersection locations prior to final plat approval.
4. To protect public health and safety with proper fire suppression, prior to final plat approval, the applicant will submit construction drawings of the dry hydrant system to Laurel Fire Department for review and approval. Once installed, the applicant will request the Laurel Fire Department test the system to ensure it works correctly and get a sign off from Laurel Fire Department. The applicant will also create an RSID for the dry hydrant system.
5. To minimize the effects on local service, prior to final plat approval, the applicant will coordinate with the USPS for locating and providing the correct amount of space for safely delivering the mail to the residents.
6. To minimize effects on the natural environment, prior to final plat approval a weed management plan and property inspection shall be completed by the County Weed Department.
7. Minor changes may be made in the SIA and final documents, as requested by the Planning, Legal or Public Works Departments to clarify the documents and bring them into the standard acceptable format.
8. The final plat shall comply with all requirements of the City of Billings Subdivision Regulations, rules, regulations, policies, and resolutions of the City of Billings, and the laws and Administrative Rules of the State of Montana.

PROCEDURAL HISTORY

Pre-Application Meeting: January 29, 2026
Preliminary Plat application submitted to Planning Division: May 1, 2026
Departmental Review Meeting: May 14, 2026

Preliminary Plat Resubmittal: May 21, 2026
Planning Board Plat Review: June 9, 2026
Planning Board Public Hearing: June 23, 2026
Preliminary Plat to Board of County Commissioners: July 21, 2026
60 Working-Day Preliminary Plat Review period ends: July 28, 2026

PLAT INFORMATION

General Location: South 80th Street West, south of Wisner Avenue which is south of King Avenue West
Legal Description: Located in Section 14, Township 1S, Range 24E or more specifically: S14, T01 S, R24 E, N2N2E2SE4 N1/2N1/2E1/2SE 14-1S-24. Tax ID D00207.
Owner/Subdivider: Las Palmas LLC, Levi Britton
Engineer/Surveyor: IMEG
Existing Zoning: Outside of zoning
Existing Land Use: Grazing land
Proposed Land Use: Residential & Commercial
Gross Area: ± 19.78 Acres
Lot Size:
Minimum: ± 14,841 square feet
Maximum: ± 48,907 square feet
Parkland Requirements: Subdivision regulations require a dedication of 7.93 acres. The applicant is providing a cash-in-lieu contribution for parkland.

TRAFFIC IMPACT STUDY (TIS)

The net new trips identified in this report are subject to examination under Yellowstone County's cost participation program to the extent that they impact travel at studied intersections. Cost participation, according to the TIS submitted, is not required because the impacts from the subdivision will have very minimal effect on existing studied intersections. Table 9, below, shows the warrants for intersection improvements.

Table 9: Signal Warrant Analysis Summary

Traffic Signal Warrants			Warrant 1, Eight-Hour Vehicular Volume	Warrant 2, Four-Hour Vehicular Volume	Warrant 3, Peak Hour	Warrant 4, Pedestrian Volume	Warrant 5, School Crossing	Warrant 6, Coordinated Signal System	Warrant 7, Crash History	Warrant 8, Roadway Network	Warrant 9, Intersection Near a Grade Crossing
2026	Intersection 1	King Avenue West & South 80th St. West	No	No	No	No	No	No	No	No	No
2031			No	No	No	No	No	No	No	No	No
2026	Intersection 2	Hesper Road & South 80th St. West	No	No	No	No	No	No	No	No	No
2031			No	No	No	No	No	No	No	No	No

Analysis of the existing traffic volumes, lane configurations, and the impacts due to the projected traffic growth and proposed development result in the following general conclusions:

- The preceding analysis demonstrates that the Shop House Acres development will not generate significant nor impactful volume of new trips at the intersections studied.
- The studied existing intersections and proposed access locations will operate at or above an LOS of "B", exceeding any minimum requirement of an LOS specified in the Appendix E of the Road Design Manual produced by the Montana Department of Transportation.
- No auxiliary turn lanes are warranted for the intersections and access locations discussed in this report.
- Vertical sight obstruction is present for traffic performing left-turn movements onto South 80th Street West from the North Access location of the development.
- The existing intersections do not warrant any further analysis for signal considerations, as no consideration warrants are met.

County Public works requested further analysis of the entry points, access separations, and site distances.

STAKEHOLDERS

There are no stakeholder responses at this time. Stakeholder input will be received at a public hearing scheduled for this subdivision on June 23, 2026.

ALTERNATIVES

In accordance with state law, the Board of County Commissioners has 60 working days to act upon this major preliminary plat. The 60 working day review period for the proposed plat ends on July 28, 2026. State and County subdivision regulations also require that preliminary plats be reviewed using specific criteria, as stated within this report. The County

may not unreasonably restrict an owner's ability to develop land if the subdivider provides evidence that any identified adverse effects can be mitigated. Within the 60 working day review period, the Board of County Commissioners is required to:

1. Approve;
2. Conditionally Approve; or
3. Deny the Preliminary Plat

FISCAL EFFECTS

The preliminary plat of this subdivision will have no financial impact on the Planning Division.

SUMMARY

The purpose of the County's subdivision review process is to identify potential negative effects of property being subdivided. When negative effects are identified it is the subdivider's responsibility to mitigate those effects. Various County departments, private service/utility providers and the affected school district(s), have reviewed this application and provided input on effects and mitigation. The Findings of Fact, which are presented as an attachment, discuss potential negative impacts of the subdivision and conditions of approval are recommended as measures to further mitigate any impacts. In this case, there were found to be some impacts from this proposed subdivision.

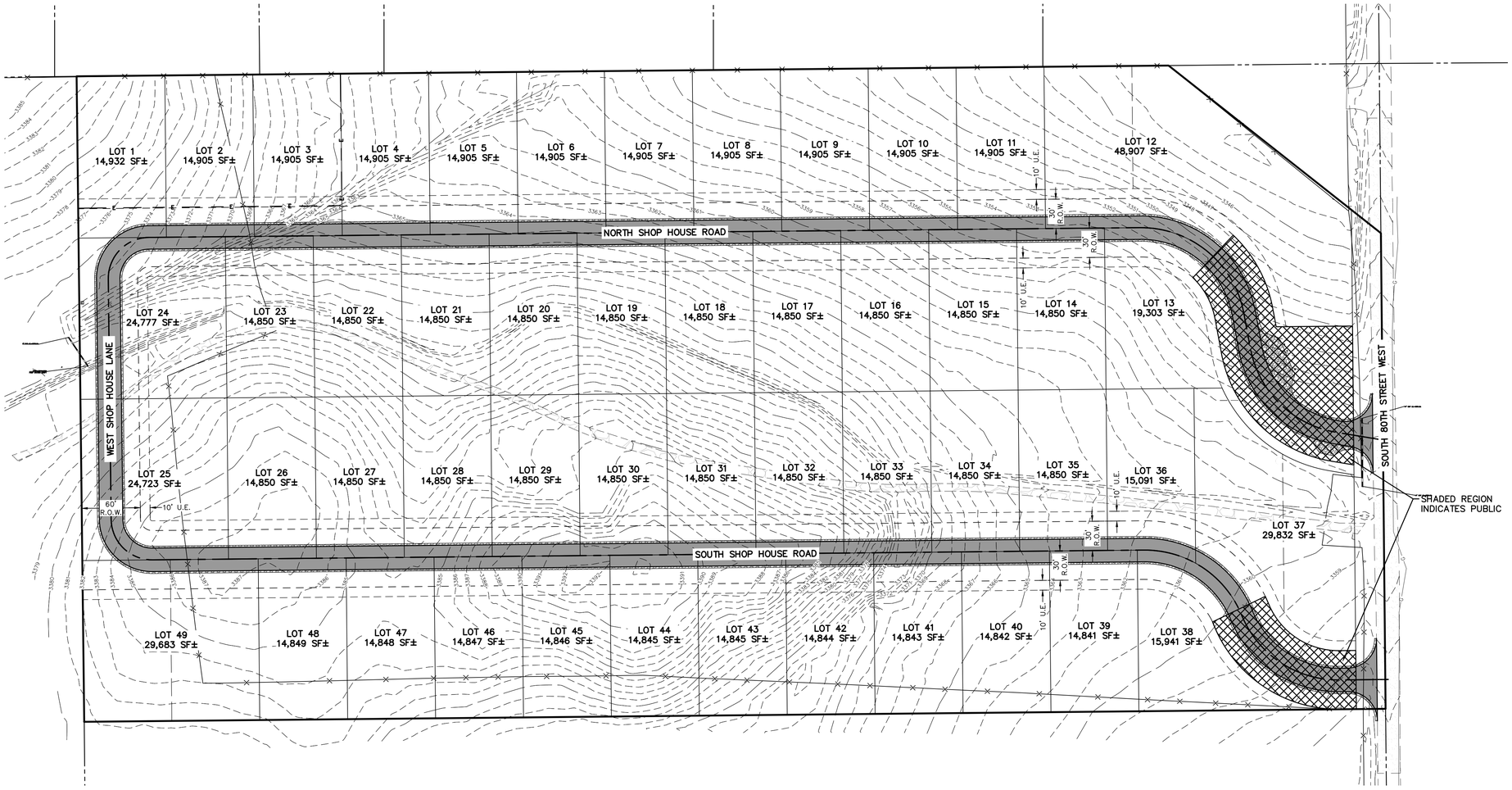
Attachments

Proposed Plat
Draft SIA
Findings of Fact
Variance request from applicant
Attachment A - Staff variance review
Traffic Study

PRELIMINARY PLAT OF

SHOP HOUSE ACRES SUBDIVISION

LOCATED IN N1/2, SE1/4, SE1/4 SECTION 14, TOWNSHIP 1 SOUTH, RANGE 24 EAST, P.M.M., YELLOWSTONE COUNTY, MONTANA



60 0 60 120

SCALE IN FEET

BASIS OF BEARING
STATE PLANE MONTANA – ZONE 2500
GROUND (TRUE) DISTANCES

RECORD OWNER:
LAS PALMAS, L.L.C.

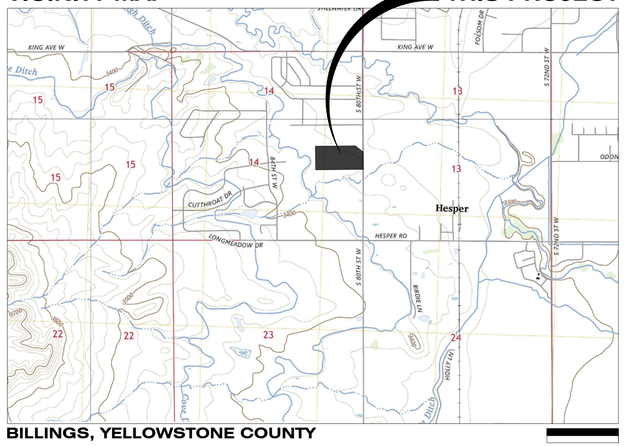
SUBDIVIDER:
LAS PALMAS, L.L.C.

DATE:
APRIL, 2026

TOTAL SUBDIVISION AREA:
19.78 ACRES (GROSS)
18.48 ACRES (NET)

VICINITY MAP

THIS PROJECT



BILLINGS, YELLOWSTONE COUNTY

0 2000

SITE DATA

NUMBER OF LOTS	49
MAXIMUM LOT AREA	48,907 SF
MINIMUM LOT AREA	14,841 SF
AREA OF OPEN SPACE	NA
LINEAR FEET OF STREETS	3,056 LF
NET ACREAGE	18.77 AC
GROSS ACREAGE	19.78 AC
EXISTING ZONING	UNZONED
PROPOSED ZONING	UNZONED
EXISTING LAND USE	AGRICULTURAL
PROPOSED LAND USE	COMMERCIAL

LEGEND

(E) = EXISTING
(P) = PROPOSED
R/W OR R.O.W. = RIGHT-OF-WAY
U.E. = UTILITY EASEMENT
= CISTERN WITH 50' CISTERN ISOLATION ZONE
= DRAINFIELD
= (E) SURVEY BOUNDARY
= (E) UNDERGROUND ELETRIC
= (E) CHAIN LINK FENCE
= (E) CONTOUR
= (P) PROPERTY LINE
= (P) CENTERLINE
= (P) EASEMENT LINE
= (P) R.O.W. LINE
= (P) SANITARY SEWER
= (P) WATER LINE

PROJECT LOCATION

SECTION 14, TOWNSHIP 1 SOUTH, RANGE 24 EAST, P.M.M. OF YELLOWSTONE COUNTY, MONTANA

1/4	SEC.	T.	R.
	14	1S	24E

PREPARED BY:

IMEG

550 N. 31ST ST., STE 111
BILLINGS, MT
59101

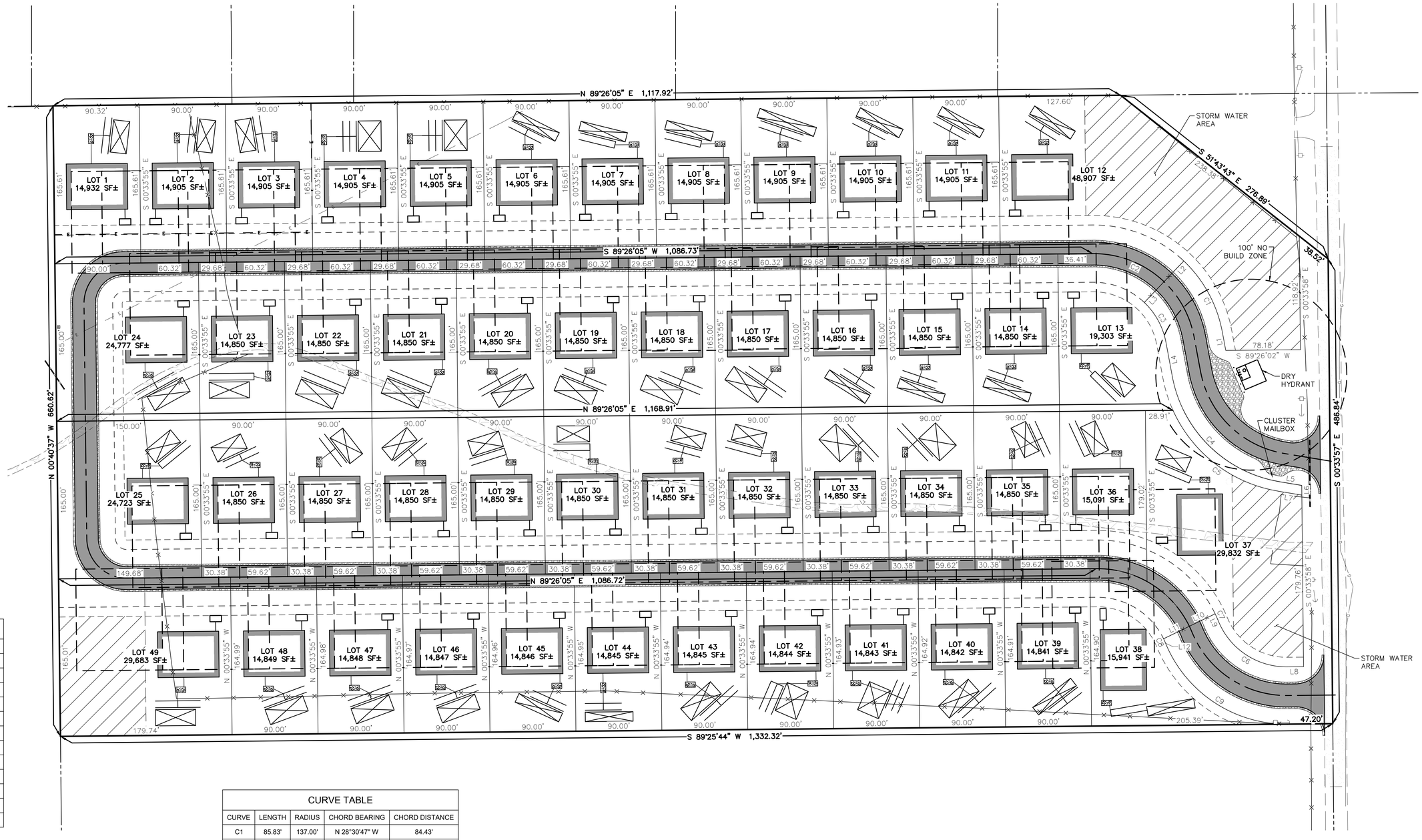
PH: 406.248.9000
FAX: 406.721.5224
www.imegcorp.com

IMEG PROJECT NO. 25006765

PRELIMINARY PLAT OF

SHOP HOUSE ACRES SUBDIVISION

LOCATED IN N1/2, SE1/4, SE1/4 SECTION 14, TOWNSHIP 1 SOUTH, RANGE 24 EAST, P.M.M., YELLOWSTONE COUNTY, MONTANA



LINE TABLE		
LINE	BEARING	DISTANCE
L1	N 10°33'55" W	19.88'
L2	S 43°32'21" W	30.00'
L3	S 43°32'21" W	30.00'
L4	S 10°33'55" E	36.67'
L5	S 80°33'55" E	23.58'
L6	S 00°33'58" E	10.15'
L7	S 80°33'55" E	25.35'
L8	S 89°25'44" W	17.05'
L9	N 23°02'04" W	2.93'
L10	S 64°11'07" W	30.00'
L11	S 64°11'07" W	30.00'
L12	S 23°02'05" E	2.96'

CURVE TABLE				
CURVE	LENGTH	RADIUS	CHORD BEARING	CHORD DISTANCE
C1	85.83'	137.00'	N 28°30'47" W	84.43'
C2	82.36'	107.00'	S 68°30'47" E	80.35'
C3	48.24'	77.00'	S 28°30'47" E	47.46'
C4	167.38'	137.00'	S 45°33'55" E	157.16'
C5	144.49'	147.00'	S 52°24'26" E	138.74'
C6	90.72'	77.00'	N 56°49'05" W	85.56'
C7	6.65'	136.99'	N 24°25'29" W	6.65'
C8	3.74'	77.00'	S 24°25'29" E	3.74'
C9	161.28'	136.89'	S 56°47'15" E	152.12'

50 0 50 100

SCALE IN FEET

LEGEND

- (E) = EXISTING
- (P) = PROPOSED
- R/W OR R.O.W. = RIGHT-OF-WAY
- U.E. = UTILITY EASEMENT
- = CISTERN WITH 50' CISTERN ISOLATION ZONE
- = DRAINFIELD
- = (E) SURVEY BOUNDARY
- = (E) UNDERGROUND ELETRIC
- = (E) CHAIN LINK FENCE
- = (E) CONTOUR
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- = (P) EASEMENT LINE
- = (P) R.O.W. LINE
- = (P) SANITARY SEWER
- = (P) WATER LINE

1/4	SEC.	T.	R.
	14	1S	24E

PREPARED BY:

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59101

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www.imegcorp.com

IMEG PROJECT NO. 25006765

SUBDIVISION IMPROVEMENTS AGREEMENT

SHOP HOUSE ACRES SUBDIVISION

IMEG #25006765

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SUBDIVISION IMPROVEMENTS AGREEMENT
SHOP HOUSE ACRES SUBDIVISION

This agreement is made and entered into this_____ day of_____ , 20____, by and between *Levi Britton,* whose address for the purpose of this agreement is 941 S 84th St. W, Billings, Montana, 59106, hereinafter referred to as "Subdivider," and YELLOWSTONE COUNTY, Montana, hereinafter referred to as "County."

WITNESSETH:

WHEREAS, at a regular meeting conducted on_____ day of_____, 20____, the Board of Planning recommended conditional approval of a preliminary plat of *Shop House Acres Subdivision,* and

WHEREAS, at a regular meeting conducted on _____ day of_____, 20___, the Yellowstone County Board of County Commissioners conditionally approved a preliminary plat of *Shop House Acres Subdivision,* and

WHEREAS, a Subdivision Improvements Agreement is required by the County prior to the approval of the final plat.

WHEREAS, the provisions of this agreement shall be effective and applicable to *Shop House Acres Subdivision* upon the filing of the final plat thereof in the office of the Clerk and Recorder of Yellowstone County, Montana. The Subdivision shall comply with all requirements of the Yellowstone County Subdivision Regulations, the rules, regulations, policies, and resolutions of Yellowstone County, and the laws and administrative rules of the State of Montana.

THEREFORE, THE PARTIES TO THIS AGREEMENT, for and in consideration of the mutual promises herein contained and for other good and valuable consideration, do hereby agree as follows:

I. VARIANCES

A. One Variance has been requested related to connectivity to adjacent parcels to allow only one connection to the property to the west and one to the south due to topography and ditch constraints of the property to the south.

II. CONDITIONS THAT RUN WITH THE LAND

A. Lot owners should be aware that this subdivision is being built adjacent to open agricultural areas and contains wildlife migratory routes. Consequently, owners are advised that wildlife indigenous to the prairies or cultivated crops are found on the property, may impact the developed property, and interface with domestic animals, residents, and visitors. Owners may also experience problems with damage to landscaped shrubs, flowers, and gardens/ Any impacts associated with wildlife and damage is the responsibility of the lot owners.

B. Lot owners should be aware that soil characteristics within the area of this subdivision, as described in the 1972 Yellowstone County Soil Survey, indicate that there could be potential

limitations for proposed construction on the lots, which may require a geotechnical survey prior to construction.

C. No water rights have been transferred to the lot owners. If irrigation ditches exist on the perimeter of this development, they will be preserved for the benefit of other properties. Any existing perimeter ditches and drains shall remain in place and shall not be altered by the Subdivider or subsequent owners.

D. There is attached hereto a Waiver waiving the right to protest the creation of the special improvement district or districts which by this reference is expressly incorporated herein and made as much a part hereof as though fully and completely set forth herein at this point. The Waiver will be filed with the plat, shall run with the land, and shall constitute the guarantee by the Subdivider and property owner or owners of the developments described herein. Said Waiver is effective upon filing and is not conditioned on the completion of the conditions set forth in this Agreement. The Subdivider and owner specifically agree that they are waiving valuable rights and do so voluntarily.

E. The property is not located within a FEMA designated floodplain or floodway. Please see the FEMA Floodplain Map 30111C1240E.

F. Culverts, associated drainage swales, and storm ponds shall not be filled in or altered by the subdivider or subsequent lot owners.

G. When required by road improvements, all fences and irrigation ditches in the public right- of-way adjacent to this subdivision shall be removed or relocated outside of the public right-of-way and any relocation outside of the public right-of-way shall be subject to securing and recording easements.

H. Future maintenance of all public (or common) improvements shall be done through one (1) or more Homeowners Association (HOA) or RSID(s) created as part of the SIA for this subdivision.

I. The Subdivider will obtain two Access Permits from County Public Works prior to any construction on any lot withing the subdivision. The application will include a site plan showing the desired location of the accesses and show that it meets the requirements outlined by the DEQ storm water requirements for the subdivision. Failure to do so will result in the Subdivider removing what has been installed and locating the access in an approved location at the Subdividers expense.

Future lot owners inside the subdivision will all access their property from the private road network, and a County Public Works Access permit will not be required.

III. TRANSPORTATION

The subdivider agrees to guarantee all improvements for a period of one (1) year from the date of final acceptance by Yellowstone County.

A. Streets & Roads

All public and private roads within the **Shop House Acres Subdivision** will be constructed as **24-foot-wide paved asphalt streets** with **2-foot gravel shoulders** within **60-foot-wide rights-of-way and Easements**. All public streets will be located in the rights-of-way and will be dedicated for public use and maintained through one or more Rural Special Improvement Districts (RSIDs) established at the time of final plat approval. All private internal driving areas will be located in the easement and will be maintained by the Shop House Acres HOA.

The internal public and private road network includes the following:

- North Shop House Road — A primary access road entering the subdivision from South 80th Street West, serving as a main east-west corridor through the development. A portion of this road shall be public to accommodate for the public dry fire hydrant and mailboxes. A gate will be installed at the transition from Public to Private Road.

- West Shop House Lane — An interior north-south local private road providing access within the subdivision.

- South Shop House Road — A primary access private road entering the subdivision from South 80th Street West, serving as a main east-west corridor through the development. A gate will be installed at the approach to 80th Street as this is a private road.

All roads will be constructed to Yellowstone County standards for cross-section, drainage, grading, and sight distance. Traffic control signs and intersection markings will comply with the Manual on Uniform Traffic Control Devices (MUTCD) and Yellowstone County Public Works requirements.

All public and private roads have been designed to County specifications, with appropriate centerline geometry, ROW dedication, easement, and stormwater grading considerations. Intersections will be built with sight distance and safety requirements in compliance with MUTCD and Yellowstone County design standards.

B. Traffic Control Devices

The Shop House Acres Subdivision will include the installation of regulatory traffic control signage at key intersections to ensure safe vehicular movement and compliance with County and MUTCD standards. Based on the internal street network layout and projected traffic flow, a total of two stop signs will be installed within the subdivision at the two proposed access locations.

Stop sign locations will include, but are not limited to, the following intersections:

1. North Shop House Road & South 80th Street West (stop for exiting traffic)
2. South Shop House Road & South 80th Street West (stop for exiting traffic)

All signage will be fabricated and installed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and Yellowstone County specifications. The subdivider shall install signage concurrent with each phase of roadway construction to ensure functionality upon completion of each new segment of the road network.

Final placement and quantity of stop signs will be subject to Yellowstone County Public Works review and approval at the time of engineering plan submittal.

C. Access

- There will be two accesses for the proposed subdivision, one from North Shop House Road and one from South Shop House Road. Each approach will have 60’ right-of-way/easement.

- All lots within the subdivision shall be accessed using the internal private road network. Approximately, the first 137’ of North Shop House Circle shall be public for the use of the public 30,000-gallon dry hydrant tank and cluster mailbox.

D. Billings Area Bikeways and Trail Master Plan (BABTMP)

The BABTMP does not intersect with this property.

IV. EMERGENCY SERVICE

Emergency services for the Shop House Acres Subdivision will be provided by regional agencies serving unincorporated Yellowstone County. Fire protection infrastructure will be integrated into the subdivision as required under Yellowstone County Subdivision Regulations and applicable fire code guidance.

Fire Protection:

Fire protection for the subdivision will be provided by the Laurel Fire Department. To support fire suppression needs, one 30,000-gallon dry hydrant tank will be installed within the subdivision. The hydrant is depicted on the preliminary plat and will be accessible to fire response vehicles. The tank will be designed and installed per County and fire authority requirements, and ongoing maintenance will be the responsibility of the subdivision’s RSID.

Law Enforcement:

Law enforcement services will be provided by the Yellowstone County Sheriff's Office, which has jurisdiction over unincorporated areas of the county.

Emergency Medical Services:

Ambulance services will be provided by American Medical Response (AMR). AMR Billings has been serving Yellowstone County since 1994, offering both emergency and non-emergency medical transport services.

All emergency service providers have been notified of the proposed subdivision during preliminary plat review. The subdivision’s road widths, intersection design, and emergency vehicle turnaround provisions have been developed to comply with fire department access standards and ensure continuous emergency response capability throughout development.

V. Storm Drainage

Stormwater management for the Shop House Acres Subdivision will be addressed through a combination of private detention ponds and conveyance swales. These systems are designed to safely accommodate runoff generated by both impervious surfaces (e.g., roads and driveways) and graded lot areas while protecting downstream properties, infrastructure, and natural drainage corridors.

A stormwater management plan will be developed in accordance with Section 4.7 of the Yellowstone County Subdivision Regulations and Montana DEQ Circular DEQ-8. The plan will include the construction of regional stormwater retention ponds, strategically located within the subdivision, defined on the preliminary plat. These facilities will capture, retain, and treat roadway runoff and conveyances from common infrastructure prior to controlled release into natural drainages or swales. Stormwater retention shall be provided on Lots 12, 37, and 49. The Subdivider acknowledges that the lot lying within the stormwater detention area will not be available for construction or sale.

All stormwater facilities, including the regional pond and appurtenant conveyance infrastructure, will:

- Be constructed to meet or exceed MDEQ performance standards,
- Be reviewed and approved by MDEQ (or its authorized designee) prior to final plat approval,
- Be sized based on rational method or hydrologic modeling as outlined in the approved Storm Pond Design Report,
- Include emergency overflows and sediment forebays where required.

Final construction drawings and storm drainage reports will be submitted for County and DEQ review as part of the public infrastructure approval process. Operation and long-term maintenance of regional drainage facilities will be the responsibility of the subdivision's RSID or HOA, as defined in the covenants and the final plat filing.

VI. Utilities

A. Water Supply

Each lot within the Shop House Acres Subdivision will be served by an individual cistern system, which will be supplied by a licensed local water service provider. These systems are designed to comply with Section 4.9 of the Yellowstone County Subdivision Regulations, ensuring that all water supply provisions meet the necessary health and safety standards. Approval from the Montana Department of Environmental Quality (MDEQ) will be obtained for these systems and included with the final plat filing. Maintenance of the cisterns will be the responsibility of the individual lot owners.

B. Sanitary Sewer

Wastewater treatment for the subdivision will be managed through individual septic systems installed on each lot. These systems will be designed and constructed in accordance with Section 4.8 of the Yellowstone County Subdivision Regulations and the standards set forth in Montana DEQ Circular DEQ-4. Approval from the MDEQ will be secured prior to the final plat approval, and documentation of such approval will be included in the final plat submission. Each lot owner will be responsible for the operation and maintenance of their respective septic system.

C. Power, Telephone, Gas, and Cable Television

Electricity, telephone, natural gas, and cable television services will be extended to each lot within the subdivision. These utilities will be installed within the utility easements designated on the final plat. The easements are designed to meet the requirements of the utility providers and will be

coordinated with them during the development process to ensure proper installation and service delivery.

D. Solid Waste Disposal

Solid waste collection and disposal services will be provided by licensed local waste disposal companies operating within Yellowstone County. Each property owner will be responsible for arranging for their own solid waste pickup services. Disposal of solid waste will be conducted in accordance with the standards set forth by the Montana Department of Environmental Quality (MDEQ) and the Yellowstone City-County Health Department, ensuring that all waste is managed in an environmentally responsible manner.

VII. Parks & Open Space

Since each unit can having living quarters these lots will be classified as residential. Because of this parkland dedication is required for the residential lots. The subdivider will be providing cash in lieu of the parkland. For the parkland dedication calculation, the development includes approximately 15.75 acres of residential lots less than 0.5 acres, which require 11% parkland dedication. The development also includes approximately 1.86 acres of residential lots between 0.5 acre and 1 acre, which require 7.5% parkland dedication. Lastly, the development includes approximately 1.12 acres of residential lots between 1 acre and 3 acres, which require 5% parkland dedication. Based on the parkland dedication calculation, approximately 1.93 acres of parkland dedication will be required and paid as cash in lieu of parkland.

VIII. Irrigation

There are no irrigation systems, irrigation districts, or water rights associated with the land comprising the Shop House Acres Subdivision. As such, no irrigation infrastructure will be installed, and no water rights will be transferred as part of the subdivision process.

The subdivision has been designed to function without a centralized or individual irrigation supply. Lot owners will not be obligated to install or maintain irrigated lawns, and no requirement for turf or landscape irrigation will be imposed through the subdivision covenants.

IX. Weed Management

The Subdivider and all future lot owners shall be responsible for the control and management of noxious weeds within the Shop House Acres Subdivision, consistent with the current Yellowstone County Noxious Weed List and in accordance with Section 7-22-2152, MCA.

Requirements

The following measures will be implemented:

- A Weed Management Plan shall be submitted to the Yellowstone County Weed Department for review and approval. This plan will identify existing noxious weed species present on the site and outline specific control methods, herbicide usage (if applicable), mechanical or cultural treatment, and maintenance timelines.
- The Weed Management Plan shall be kept current and updated as necessary, particularly prior to the start of construction in any new phase of development. The cost of weed

management shall be borne by the individual property owner or responsible development entity.

- A Revegetation Plan shall also be submitted as part of the overall weed management strategy. This plan will identify seed mix recommendations to promote the establishment of native or low-maintenance species for soil stabilization and long-term weed suppression. Recommendations may be obtained from the Yellowstone County Weed Department and are subject to modification based on a required pre-development site inspection.

Enforcement of weed control will be consistent with County policies, and ongoing compliance will be the responsibility of each owner of record. Failure to adhere to the approved plan may result in enforcement action under County weed ordinances.

X. Soils / Geotechnical Study

No formal geotechnical investigation or site-wide soils analysis has been conducted by the Subdivider for the Shop House Acres Subdivision. Soil conditions across the subdivision are expected to vary due to the property's natural topography and geological setting. As a result, subsurface conditions—including soil bearing capacity, frost susceptibility, shrink-swell potential, and groundwater levels—may differ significantly between lots.

Individual lot owners are strongly encouraged to conduct site-specific geotechnical evaluations prior to initiating any structural construction. These evaluations should be performed by a qualified professional geotechnical engineer to determine the appropriate foundation design and to assess the need for any soil stabilization, drainage enhancements, or specialized construction techniques.

XI. Phasing of Improvements

The Shop House Acres Subdivision will not be a phased construction development. However, in accordance with MCA 76-3-617(4), the Subdivider shall notify the governing body a minimum of 30 days prior to the commencement of any infrastructure construction.

XII. Financial Guarantees

The Subdivider shall be responsible for the design, installation, and construction of all required public improvements in each phase of the Shop House Acres Subdivision. Improvements include, but are not limited to: roads, stormwater drainage, fire protection systems, and utility infrastructure. All such improvements shall be constructed under private contract and designed by a licensed professional civil engineer registered in the State of Montana.

All improvements must be completed prior to final plat approval, unless a financial guarantee is provided in accordance with the procedures set forth in Chapter 5 of the Yellowstone County Subdivision Regulations.

If improvements are not fully constructed at the time of final plat, the Subdivider shall provide the County with a monetary security in an amount equal to 125% of the estimated cost of the uncompleted improvements. Acceptable forms of financial security include:

- An irrevocable letter of credit from a federally insured financial institution,
- A performance bond issued by a licensed surety company,
- An escrow agreement, or

- Any other method approved by the Yellowstone County Planning Board and Board of County Commissioners.

The cost estimate shall be prepared and sealed by a Montana-licensed professional engineer and reviewed by the County Engineer or designee. All financial instruments shall remain in effect until the County has verified that improvements have been satisfactorily completed and accepted for public use.

Upon completion of the improvements, the Subdivider's engineer shall submit to the Yellowstone County Public Works Department:

- A sealed, certified statement of completion,
- As-built drawings, and
- Any required post-construction certifications pursuant to Section 4.6.C of the Yellowstone County Subdivision Regulations.

The Subdivider shall also guarantee all installed public improvements for a period of one (1) year following final acceptance by the County.

XIII. LEGAL PROVISIONS

A. Subdivider agrees to guarantee all public improvements for a period of one year from the date of final acceptance by Yellowstone County.

B. The owners of the properties involved in this proposed Subdivision by signature subscribed herein below agree, consent, and shall be bound by the provisions of this Agreement.

C. The covenants, agreements, and all statements in this Agreement apply to and shall be binding on the heirs, personal representatives, successors and assigns of the respective parties.

D. In the event it becomes necessary for either party to this Agreement to retain an attorney to enforce any of the terms or conditions of this Agreement or to give any notice required herein, then the prevailing party or the party giving notice shall be entitled to reasonable attorney fees and costs.

E. Any amendments or modifications of this Agreement or any provisions herein shall be made in writing and executed in the same manner as this original document and shall after execution become a part of this Agreement.

F. Subdivider shall comply with all applicable federal, state, and local statutes, ordinances, and administrativeregulations during the performance and discharge of its obligations. Subdivider acknowledges and agrees that nothing contained herein shall relieve or exempt it from such compliance.

G. Subdivider agrees to create any required (or expansion of existing) RSID(s) for future maintenance of all public (or common) constructed improvements prior to final plat approval.

IN WITNESS WHEREOF, the parties hereto have set their hands and official seals on the date first above written.

"SUBDIVIDER" *Levi Britton*

_____
Levi Britton

STATE OF _____)
: ss
County of _____)

On this_____day of_____, 20____, before me, a Notary Public in and for the State of _____, personally appeared Levi Britton, *(Subdivider),* who executed the foregoing instrument and acknowledged to me that they executed the same.

SS _____

This agreement is hereby approved and accepted by Yellowstone County, this_____day of _____, 20____

"COUNTY"
COUNTY OF YELLOWSTONE
MONTANA

County of Yellowstone
Board of County Commissioners

By:_____
Mark Morse, Chairman

_____
Mike Waters, Commissioner

_____
Chris White, Commissioner

Attest:_____
Jeff Martin, County Clerk and Recorder

STATE OF MONTANA)
: ss
County of Yellowstone)

On this_____day of_____, 20____, before me, a Notary Public in and for the State of Montana, personally appeared Mark Morse, Mike Waters, Chris White and Jeff Martin, known to me to be the Board of County Commissioners and the County Clerk and Recorder, respectively, of Yellowstone County, Montana, whose names are subscribed to the foregoing instrument in such capacity and acknowledged to me that they executed the same on behalf of Yellowstone County, Montana.

SS _____

Waiver of Right to Protest

FOR VALUABLE CONSIDERATION, the undersigned, being the Subdivider and all of the owners of the hereinafter described real property, do hereby waive the right to protest the formation of one or more Rural Special Improvement Districts (RSID's), for a period of no more than twenty years from the recording of this waiver, which Yellowstone County may require.

This Waiver and Agreement is independent from all other agreements and is supported by sufficient independent consideration to which the undersigned are parties, and shall run with the land and shall be binding upon the undersigned, their successors and assigns, and the same shall be recorded in the office of the County Clerk and Recorder of Yellowstone County, Montana.

The real property hereinabove mentioned is more particularly described as follows:

Shop House Acres Subdivision

Signed and dated this_____day of_____, 20____.

_____

Levi Britton

STATE OF _____)
: ss
County of _____)

On this____day of_____, 20____, before me, a Notary Public in and for the State of _____, personally appeared Levi Britton, the person who executed the forgoing instrument and acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year hereinabove written.

SS_____

FINDINGS OF FACT

The City-County Planning Division staff prepared the Findings of Fact for Shop House Acres Subdivision. These findings are based on the preliminary plat application and supplemental documents addressing the review criteria required by the Montana Subdivision and Platting Act (76-3-608, MCA) and the Yellowstone County Subdivision Regulations (YCSR).

A. What are the effects on agriculture, local services, the natural environment, wildlife and wildlife habitat and public health and safety (76-3-608 (3) (a) MCA) (Section 3.2 (H) (2) YCSR)

1. Effect on agriculture and agricultural water users' facilities

The subject property has been used for grazing purposes. No water rights or shares will be transferred to individual lot owners. Irrigation ditches that exist on the perimeter of this development are for the benefit of other properties. Perimeter ditches and drains shall remain in place and shall not be altered by the subdivider or subsequent owners. There will be no effect on the water users downstream from this property.

2. Effect on local services

a. **Water** – The proposed subdivision is not located within any public water district. Each lot within the Shop House Acres Subdivision will be served by an individual cistern system, which will be supplied by a licensed local water service provider. The operation and maintenance of the water system will be the responsibility of individual lot owners. Water systems will be installed meeting the requirements outlined in Section 4.9 of the Yellowstone County Subdivision Regulations and the MDEQ. **(Condition #1)**

b. **Septic -** The proposed subdivision is not located within any public sewer district. Wastewater treatment for the subdivision will be managed through individual septic systems installed on each lot. The wastewater disposal systems will be submitted to and approved by Montana Department of Environmental Quality. These systems shall be located and installed as approved by Montana Department of Environmental Quality, or its designee. Septic systems will be installed meeting the requirements outlined in Section 4.8 of the Yellowstone County Subdivision Regulations and the MDEQ. **(Condition #1)** The operation and maintenance of the septic system will be the responsibility of individual lot owners.

All private utilities, power, telephone, gas and cable television will be installed in the public and private right of way or easements identified on the plat.

c. **Streets and roads** – Access to the Subdivision shall be from proposed approaches from South 80th Street West. A portion of the north entry will be public and will accommodate the 30,000-gallon dry hydrant system. It will also accommodate the Central Box Units (CBU) from the USPS with enough space for safe mail delivery and retrieval. A portion of the south entry road into the subdivision will also be public. The requirement for electronic gates on private roads will require a section of the entry roads

to be public and long enough to get vehicles off of South 80th Street West to avoid traffic problems.

Roads within the subdivision will be private roads and will be built to the County standard paved surface road. Both the public and private roads will be in a 60-foot-wide rights of way. Both will be built with a 24-foot paved surface and 2-foot gravel shoulders on each side. An RSID will be created to maintain the public road portion. The HOA will be responsible for the private road system inside the subdivision. **(Condition #2)**

County Public Works requested additional analysis of the site distance for the entries to the proposed subdivision because of the hill on the southern side of the development. Site distances are a concern for safety getting into and out of the subdivision. County Public Works is asking for information from a professional engineer, referencing AASHTO standards to provide analysis of site distances and access locations to the subdivision. **(Condition #3)**

Traffic Study - The net new trips identified in this report are subject to examination under Yellowstone County's cost participation program to the extent that they would travel through studied intersections. Cost participation, according to the TIS submitted, is not required because the impacts from the subdivision will have very minimal effect on existing studied intersections. Table 9, below, shows the warrants for intersection improvements.

Table 9: Signal Warrant Analysis Summary

Traffic Signal Warrants			Warrant 1, Eight-Hour Vehicular Volume	Warrant 2, Four-Hour Vehicular Volume	Warrant 3, Peak Hour	Warrant 4, Pedestrian Volume	Warrant 5, School Crossing	Warrant 6, Coordinated Signal System	Warrant 7, Crash History	Warrant 8, Roadway Network	Warrant 9, Intersection Near a Grade Crossing
2026	Intersection 1	King Avenue West & South 80th St. West	No	No	No	No	No	No	No	No	No
2031			No	No	No	No	No	No	No	No	No
2026	Intersection 2	Hesper Road & South 80th St. West	No	No	No	No	No	No	No	No	No
2031			No	No	No	No	No	No	No	No	No

Traffic Study Conclusion

Analysis of the existing traffic volumes, lane configurations, and the impacts due to the projected traffic growth and proposed development result in the following general conclusions:

- The preceding analysis demonstrates that the Shop House Acres development will not generate significant nor impactful volume of new trips at the intersections studied.
- The studied existing intersections and proposed access locations will operate at or above an LOS of "B", exceeding any minimum requirement of an LOS specified in the Appendix E of the Road Design Manual produced by the Montana Department of Transportation.
- No auxiliary turn lanes are warranted for the intersections and access locations discussed in this report.

- Vertical sight obstruction is present for traffic performing left-turn movements onto South 80th Street West from the North Access location of the development.
- The existing intersections do not warrant any further analysis for signal considerations.

d. **Fire and Police services** – The property is within the Laurel Fire Service Area boundary. The subdivision will have a dry hydrant tank installed alongside the road, North Shop House Road, on the north entry, as shown on the plat. The applicant will submit drawings for the tank to the Laurel Fire Department for review and approval. When the tank is installed the applicant will have the system tested and signed off by the Laurel Fire Department. **(Condition #4)**

The Yellowstone County Sheriff's Department will provide law enforcement services to this subdivision.

e. **Solid Waste disposal** – The Billings Landfill has capacity for solid waste disposal. Solid waste will be collected and disposed of by a private garbage collection company. Each lot owner will be responsible for arranging for collection.

f. **Storm water drainage** – Stormwater management for the Shop House Acres Subdivision will be addressed through a combination of private detention ponds and conveyance swales. These systems are designed to safely accommodate runoff generated by both impervious surfaces (e.g., roads and driveways) and graded lot areas while protecting downstream properties, infrastructure, and natural drainage corridors. Proposed storm water drainage shall be submitted to the MDEQ for review and approval prior to final plat. All proposed stormwater systems shall meet the requirements of Section 4.7 of Yellowstone County Subdivision Regulation's and the requirements of MDEQ. **(Condition #1)**

g. **School facilities** – The proposed subdivision is located within Elder Grove School District for K through 8. Elder Grove School responded that at the Elementary School has a capacity of 550 with recent enrollment at 500. The Middle School capacity is 300 with a recent enrollment of 250. West High School will provide school for grades 9 through 12. West High School capacity is shown as 1731with current enrollment of 2133.

h. **Parks and recreation** – Parkland dedication is required for this subdivision. They are required to provide 1.93 acres of parkland. The applicant is proposing to provide a cash in lieu contribution to satisfy the requirement of parkland.

i. **Postal Service –** The applicant will be required to coordinate with the USPS to ensure the space they are proposing is a safe location for the postal worker to deliver the mail and the residents to retrieve their mail. The applicant is currently showing the location on the north entrance where the road is a public road. **(Condition #5)**

j. **Historic features** – No known historic or cultural assets exist on the site.

k. **Phasing of Development** - The applicant is proposing to develop this subdivision without doing phases.

3. Effects on the natural environment

The development will use noxious weed control measures to prevent the spread of noxious weeds to adjacent developed or agricultural land. As required by County Subdivision Regulations Section 4.15 all county subdivisions are required to apply for and obtain a weed management plan with the County Weed Department. Any subdivision that has an existing Weed Management Plan is required to get an updated Weed Management Plan. A weed management plan will be completed and a copy will be submitted with final plat. **(Condition #6)**

There are no apparent or known natural hazards on the property.

4. Effects on wildlife and wildlife habitat

The area being defined is an area with greater than one-mile of buffer-zone from the proposed subdivision. As such, not all information provided pertain specifically to the subdivision.

The U.S. Fish and Wildlife Services online Information for Planning and Consultation (IPaC) tool was assessed that no critical habitats are within the subdivision. The IPaC tool also listed endangered species that are potentially affected by activities in this located, including the monarch butterfly and Suckley's Cuckoo Bumble Bee. There are Bald Eagles and/or Golden Eagles within the project area and they shall be protected under the Bald and Golden Eagle Protection Act. There are additionally eight species of migratory birds that could be present in the area. Lastly, subdivision development is typically located in areas of existing agricultural disturbance, and the more valuable riparian vegetation and habitat within the subdivision will be mostly preserved. In conclusion, no 'key' wildlife areas are known to exist in the subdivision.

Based on the available data and site analysis, no notable concerns requiring mitigation have been identified at this time.

There are no known endangered or threatened species on the property. A paragraph in the 'Conditions that Run with the Land' section of the SIA warns future lot owners of the likely presence of wildlife in the area and their potential to damage residential landscaping.

5. Effects on public health and safety

Plans and designs for the water and septic system will be reviewed and approved by MDEQ prior building construction on each lot to ensure public health and safety.

Fire and emergency services are provided for this proposed subdivision from Laurel Fire Department and the Yellowstone County Sheriff's department.

B. Was an environmental assessment required? If yes, what, if any, significant adverse impacts were identified? (76-3-603 MCA) (Chapter 9, YCSR)

A summary of impacts was required for this subdivision pursuant Section 9.2 of the County Subdivision Regulations.

C. Does the subdivision conform to the Yellowstone County 2008 Growth Policy, the 2018 Urban Area Transportation Plan and the Billings Area Bikeway and Trail Master Plan Update? [BMCC 23-302.H.4.]

1. **Yellowstone County - 2008 Growth Policy**

The subdivision is consistent with the following goals of the Growth Policy:

- Goal: Predictable land use decisions that are consistent with neighborhood character and land use patterns. (p. 6)

The subdivision is consistent with the type of commercial development to the north on King Avenue West. There is also some large lot residential to the north.

- Goal: Controlled weed populations. (p. 9)

The developer shall complete a weed management plan and shall provide a re-vegetation plan for any ground disturbed by development.

2. 2023 Billings Urban Area Long Range Transportation Plan

The subject property maintains the road study area of the Transportation Plan. As proposed, the internal streets are neighborhood streets associated with this subdivision.

3. Billings Area Bikeway and Trail Master Plan (BABTMP)

This subdivision is outside the BABTMP boundaries for trails. This subdivision will not be required to install any trails.

D. Does the subdivision conform to the Montana Subdivision and Platting Act (MSPA) and to local subdivision regulations? [MCA 76-3-608 (3) (b) and Section 3.2 (3) (a) YCSR]

The proposed subdivision meets the requirements of the MSPA and the YCSR. The subdivider and the local government have complied with the subdivision review and approval procedures that are set forth by local and state subdivision regulations.

E. Does the subdivision conform to sanitary requirements? [Section 4.8 (C) and 4.9 (C), YCSR]

The subdivision must receive approval from the MDEQ prior to any building construction on each lot. The new parcels will be connected to the subdivision community septic system. This system will be approved by MDEQ before final plat.

F. Does the proposed subdivision meet any applicable Zoning Requirements? [Section 3.2 (H) (3) (e), YCSR]

The proposed subdivision is outside the County Zoning Jurisdiction.

G. Does the subdivision provide for necessary planned utilities? [MCA 76-3-608 (3) (c) and Section 3.2 (H) (3) (b), YCSR]

The applicant will coordinate with private utility companies to provide the required easements.

H. Does the proposed subdivision provide for Legal and Physical Access to all lots? [MCA 76-3-608 (3) (d) and Section 3.2 (H) (3) (c) (d), YCSR]

Legal and physical access will be provided from South 80th Street West. Access to each lot will be from the internal roads of the subdivision.

CONCLUSIONS OF FINDINGS OF FACT

- This subdivision does not create adverse impacts that warrant denial of the subdivision.
- Impacts to agriculture, agriculture water user facilities, local services, public health and safety, the natural environment, and wildlife should be minimal, and can be mitigated by reasonable conditions of final plat approval.
- The subdivision conforms to some of the goals of the Growth Policy.
- The applicant has complied with the MSPA and YCSR processes and the subdivision conforms to the law requirements.

RECOMMENDATION

Staff recommends to the Planning Board that they forward a recommendation of conditional approval to the Board of County Commissioners for the preliminary plat of Shop House Acres Subdivision, approve the variance request and adopt the Findings of Fact as presented in the staff report.

PRELIMINARY SUBDIVISION VARIANCE APPLICATION

SECTION 11.1 VARIANCE (76-3-506), MCA

PLANNING DIVISION
2825 3RD AVENUE NORTH, 4TH FLOOR
BILLINGS, MONTANA 59101

PHONE: (406)247-8676 **FAX: (406) 657-8327**

PROJECT# PZ-26-00013

PROPERTY INFORMATION	
Primary Parcel/Legal Description (C/S, Subdivision, Lot, Block)	**Property Tax ID**
S14, T1S, R24E, P.M.M of Yellowstone County, Montana	000D002070
General Location	Approximately 3000' south of the intersection of S 80th Street West and King Ave West

CLASSIFICATION: (CHECK ONE)

	City Major (6 or more lots)		**City Minor (5 lots or fewer)**		**City Subsequent Minor (Reviewed as aa minor)**		**City Expedited**
✓	**County Major (6 or more lots)**		**County Minor (5 lots or fewer)**		**County Subsequent Minor (Reviewed as a major)**		**County Expedited**

ATTRIBUTES

Gross Area (Acres)	19.78 acres	Net Area (Acres)	18.48 acres	Number of Lot(s)	49
Lot Size Maximum (Square Feet)	48,907 SF	Lot Size Minimum (Square Feet)	14,841 SF		

APPLICANT/SURVEYOR INFORMATION

PROPERTY OWNER:

E-mail Address	yellowstonecontractors@yahoo.com	Mobile Phone	406-690-6633	Home Phone	
Mailing Address (City, State, Zip)	49660 Hammer Dam Rd. Ronan, MT 59864				

AGENT/SURVEYOR:

E-mail Address	Kolten.L.Knatterud@IMEGcorp.com	Mobile Phone		Business Phone	406-248-9000
Mailing Address City, State, Zip	550 N 31st St #111, Billings, MT 59101				

A. Variance(s) Requested

List and Attach Variance Request application and Variance Request criteria answers per Chapter 11. 1.A.1-5. **Each requested variance shall be deemed a separate application, to be processed concurrently with the preliminary plat. A variance review fee must accompany all applications for variances.**

A variance is being pursued to relieve the applicant from the requirement to provide street right-of-way within the proposed subdivision, to the boundary lines of the tract to be developed.

B. **Facts of Hardship:** Provide a **separate written statement** describing the facts of hardship upon which the request for variance is based.

I declare that I am the owner of record of the above-described property, and have examined all statements and information contained herein, and all attached exhibits, and to the best of my knowledge and belief, the information is true and correct.

Owner of Record **Date**

Owner Under Contract **Date**

PRELIMINARY SUBDIVISION VARIANCE APPLICATION
SECTION 11.1 VARIANCE (76-3-506), MCA
PLANNING DIVISION
2825 3RD AVENUE NORTH, 4TH FLOOR
BILLINGS, MONTANA 59101
PHONE: (406)247-8676 FAX: (406) 657-8327 **PROJECT#**

Article 23-1100. ADMINISTRATIVE PROVISIONS

Section 23-1101. Variances.

The City Council or Yellowstone County Board of County Commissioners may grant reasonable variances from the design and improvement standards of these Regulations when strict compliance would result in undue hardship and the result would not negatively affect public health and safety. The granting of a variance shall not have the effect of nullifying the intent and purpose of these Regulations or justifying submission of an incomplete application. The City Council or Board of County Commissioners may not approve a variance that would permit structures within the 100-year floodplain, as defined in 76-5-101, MCA.

A. Requesting a Variance. The subdivider shall include with the submission of the variance request, a written statement describing the facts of hardship upon which the request for the variance is based. Each requested variance shall be deemed a separate application, for which a fee shall be required. Information addressing each of the following findings shall accompany the application. The Planning Board shall review the submitted findings and make a recommendation to the City Council or Yellowstone County Board of County Commissioners.

The governing Board shall not approve variances unless the subdivider has demonstrated that the request satisfies the following findings:

1. The granting of the variance will not be detrimental to the public health, safety, or general welfare or injurious to other adjoining properties;

2. Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, an undue hardship to the owner would result if the strict letter of the regulation was enforced;

3. The variance will not result in an increase in taxpayer burden;

4. The variance will not in any manner place the subdivision in nonconformance with any adopted zoning regulations or Growth Policy; and

5. The subdivider must prove that the alternative design is equally effective and the objectives of the improvements are satisfied.

B. In granting variances, the Governing Body may require conditions of approval that will, in their judgment, secure the objectives of these Regulations.

C. When any such variance is granted, the motion of approval of the proposed subdivision shall contain a statement describing the variance and the facts and conditions upon which the issuance of the variance is based.

D. An application for a variance is not necessary where Planned Neighborhood Developments are proposed, as modifications to the standards and requirements of these Regulations may be approved by the governing body.

Variance Request #1 – Street Right-of-Way

Section 4.6.B.1 Relation to Undeveloped Areas: When a proposed subdivision adjoins undeveloped land, streets within the proposed subdivision shall be arranged to allow access to the adjoining undeveloped land. Street right-of-way within the proposed subdivision shall be provided to the boundary lines of the tract to be developed, unless prevented by topography or other physical conditions.

A variance is being pursued to relieve the applicant from the required access spacing of 600 feet for connections to adjacent parcels and to allow the proposed subdivision to provide one access connection to the property located immediately south of the subject property.

The proposed subdivision will also provide roadway connections to the adjacent property located to the south and west through the proposed internal road network. Therefore, the applicant is not requesting relief from the requirement to provide access to adjacent parcels. The variance request is specifically related to the required spacing of those access connections and the number of access points provided to the property located to the south and west.

There is existing marshy, shallow groundwater on the property located immediately south of the subject property, which limits the practicality of providing multiple access points along the southern boundary. The 133-acre parcel located south and west of the subject property also has multiple alternative access opportunities from S. 80th Street West, Hesper Road, and S. 84th Street West. Additionally, the proposed subdivision will include an approach along the southern boundary, with a portion dedicated as public right-of-way to provide access to the southern parcel. The property immediately north of the subject property also has existing access from S. 80th Street West.

Due to the physical site constraints and the multiple alternative access opportunities available to the adjacent parcel, the applicant is requesting a variance from the required access spacing and to allow only one access connection to the property located immediately south of the subject property.

1. The granting of the variance will not be detrimental to the public health, safety, or general welfare or injurious to other adjoining properties;

The granting of the variance will not be detrimental to public health, safety, or general welfare, nor will it be injurious to adjoining properties. Shop House Acres Subdivision proposes two new access points onto S. 80th Street West from the tract to be developed. These access points will provide safe access to the subdivision roadways for all 49 proposed lots. The variance will not be injurious to adjoining properties, as they have several alternative access opportunities, as noted above.

2. Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, an undue hardship to the owner would result if the strict letter of the regulation was enforced;

Undue hardship to the owner would result if the strict letter of the regulation were enforced, as there is existing marshy, shallow groundwater on the property located immediately south of the subject property. This is a physical and topographical condition unique to the property. The approach located in the southeast corner of the subject property will provide a portion of public right-of-way on the southern boundary line that can also serve as access to the property located immediately south of the subject property.

3. The variance will not result in an increase in taxpayer burden;

An increase in taxpayer burden will not result from approving this variance. The subdivider proposes to construct the proposed roadways within Shop House Acres. If the property located to the south and west is developed at a future time, there are existing alternative access opportunities on the existing surrounding roadways.

4. The variance will not in any manner place the subdivision in nonconformance with any adopted zoning regulations or Growth Policy; and

Approving this variance will not place the subdivision in nonconformance with the growth policy. The property is unzoned so approving the variance will not place the subdivision in nonconformance with any adopted zoning regulations.

5. The subdivider must prove that the alternative design is equally effective and the objectives of the improvements are satisfied.

The alternative design proposed for Shop House Acres is equally effective as it is proposed to connect with existing roadways to the east. The lot to the south and west already has opportunities to connect to the south, east and west.

Variance Request
Shop House Acres Subdivision
Attachment A

Shop House Acres is a proposed major subdivision in Yellowstone County. The applicant has requested a variance from Section 4.6.B.1, of the Yellowstone County Subdivision Regulations, which outlines connection to undeveloped / under developed land surrounding proposed subdivisions. The maximum distance between those connections is 600 feet.

This variance is being pursued to limit the number of connections to the south. One connection could be made with the entry/exit on the south in the public right of way area. The southern entrance has a section of it that is public right of way. Part of that road right of way is immediately adjacent to the property line, providing a future connection. The south border would require two connections at one every 600 feet.

The applicant is specifically requesting one connection to the south stating that the land to the south is marshy and has a high-water table.

In correspondence with County Public Works staff received the following email after requesting their input about the variance request.

Dave, summary as follows:

- They will seek a variance for connectivity to the south.
- They will include language to allow future connection to the west in the SIA – the right of way is immediately adjacent to the property line. No variance needed for west connection.

Monica Plecker, AICP
Public Works Director

1. The granting of the variance will not be detrimental to the public health, safety, or general welfare or injurious to other adjoining properties.

The granting of this variance will not be detrimental to public health, safety, or the general welfare of adjoining properties. The point of multiple internal connections to adjacent property is to allow movement of people through developments without having to go out onto arterial roads to get to another property in the subdivision next to them. One connection to the south and west will help accomplish that goal.

2. Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, an undue hardship to the owner would result if the strict letter of the regulation was enforced.

According to the applicant's agent, the land very near the south border of this project is marshy and has shallow groundwater on the property. This would make development difficult to accomplish. A portion of the right of way for the southern access, to the subdivision, runs along the southern property line. This would allow a future connection to the south. With the land conditions on the southern property, one connection to the proposed subdivision would be acceptable. County Public Works is supportive of the variance request. To the north is a large lot residential subdivision. All the lots to the north of this proposed subdivision have been developed. The subdivision to the north, Homestead Acres, recorded October of 2020, received a variance to not provide a connection to its south from the Board of County Commissioners.

3. The variance will not result in an increase in taxpayer burden.

The granting of this variance would not increase taxpayer burden.

4. The variance will not in any manner place the subdivision in nonconformance with any adopted zoning regulations or Growth Policy.

The granting of this variance would not put this proposed subdivision in nonconformance with any adopted County zoning. They are outside of the County zoning jurisdiction.

5. The subdivider must prove that the alternative design is equally effective, and the objectives of the improvements are satisfied.

The option of the single connection to the south and a connection to the west will work for future connections to other subdivisions that may come along in the future.

Shop House Acres Major Subdivision

Traffic Impact Study

Yellowstone Contractors

IMEG #25006765.00

March 17, 2026

Prepared By:
IMEG Corp
Matthew Holbrook, E.I.
Brad Lange, P.E., P.T.O.E.

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Traffic Impact Study

For the
Shop House Acres Major Subdivision

Prepared for:
Yellowstone Contractors & Yellowstone County

IMEG #25006765.00

March 17, 2026

1 EXECUTIVE SUMMARY and INTRODUCTION

1.1 Executive Summary

The Shop House Acres development involves the construction of 55 individual lots for the building of private use shop buildings with a residential living quarter on each lot, which are intended to be serviced by individual cisterns and septic systems. This development will be traversed through construction of a private roadway throughout the development that will provide circular movement and two access locations to South 80th Street West. The proposed development is estimated to generate a total of 108 Peak Hour Trips, 48 AM trips and 60 PM trips. Through the analysis of these additional trips on the surrounding intersections, it has been concluded that negligible impacts will be made to King Avenue West & South 80th Street West and Hesper Road & South 80th Street West.

1.2 Purpose

The purpose of this Traffic Impact Study (TIS) is to determine the operational impact that the proposed Shop House Acres development traffic will have on the surrounding major intersections and to recommend modifications, if required, that will allow the major intersections and access drives to function adequately as the population grows. The proposed development will have two (2) access locations to South 80th Street West, which will have impacts to King Avenue West, to the north, and Hesper Road, to the south.

This TIS focuses solely on Shop House Acres development. This TIS does not take into consideration any other proposed or future residential, commercial, or industrial developments in the surrounding area. Future developments will need to prepare a separate traffic study. At the time of this study, there are no known developments in the vicinity to be considered as part of this study.

1.3 Objective

To evaluate the necessary intersections identified by Yellowstone County Public Works and the development impacts, IMEG performed the following initial tasks:

- Evaluated current traffic volumes, collected for 24 hours in 15-minute intervals and 1-hour intervals at the following intersections:
    - King Avenue West & South 80th Street West (Intersection 1)

  - Hesper Road & South 80th Street West (Intersection 2)

- Reviewed the proposed Shop House Acres Major Subdivision site development plan, see Appendix A.
- Utilized the ITE Trip Generation Manual, 12th Edition, see Appendix D, to determine the number of AM and PM trips generated by the proposed development.
- Assigned trip distribution to the development traffic to determine entering and existing volume. Generated trips will not increase by the growth factor. Refer to Appendix B for a summary of those traffic movements.
- Researched and collected traffic data and other background information from Montana Department of Transportation (MDT).
- Seasonally adjusted and calculated traffic data using the Highway Capacity Software (HCS), Version 2026 for the following scenarios:
  - Existing 2026 AM and PM peak hour traffic using the existing lane geometry at the studied intersections. See Appendix C.
  - Projected 2031 AM and PM peak hour background traffic operational capacity, see Appendix C, using existing lane geometry at the studied intersections.
  - Projected 2031 AM and PM peak hour total traffic operational capacity, see Appendix C, using existing lane geometry.

2 EXISTING CONDITIONS

2.1 Study Roadway(s)

The following roadways describe the intersections that are to be analyzed as part of this study. See Figure 1 for the intersection study areas and Figure 2 for the Montana Department of Transportation roadway classifications.

2.1.1 King Avenue West

King Avenue West is classified by Montana Department of Transportation (MDT) as a "Major Collector" roadway with no additional classification set by either the City of Billings or Yellowstone County. King Avenue West is a paved rural county roadway consisting of one (1) 12-foot lane for each travel direction (east/west), followed by a 2-foot gravel shoulder. This configuration is consistent with the Yellowstone County Standard Drawing #100 for a typical paved road. In the reasonable vicinity of the study area along King Avenue West, there are no crosswalks, sidewalks, bike lanes, curbs, or street illuminations. The posted speed for King Avenue West is 60 mph in this area.

2.1.2 Hesper Road

Hesper Road is classified by Montana Department of Transportation (MDT) as a "Local" roadway with no additional classification set by either the City of Billings or Yellowstone County. Hesper Road is a paved rural county roadway consisting of one (1) 12-foot lane for each travel direction (east/west), followed by a 2-foot gravel shoulder. This configuration is consistent with the Yellowstone County Standard Drawing #100 for a

typical paved road. In the reasonable vicinity of the study area along Hesper Road, there are no crosswalks, sidewalks, bike lanes, curbs, or street illuminations. The posted speed for Hesper Road is 45 mph in this area.

2.1.3 South 80th Street West

South 80th Street West (80th Street) is classified by Montana Department of Transportation (MDT) as a "Local" roadway with no additional classification set by either the City of Billings or Yellowstone County. 80th Street is a paved rural county roadway consisting of one (1) 12-foot lane for each travel direction (east/west), followed by a 2-foot gravel shoulder. This configuration is consistent with the Yellowstone County Standard Drawing #100 for a typical paved road. In the reasonable vicinity of the study area along 80th Street, there are no crosswalks, sidewalks, bike lanes, curbs, or street illuminations. It should be noted that in the proposed development vicinity there is a vertical grade change worth of vertical sight evaluation, which is discussed later in this report. The posted speed for 80th Street is 50 mph in this area.

2.2 Study Intersection(s)

The following describes the intersections that are analyzed as part of this study. The intersection study areas are shown in Figure 1.

2.2.1 Intersection 1 – King Avenue West & South 80th Street West

The intersection has four approach legs and is stop-controlled in the north and south directions. Being a rural county road, there are no crosswalks, sidewalks, bike lanes, or intersection illuminations.

Traffic data for this intersection was collected on February 12th, 2026. From the collected traffic data, it was determined that the AM peak hour for the intersection was between 7:15 and 8:15, while the PM peak hour was between 4:15 and 5:15.

2.2.2 Intersection 2 – Hesper Road & South 80th Street West

The intersection has four approach legs and is stop-controlled in the north and south directions. Being a rural county road, there are no crosswalks, sidewalks, bike lanes, or intersection illuminations.

Traffic data for this intersection was collected on February 12th, 2026. From the collected traffic data, it was determined that the AM peak hour for the intersection was between 7:00 and 8:00, while the PM peak hour was between 4:45 and 5:45.

2.3 Study Area Land Uses

The proposed development is currently surrounded by single-family residential neighborhoods to the north and west. Immediately to the east and south is agricultural farmland.

2.4 2026 Existing Site Conditions

The existing lane configurations and Peak Hour turning movement volumes are shown in Figure 3. IMEG collected the existing traffic data using Miovision cameras on Thursday, February 12 for 24 hours beginning at 12:00am. MDT seasonal adjustment

factors were applied to the recorded traffic counts, to which were then entered into Highway Capacity Software (HCS), Version 2026, to evaluate the current level of service. The Two-Way Stop Control (TWSC) module was used to determine the operational capacity of each leg and the intersections studied. A summary of the results for each intersection can be seen in Table 1 as well as Appendix C. The 2024 MDT seasonal adjustment factors can also be found in Appendix G with the collected Miovision data found in Appendix H.

2.5 Pedestrian and Bicycle Considerations

There are currently no bicycle or pedestrian considerations as the study performed is located within a rural county setting with no sidewalks or bike lanes provided along the various segments of the roads studied.

Table 1: 2026 Existing Traffic Peak Hour Capacity Analysis Summary

No.	Intersection	Approach	2026 Existing Traffic Peak Hour Capacity Analysis Summary					
			AM PEAK HOUR			PM PEAK HOUR		
			Approach Delay (sec/veh)	Approach LOS	95th % Queue (veh)	Approach Delay (sec/veh)	Approach LOS	95th % Queue (veh)
Intersection Control			*Two-Way Stop Control (NB/SB)*					
1	King Avenue West & South 80th Street West	EB	0.3	A	0.0	0.8	A	0.0
		WB	1.7	A	0.0	1.6	A	0.1
		NB	9.4	A	0.2	10.2	B	0.2
		SB	11.5	B	0.8	11.4	B	0.4
Intersection Control			*Two-Way Stop Control (NB/SB)*					
2	Hesper Road & South 80th Street West	EB	2.0	A	0.1	2.3	A	0.0
		WB	0.9	A	0.0	0.9	A	0.0
		NB	9.7	A	0.1	9.7	A	0.2
		SB	9.5	A	0.1	9.5	A	0.3

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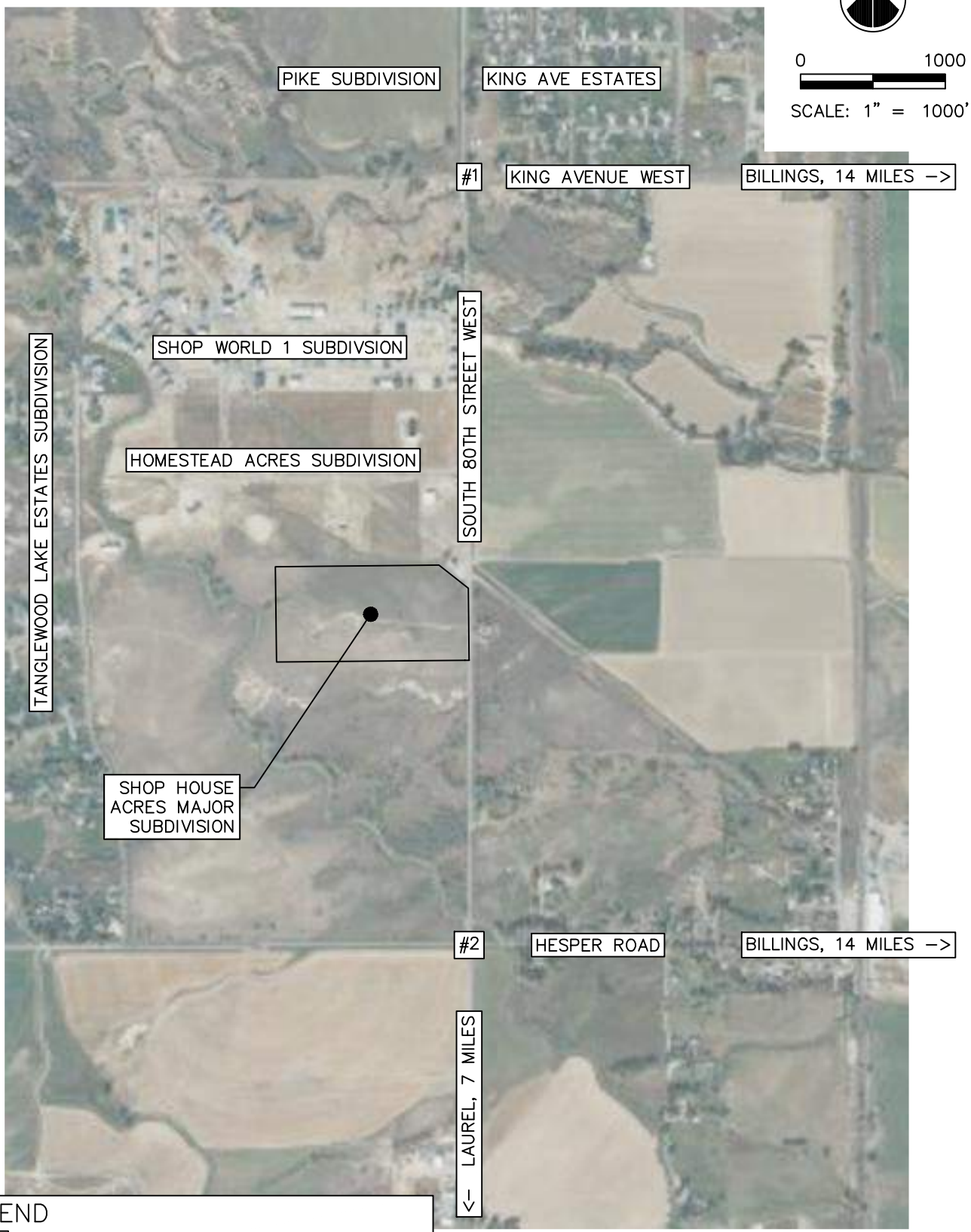

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SHOP HOUSE ACRES MAJOR SUBDIVSION

BILLINGS, MONTANA

TRAFFIC IMPACT STUDY INTERSECTION LOCATION OVERVIEW

EXHIBIT

FIG - 1

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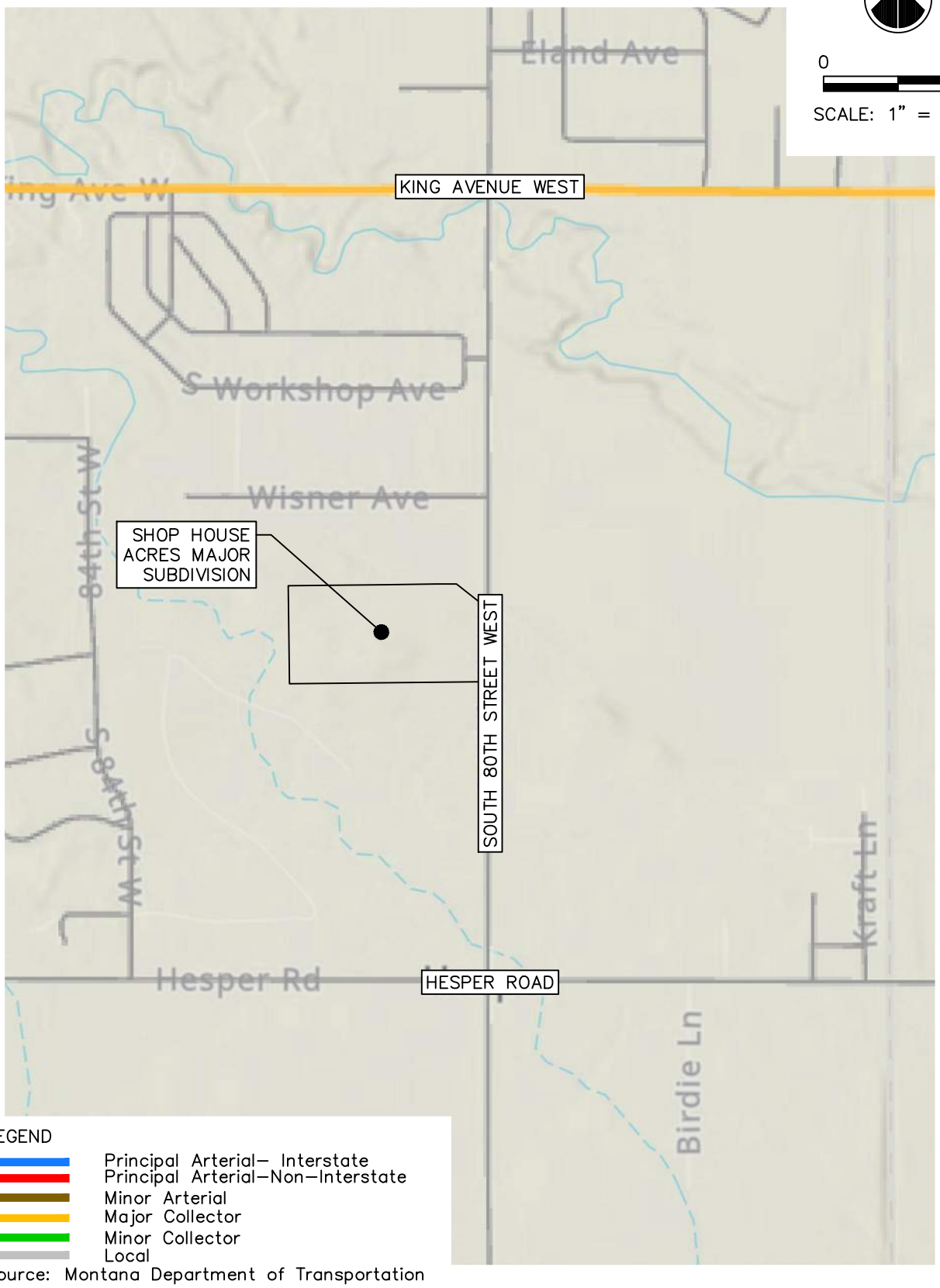

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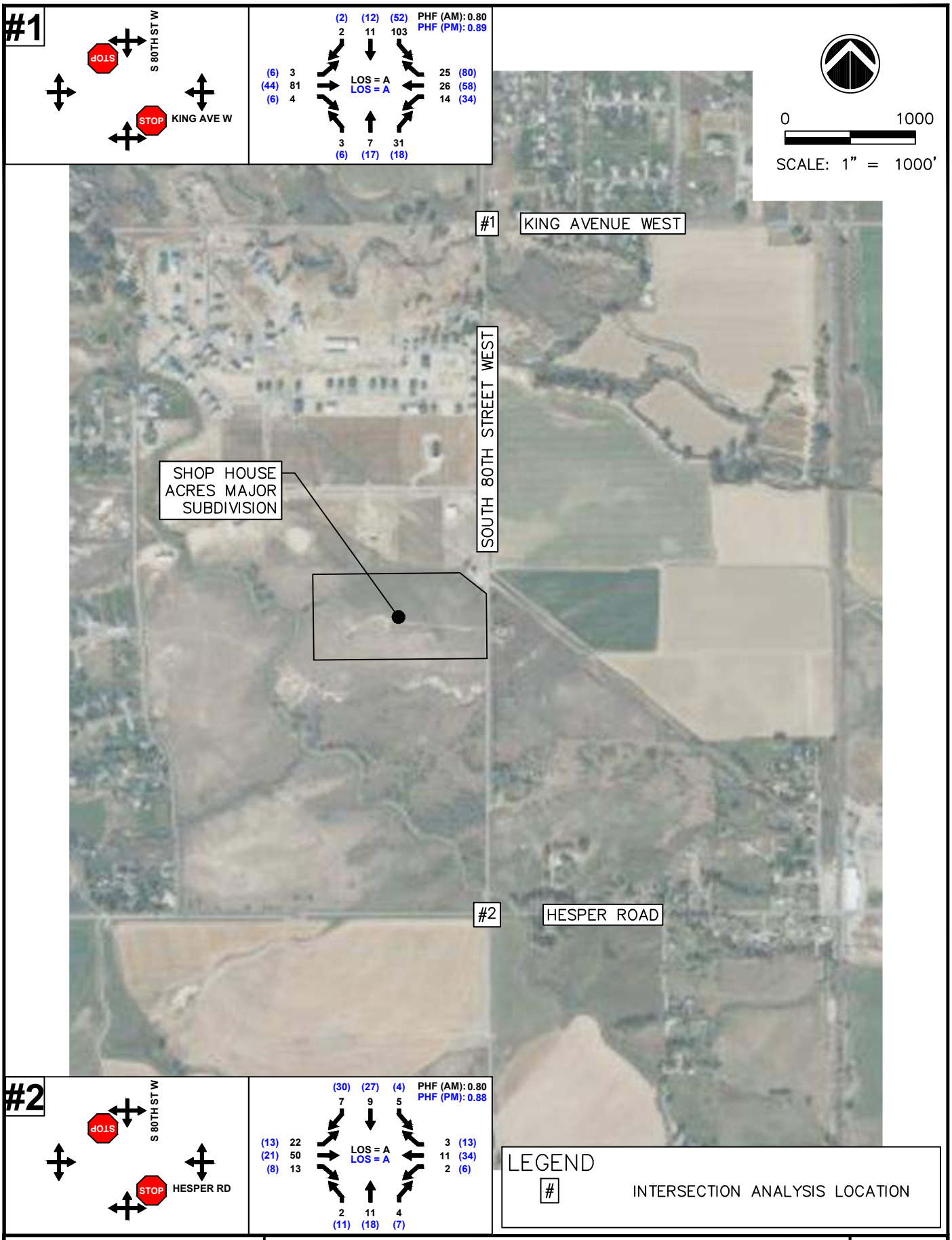
SHOP HOUSE ACRES MAJOR SUBDIVSION

BILLINGS, MONTANA

ROADWAY FUNCTIONAL CLASSIFICATION
MONTANA DEPARTMENT OF TRANSPORTATION

EXHIBIT

FIG - 2



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SHOP HOUSE ACRES MAJOR SUBDIVSION

BILLINGS, MONTANA

2026 BACKGROUND TURNING MOVEMENTS

EXHIBIT

FIG - 3

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2.6 Development Considerations

2.6.1 Crash Data

IMEG reached out to MDT on February 16, 2026 requesting additional information for historical crash data in the vicinity of the study area. MDT provided historical crash data for the two (2) existing intersections within this study for the years between 2020-2024.

The purpose of this section is to document the number of crashes, rank the severity of crashes, and quantify the overall intersection crash rates of studied intersections that have data available. The crash information provided herein is intended to identify intersections with crash characteristics that may warrant further studies. General crash characteristics were evaluated along with potential causes based on the information provided by MDT. This information covers the minimum five-year time period from 2020 to 2024 as stated in the Yellowstone County Subdivision Regulations, Section 4.6.C.4.B.2 adopted February 5, 2019. Appendix I contains the crash records provided by the Montana Department of Transportation. Table 2 shows the total number of crashes at each intersection.

To calculate the crash rate for the intersections described above, the commonly accepted crash rate equation from *Intersection Safety – A Manual for Local Rural Road Owners* produced by the U.S. Department of Transportation Federal Highway Administration was used to quantify each intersections safety on a proportional basis. This method used is due to the varying volume of traffic each intersection experiences. The following equation expresses an intersections number of crashes per every million vehicles:

$$\boldsymbol{Intersection\ Crash\ Rate} = \frac{(Total\ \#\ of\ Crashes)(1{,}000{,}000\ Vehicles)}{(AADT\ Entering\ the\ Intersection)(Analysis\ Time\ Period)(365)}$$

To calculate the severity index and rate for each of the studied intersections, the following Montana Department of Transportation equations were used:

$$\boldsymbol{MDT\ Severity\ Index} = \frac{(8 * Incap.\ \&\ F) + (3 * Non - Incap.\ \&\ PI) + (1 * PDO\ \&\ U)}{Total\ Crashes}$$

$$\boldsymbol{Severity\ Rate} = (Crash\ Rate)(MDT\ Severity\ Index)$$

Where:

F = Fatal
PI = Possible Injury
Incap. = Incapacitated
PDO = Property Damage Only
U = Unknown

Table 2: Intersection Crashes in the Five-Year Period

INTERSECTION		# CRASHES
King Avenue West & South 80th Street West	U-2W	1
Hesper Road & South 80th Street West	U-2W	2
U-2W=Unsignalized Intersection Two-Way Stop Controlled		

Table 3 ranks the number of crashes against the annual average daily traffic (AADT) (provided by MDT's "MS2" traffic count software) entering each intersection, expressed as crashes per million entering vehicles (MEV). The Intersection Crash Rate formula was used to determine the intersection rate, expressed in MEV. It is to note that the AADT utilized for each intersection was calculated by adding up the total AADT from 2021 to 2025 and dividing by five. Since each roadway is a "2-way" road, the final AADT was then divided by two to determine a 50/50 split for AADT entering the intersection. For the data obtained at the intersection of King Ave. West & South 80th Street West, MDT Traffic Count Station 56-4-015 was used to determine AADT. For the data obtained at the intersection of Hesper Road & South 80th Street West, MDT Traffic Count Station 088451Y was used to determine AADT.

Table 4 illustrates a detailed look at the crashes to determine the MDT "severity index rating." The severity index is a ratio that shows where the most sever types of crashes occur. Crashes were put into five categories of severity: property damage, possible injury crash, minor injury crash, serious injury crash, and fatal injury crash. The severity index rating is then determined using the MDT Severity Index equation. Also shown is the severity rate, which uses the Severity Rate equation by multiplying the Crash Rate by the MDT Severity Index.

Table 3: Intersection Crash Rate

INTERSECTION		# CRASHES	VOLUME*	CRASH RATE
King Avenue West & South 80th Street West	U-2W	1	1,914	**0.29**
Hesper Road & South 80th Street West	U-2W	2	579	**1.89**
U-2W=Unsignalized Intersection Two-Way Stop Controlled				

Table 4: MDT Severity Index and Rate

INTERSECTION	PROPERTY DAMAGE ONLY OR UNKNOWN	POSSIBLE INJURY	MINOR INJURY	SERIOUS INJURY	FATAL INJURY	SEVERITY INDEX	SERVERITY RATE
King Avenue West & South 80th Street West	0	0	1	0	0	3.00	**0.86**
Hesper Road & South 80th Street West	1	1	0	0	0	2.00	**3.79**

2.6.2 Approach Site Triangles

To determine sufficient driver clear vision for the development approaches, the proposed site conditions, features, and structures were evaluated using the following sight distance equation:

$$b = 1.47 V_{major} t_g$$

Where:

b = length of leg of sight triangle along the major road (ft)

V_{major} = design speed of major road (mph)

t_g = travel time to reach and clear the major road (sec)

The following intersections were evaluated as follows:

1. King Avenue West & South 80th Street West
    a. Greenbook Case B – Section 9.5.3.1 (Stop control on Minor Road)
2. Hesper Road & South 80th Street West
    a. Greenbook Case B – Section 9.5.3.1 (Stop control on Minor Road)
3. Development North Access "N"
    a. Greenbook Case B – Section 9.5.3.1 (Stop control on Minor Road)
4. Development South Access "S"
    a. Greenbook Case B – Section 9.5.3.1 (Stop control on Minor Road)

The time gap chosen for these intersections were both, "Passenger Car" & "Single-Unit Truck" as vertical sight clearance was a concern for the North Access. The determination was made for a "Single-Unit Truck" in lieu of a "Combination Truck" was based on the understanding of intended development use and anticipated traffic. Additionally, the decision point for each case was based on the conservate assumption that vehicles typically stop 18-feet back from the edge of the major travel lane, as recommended in *AASHTO A Policy on Highway Geometric Design and Streets (2018), 7th Edition "The Greenbook".* Furthermore, vertical sight clearance was considered for both a passenger car line of sight, 3.50', as well as a truck's line of sight, 7.60', for the development approaches following the assumed approaching object height of 3.50' along the sight triangle alignment. Figures for these calculations can be found in Appendix J. During this analysis, it was identified that a vehicle, truck and car, making a left turn from the North Approach will experience a visual impairment due to the hill crest of South 80th Street West located immediately to the south of the approach. No other development movements were identified as being impaired through this analysis.

3 PROJECTED TRAFFIC – TRIP GENERATION AND DISTRIBUTION

3.1 Roadway Traffic Forecast

A 0.84% and 4.51% growth factor was utilized for the traffic calculations at King Avenue West and Hesper Road, respectively. These growth rates are based on current demographic trends and MDT Historical count data for adjacent roadways. Beginning with the opening year of 2031 this growth factor will be used to project the peak hour turning movement volumes.

The annualized growth factor was determined using the equation:

$$Growth\ Rate = \left(\frac{P_{final}}{P_{initial}}\right)^{\frac{1}{n}} - 1$$

Where:

P = Population final/initial

n = Number of Years

Using the annualized growth rate equation above as well as the population data provided by Montana's Department of Transportation AADT counts, the following information was used to identify the growth rates used:

King Avenue West			Hesper Road		
MDT Rout:	S-532		MDT Rout:	L-56-526	
MDT Classification:	RMA_RMC_345		MDT Classification:	RMA_RMC_345	
MDT Functional Class:	Major Collector		MDT Functional Class:	Local	
Traffic Count Site:	56-4-015		Traffic Count Site:	088451Y	
AADT Year	AADT Count	AADT Annual Growth	AADT Year	AADT Count	AADT Annual Growth
2025	1956	-6%	2025	667	1%
2024	2082	14%	2024	651	25%
2023	1833	1%	2023	522	1%
2022	1822	-3%	2022	519	-3%
2021	1876	197%	2021	535	9%
Annualized Growth Rate:		**0.84%**	**Annualized Growth Rate:**		**4.51%**

3.1.1 Proposed Development Site

Shop House Acres development is currently addressed as 1248 South 80th Street West, Billings, MT and is located in Section 14, Township 01 North, Range 24 East, Yellowstone County, Montana. There is currently no zoning in this area. If the land use changes in the future, a new traffic impact study will be required by the future developer. The development is bound by the existing Home Stead Acres Subdivision and Shop World Subdivision to the north, Tanglewood Estates Subdivision to the west, and agricultural farmland to the south and east.

To estimate trip generation for the development, land use codes from the Institute of Transportation Engineers (ITE) were applied. Specifically, ITE Code 210 – Single-Family Detached Housing as this seems the most relevant and applicable code to use during IMEG's meeting with the County Public Works department on February 11th, 2026. The site plan, provided in Appendix A, illustrates the proposed 55-lot development area and Figure 4 illustrating access to the site.

3.2 2031 Trip Distribution

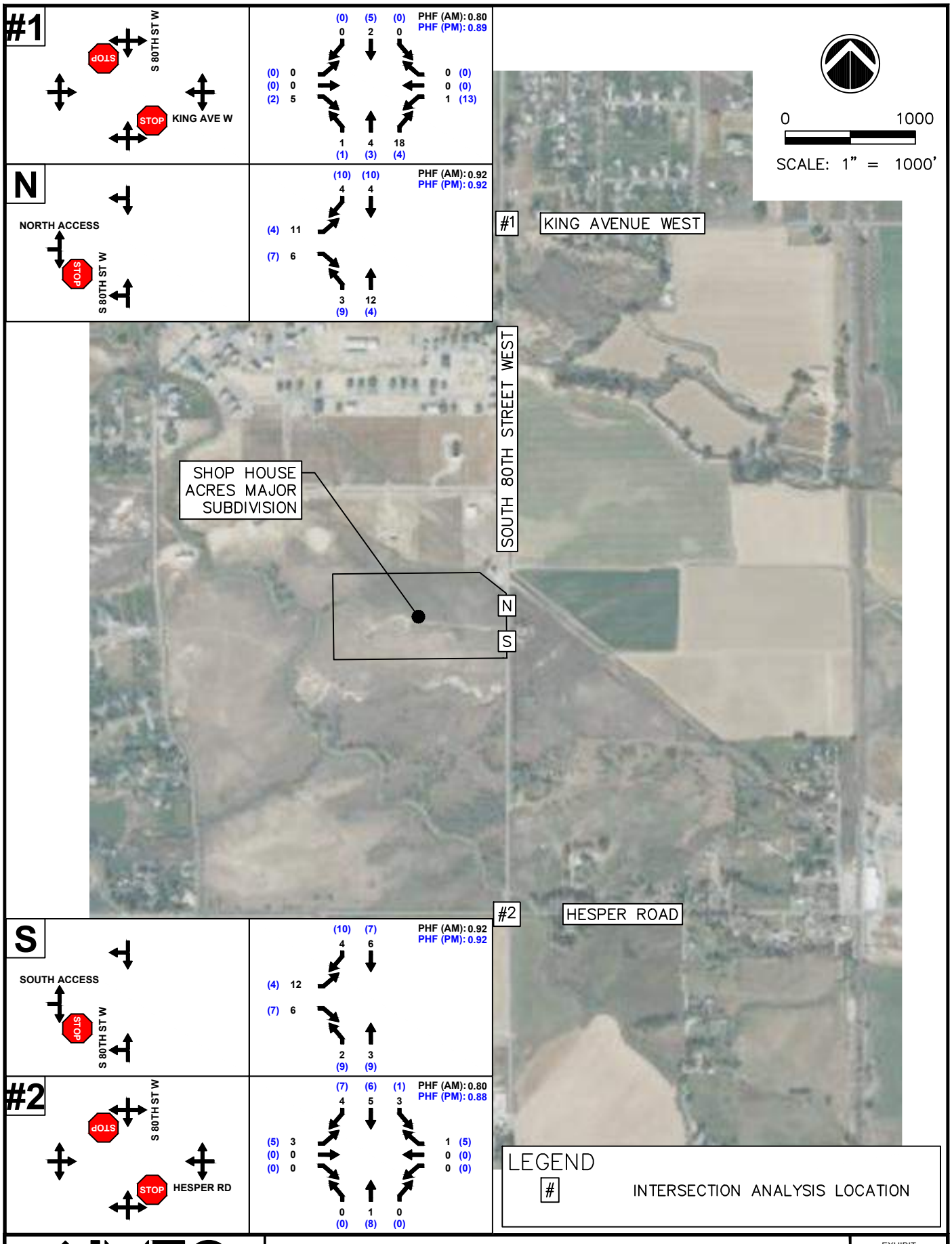
There are two (2) proposed access locations for the development that will both be accessed of South 80th Street West. It is assumed that the development's trips will utilize existing patterns that were recorded with the 2026 background traffic data. The existing traffic movements indicate the following distribution at the developments access locations:

AM Distribution		PM Distribution	
Right-Turn$_{Entry}$	52%	Right-Turn$_{Entry}$	54%
Right-Turn$_{Exit}$	34%	Right-Turn$_{Exit}$	60%
Left-Turn$_{Entry}$	48%	Left-Turn$_{Entry}$	46%
Left-Turn$_{Exit}$	66%	Left-Turn$_{Exit}$	40%

This assumption is believed to be reasonable as the proposed development is assumed to follow existing traffic and driver's habits. Figure 4 shows the generated trip assignments for both the AM and PM peak hours. A summary of the trips generated can be found in Table 5. ITE Trip Generation Worksheets are shown in Appendix E.

Table 5: 2024 Trip Movement Summary

2031 Trip Generation – Shop House Acres										
Time Period	Land Use	ITE Code	Variable	Quantity	Avg Rate	Fitted Curve	Trips In	Trips Out	% Enter	% Exit
AM	Single-Family Detached Housing	210	Dwelling Units	55	41	48	13	35	27	73
PM	Single-Family Detached Housing	210	Dwelling Units	55	53	60	38	22	63	37
					Totals	**108**	**51**	**57**		



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SHOP HOUSE ACRES MAJOR SUBDIVSION

BILLINGS, MONTANA

2031 DEVELOPMENT TURNING MOVEMENTS

EXHIBIT

FIG - 4

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4 TRAFFIC OPERATIONAL ANALYSIS

4.1 Analysis Description

Traffic volumes provide a general view of where the traffic is coming and going through the intersection. The concept of Level of Service (LOS) is to take the traffic volumes and then provide an overall operational analysis of the intersection or each leg of the intersection based on travel delay.

For unsignalized intersections, the LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. LOS has a range of LOS "A" (best) to LOS "F" (worst). Table 6 shows the Level of Service definitions and delay for both signalized and unsignalized intersections.

Table 6: Level of Service Definitions

Level of Service	Signalized Intersection Control Delay (sec/veh)	All-way Stop, Two-Way Stop, and Roundabout Intersection Control Delay (sec/veh)
A	≤= 10	≤= 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55-80	> 35 - 50
F	> 80; Volume Exceeds Capacity	> 50; Volume Exceeds Capacity
Source: Highway Capacity Manual 7th Edition		

LOS "C" is typically considered an acceptable level of service, although exceptions could be made in specific cases. In *Appendix E* of the Road Design Manual produced by the Montana Department of Transportation the minimum LOS for an Urban Collector Road is a grade "D", with no specified minimum grade for Local Roads.

If the intersection LOS exceeds (worse) these study goals, it demonstrates operational or capacity related needs to be addressed for any potential improvements

4.2 2031 Capacity and Level of Service

A capacity analysis was performed for the projected 2031 background traffic volumes based on the respective growth rates as discussed in section 3.1 for the same lane configuration used for the existing 2026 capacity analysis. See Figure 5 for 2031 background movements. Table 7 summarizes the Highway Capacity Software (HCS) results, which can also be found in Appendix C.

4.3 2031 Projected Traffic Capacity plus Development Traffic

A capacity analysis was performed for the 2031 total traffic volumes using the existing lane configurations for the intersection study locations. 2031 is the anticipated year that the development will be fully built and occupied. The 2026 traffic volumes were increased by the previously mentioned growth factors discussed in section 3.1 with the additional development traffic identified in section 3.2. See Figure 6 below for 2031 total movements. Table 8 summarizes the Highway Capacity Software (HCS) results, which can also be found in Appendix C.

Table 7: 2031 Background Traffic Peak Hour Capacity Analysis Summary

No.	Intersection	Approach	2031 Background Traffic Peak Hour Capacity Analysis Summary					
			AM PEAK HOUR			PM PEAK HOUR		
			Approach Delay (sec/veh)	Approach LOS	95th % Queue (veh)	Approach Delay (sec/veh)	Approach LOS	95th % Queue (veh)
Intersection Control			*Two-Way Stop Control (NB/SB)*					
1	King Avenue West & South 80th Street West	EB	0.3	A	0.0	0.9	A	0.0
		WB	1.7	A	0.0	1.6	A	0.1
		NB	9.5	A	0.2	10.3	B	0.2
		SB	11.9	B	0.9	11.7	B	0.4
Intersection Control			Two-Way Stop Control (NB/SB)					
2	Hesper Road & South 80th Street West	EB	2.0	A	0.1	2.4	A	0.0
		WB	1.1	A	0.0	0.9	A	0.0
		NB	10.0	B	0.1	10.1	B	0.2
		SB	9.8	A	0.1	9.8	A	0.3

Table 8: 2031 Future Capacity Analysis Summary Plus Development Traffic

No.	Intersection	Approach	2031 Future Capacity Analysis Summary Plus Development Traffic					
			AM PEAK HOUR			PM PEAK HOUR		
			Approach Delay (sec/veh)	Approach LOS	95th % Queue (veh)	Approach Delay (sec/veh)	Approach LOS	95th % Queue (veh)
Intersection Control			*Two-Way Stop Control (NB/SB)*					
1	King Avenue West & South 80th Street West	EB	0.3	A	0.0	0.9	A	0.0
		WB	1.8	A	0.0	2.1	A	0.1
		NB	9.7	A	0.3	10.6	B	0.3
		SB	12.4	B	0.9	12.3	B	0.5
Intersection Control			*Two-Way Stop Control (NB/SB)*					
2	Hesper Road & South 80th Street West	EB	2.2	A	0.1	2.8	A	0.0
		WB	1.0	A	0.0	0.8	A	0.0
		NB	10.1	B	0.1	10.4	B	0.3
		SB	10.0	B	0.2	9.9	A	0.4
Intersection Control			One-Way Stop Control (EB)					
3	Development North Approach	EB	8.9	A	0.1	9.1	A	0.0
		WB						
		NB	0.4	A	0.0	1.0	A	0.0
		SB	-	-	-	-	-	-
Intersection Control			One-Way Stop Control (EB)					
4	Development South Approach	EB	8.9	A	0.1	9.1	A	0.0
		WB						
		NB	0.3	A	0.0	0.9	A	0.0
		SB	-	-	-	-	-	-

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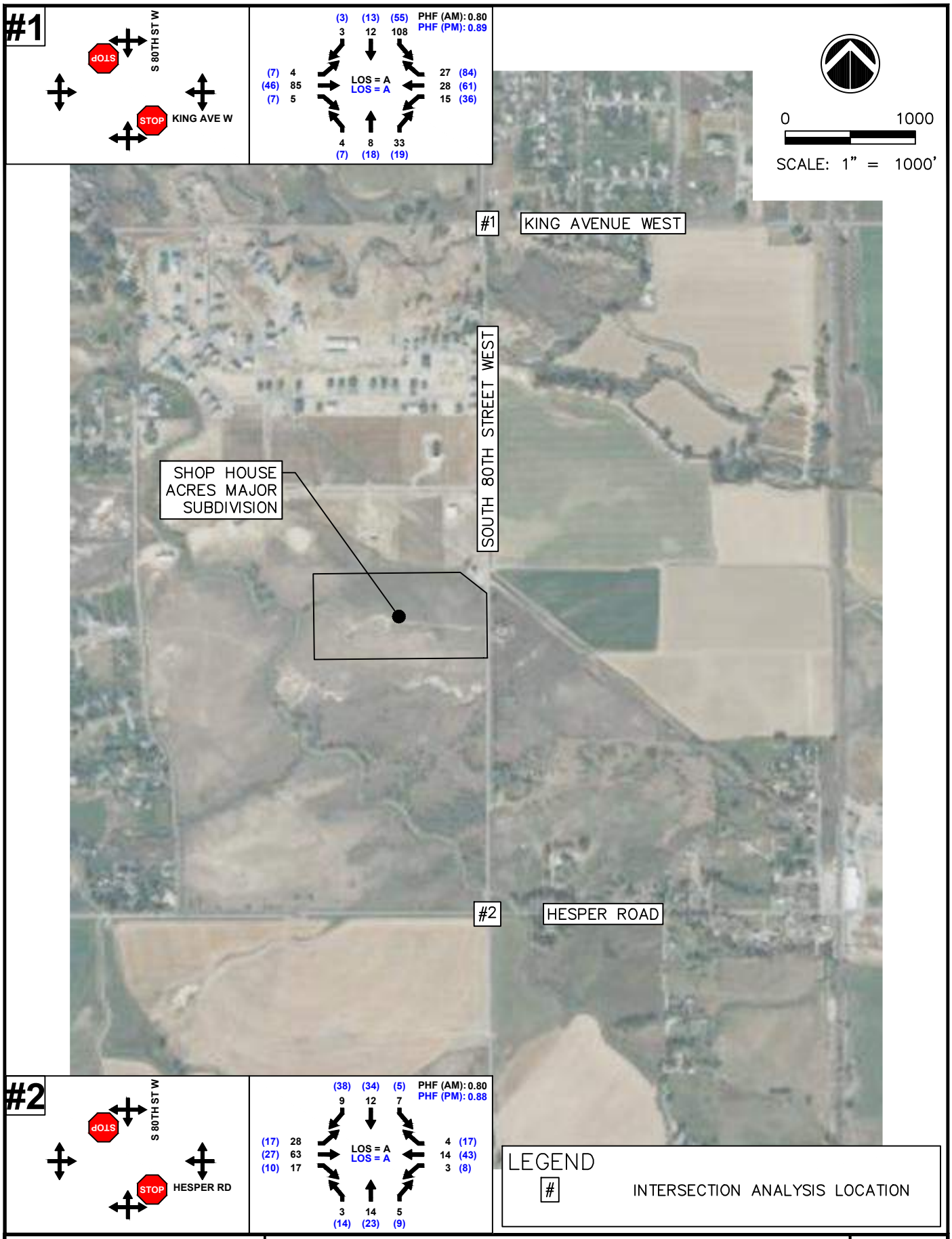

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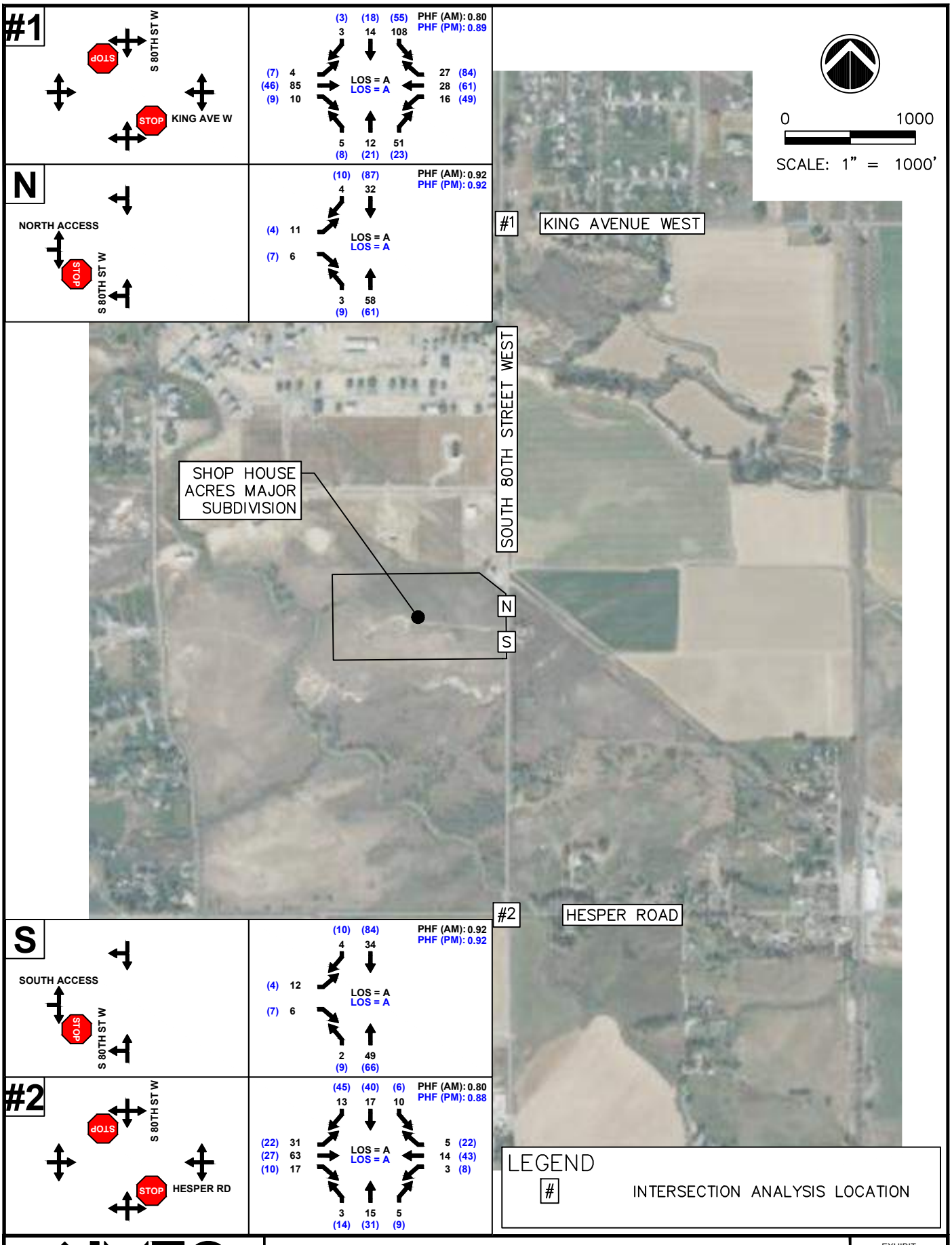
2031 BACKGROUND TURNING MOVEMENTS

EXHIBIT

FIG - 5



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BILLINGS, MONTANA

2031 TOTAL TURNING MOVEMENTS

EXHIBIT

FIG - 6

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5 ADDITIONAL TRAFFIC OPERATIONAL ANALYSIS

5.1.1 Traffic Signal Warrant Analysis

A traffic signal warrant analysis was performed by using the Highway Capacity Software (HCS) MUTCD Warrants function. Meeting a signal warrant is an indication that the intersection could be considered for the installation of traffic signals. Table 9 below summarizes the signal warrant calculations, taking into account seasonally adjusted traffic counts, pedestrian movements, and articulated trucks for each hour between 7:00 am and 6:00pm for both the existing 2026 traffic and the 2031 total traffic. Additional signal warrant analysis information can be found in Appendix E.

Table 9: Signal Warrant Analysis Summary

Traffic Signal Warrants			Warrant 1, Eight-Hour Vehicular Volume	Warrant 2, Four-Hour Vehicular Volume	Warrant 3, Peak Hour	Warrant 4, Pedestrian Volume	Warrant 5, School Crossing	Warrant 6, Coordinated Signal System	Warrant 7, Crash History	Warrant 8, Roadway Network	Warrant 9, Intersection Near a Grade Crossing
2026	Intersection 1	King Avenue West & South 80th St. West	No	No	No	No	No	No	No	No	No
2031			No	No	No	No	No	No	No	No	No
2026	Intersection 2	Hesper Road & South 80th St. West	No	No	No	No	No	No	No	No	No
2031			No	No	No	No	No	No	No	No	No

5.1.2 Right-Turn Lane Analysis

For this analysis, the existing two (2) Intersections, #1 & #2, as well as the proposed two (2) development access locations, "N" & "S", were considered for the need for an auxiliary right-turn lane for the free-flowing legs of the intersection based on the criteria outlined in Chapter 28.4 of the Engineering Traffic Manual (2007), which can be found in Appendix F. Although neither of the existing intersections nor the proposed access locations warrant the need for any further considerations, Table 10 summarizes each of the TWSC intersections and the decisions warranting further design considerations for an auxiliary right-turn.

5.1.3 Left-Turn Lane Analysis

For this analysis, the existing two (2) Intersections, #1 & #2, as well as the proposed two (2) development access locations, "N" & "S", were considered for the need for an auxiliary left-turn lane for the free-flowing legs of the intersection based on the criteria outlined in Chapter 28.4 of the Engineering Traffic Manual (2007), which can be found in Appendix F. Although neither of the existing intersections nor the proposed access locations warrant the need for any further considerations, Table 10 summarizes each of the TWSC intersections and the decisions warranting further design considerations for an auxiliary left-turn lane.

Table 10: Auxiliary Turn-Lane Summary

Auxiliary Turn-Lane Warrants			Northbound Left		Northbound Right		Southbound Left		Southbound Right		Eastbound Left		Eastbound Right		Westbound Left		Westbound Right	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
$2026_{Existing}$	Intersection 1	King Avenue West & South 80th St. West	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
$2031_{Existing}$			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2031_{Total}			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
$2026_{Existing}$	Intersection 2	Hesper Road & South 80th St. West	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
$2031_{Existing}$			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2031_{Total}			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
$2026_{Existing}$	Intersection N	Development North Access & South 80th St. West	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
$2031_{Existing}$			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2031_{Total}			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
$2026_{Existing}$	Intersection S	Development South Access & South 80th St. West	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
$2031_{Existing}$			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2031_{Total}			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

6 IMPACT MITIGATION FINANCIAL CONTRIBUTION ANALYSIS

This analysis follows the requirements outlined in the Yellowstone County Subdivision Regulations, Section 4.6.C.4.B.8. Following the "Vegas Method" it was concluded that King Avenue West at South 80th Street West is projected to increase by 1.58% and Hesper Road at South 80th Street West is projected to increase by 1.17%. With both intersections not meeting or exceeding the minimum contribution threshold of 2.00% in growth, the developer for Shop House Acres is not required to participate in the financial cost share for either intersection. A detailed calculation and summary of this data is presented in Appendix K.

7 CONCLUSION

Analysis of the existing traffic volumes, lane configurations, and the impacts due to the projected traffic growth and proposed development result in the following general conclusions:

- The preceding analysis demonstrates that the Shop House Acres development will not generate significant nor impactful volume of new trips at the intersections studied.
- The studied existing intersections and proposed access locations will operate at or above an LOS of "B", exceeding any minimum requirement of an LOS specified in the *Appendix E* of the Road Design Manual produced by the Montana Department of Transportation.
- No auxiliary turn lanes are warranted for the intersections and access locations discussed in this report.

- Vertical sight obstruction is present for traffic performing left-turn movements onto South 80th Street West from the North Access location of the development.
- The existing intersections do not warrant any further analysis for signal considerations as no considerations warrants are met.

8 RECOMMENDATIONS

Based on the data presented during this study, it is recommended that:

- Due to the vertical sight obstruction of the hill on South 80th Street West, it is recommended that a "Hill Blocks View" and an advisory speed sign of 30mph be placed along South 80th Street West for the north-bound traffic as identified by the intersection sight distance (ISD) limitations shown Figures J-3 & J-4 in Appendix J.
    - "Hill Block View" - Reference figure 2C-5, sign W7-6 from the Manual of Uniform Traffic Control Devices, 11th edition.
    - Advisory Speed Sign - Reference figure 2C-1, sign W13-1P from the Manual of Uniform Traffic Control Devices, 11th edition.
- Any additional improvements shall be designed in accordance with MTD and Yellowstone County standards and comply with the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD).
- Any future development(s) of the current property or surrounding properties shall perform a new traffic impact study.

9 REFERENCES

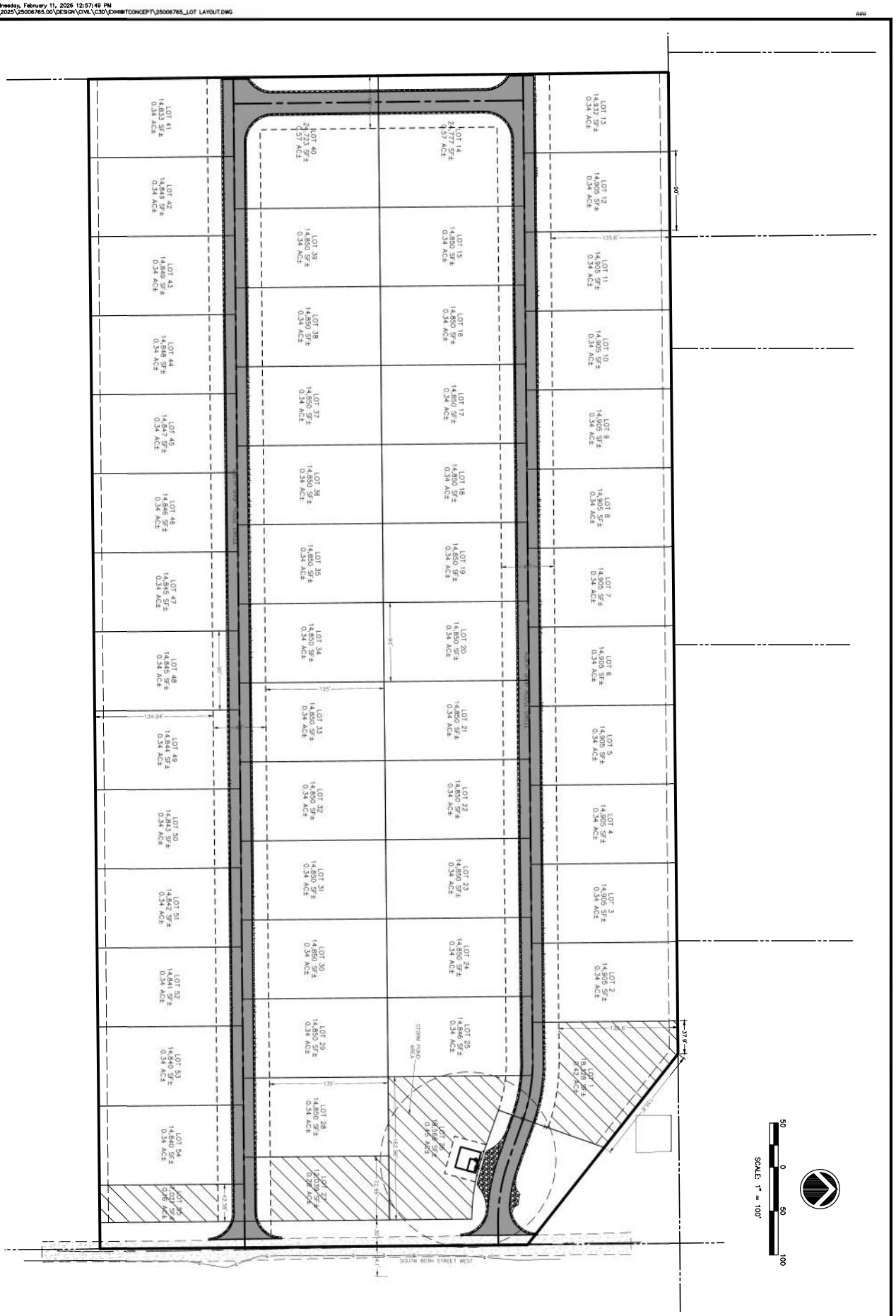
- *Montana Department of Transportation (MDT)*
- *Manual on Uniform Traffic Control Devices, 11th edition*
- *ITE Trip Generation Manual, 12th edition*
- *Highway Capacity Software (HCS), Version 2026*
- *AASHTO A Policy on Highway Geometric Design and Streets (2018), 7th Edition*
- *Intersection Safety – A Manual for Local Rural Road Owners*

Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX A

Site Plan



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			Field Book No:	
			Drawing Number: 25006765_LOT LAYOUT.dwg	
			File Name:	
IMEG Project No. 25006765				

SHOP HOUSE ACRES SUBDIVISION

YELLOWSTONE COUNTY MONTANA

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REVISIONS		
No.	DESCRIPTION	DATE
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Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX B

Traffic Volume Data and Lane Assignment Volumes

Background AM & PM Peak Hour Traffic Volumes

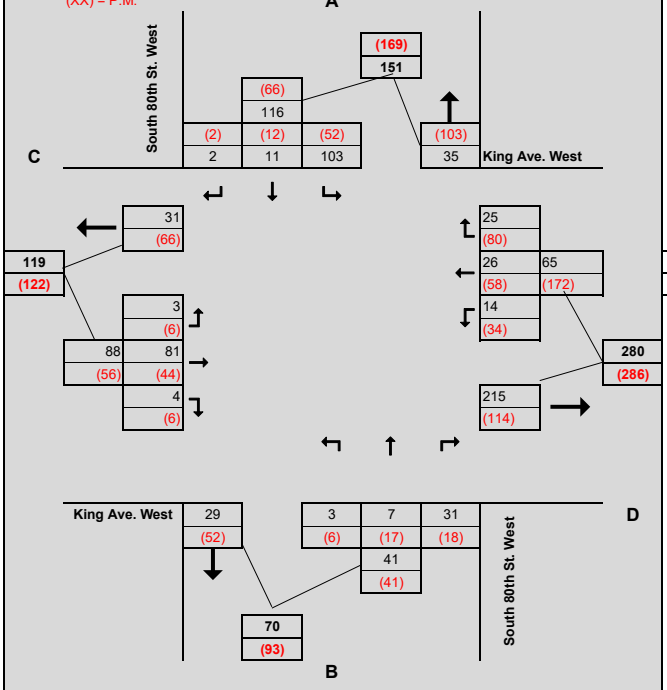
Forecasted by: IMEG
Phone: 406-248-9000

AM Peak Hour: 7:15 AM — AM PHF: 0.80
PM Peak Hour: 4:15 PM — PM PHF: 0.89
Date Traffic Collected: 2/12/2026
Date Calculated: 2/20/2026

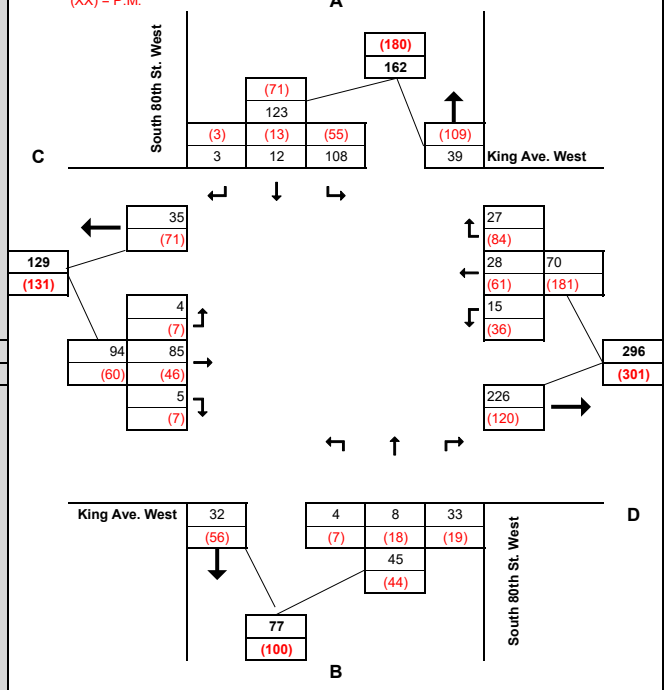
Shop House Acres Major Subdivision
Project No: 25006765.00
Route: King Ave. West & South 80th St. West
County: Yellowstone State: Montana
City of: Billings

XX = A.M.
(XX) = P.M.

Existing Year: 2026



Full Build Year: 2031



Total AM & PM Peak Hour Traffic Volumes

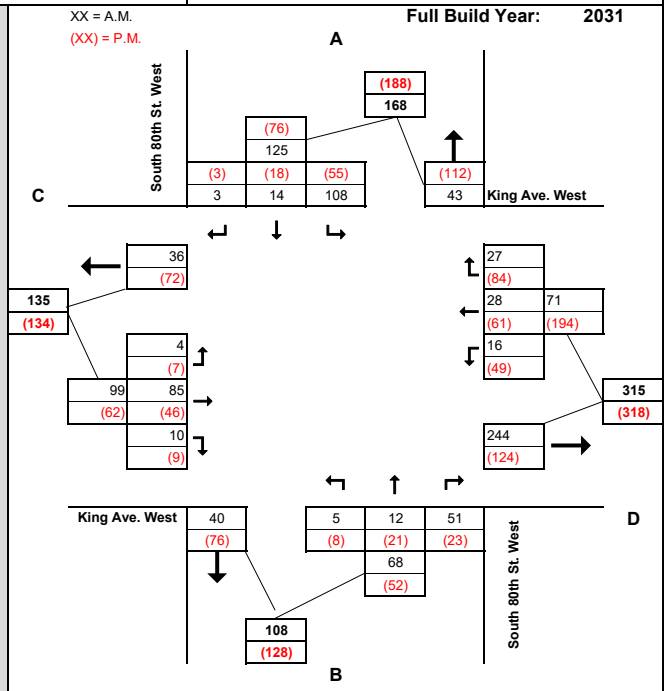
Forecasted by: IMEG
Phone: 406-248-9000

AM Peak Hour: 7:15 AM — AM PHF: 0.80
PM Peak Hour: 4:15 PM — PM PHF: 0.89

Shop House Acres Major Subdivision
Project No: 25006765.00
Route: King Ave. West & South 80th St. West
County: Yellowstone State: Montana
City of: Billings

XX = A.M.
(XX) = P.M.

Full Build Year: 2031



Background AM & PM Peak Hour Traffic Volumes

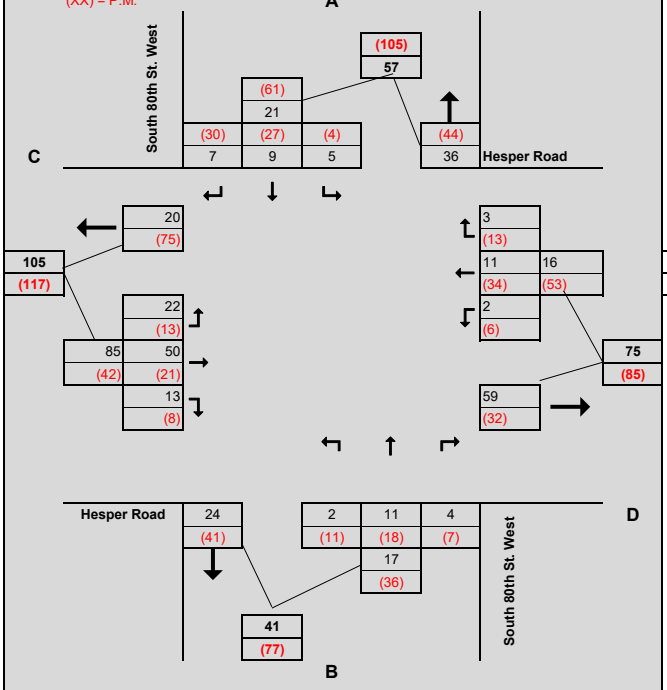
Forecasted by: IMEG
Phone: 406-248-9000

AM Peak Hour: 7:00 AM
PM Peak Hour: 4:45 PM
AM PHF: 0.80
PM PHF: 0.88
Date Traffic Collected: 2/12/2026
Date Calculated: 2/20/2026

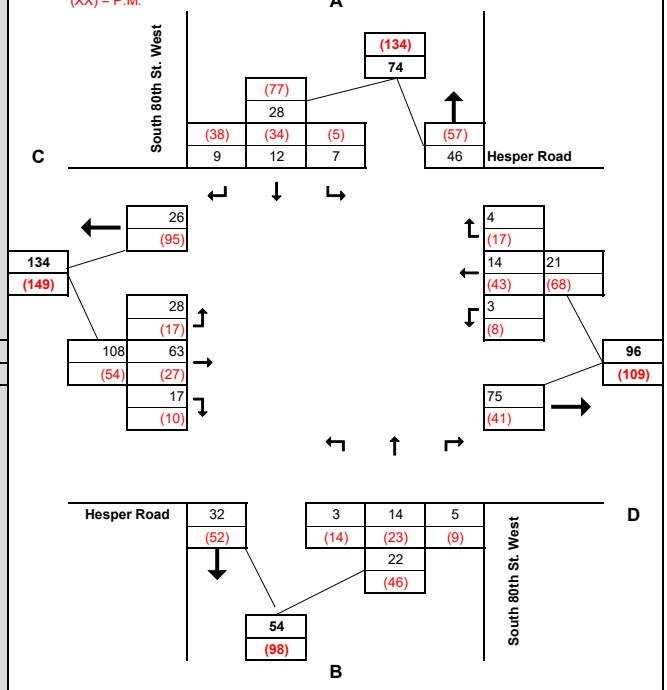
Shop House Acres Major Subdivision
Project No: 25006765.00
Route: Hesper Road & South 80th St. West
County: Yellowstone State: Montana
City of: Billings

XX = A.M.
(XX) = P.M.

Existing Year: 2026



Full Build Year: 2031



Total AM & PM Peak Hour Traffic Volumes

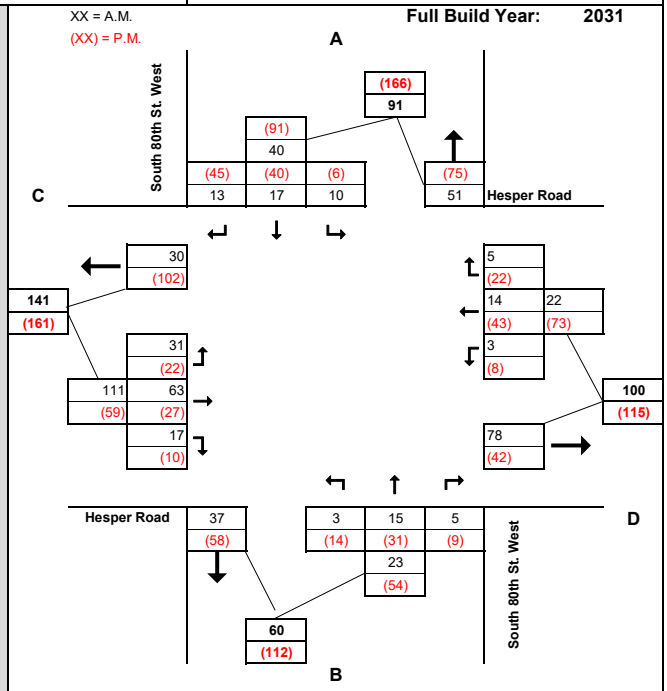
Forecasted by: IMEG
Phone: 406-248-9000

AM Peak Hour: 7:00 AM
PM Peak Hour: 4:45 PM
AM PHF: 0.80
PM PHF: 0.88

Shop House Acres Major Subdivision
Project No: 25006765.00
Route: Hesper Road & South 80th St. West
County: Yellowstone State: Montana
City of: Billings

XX = A.M.
(XX) = P.M.

Full Build Year: 2031



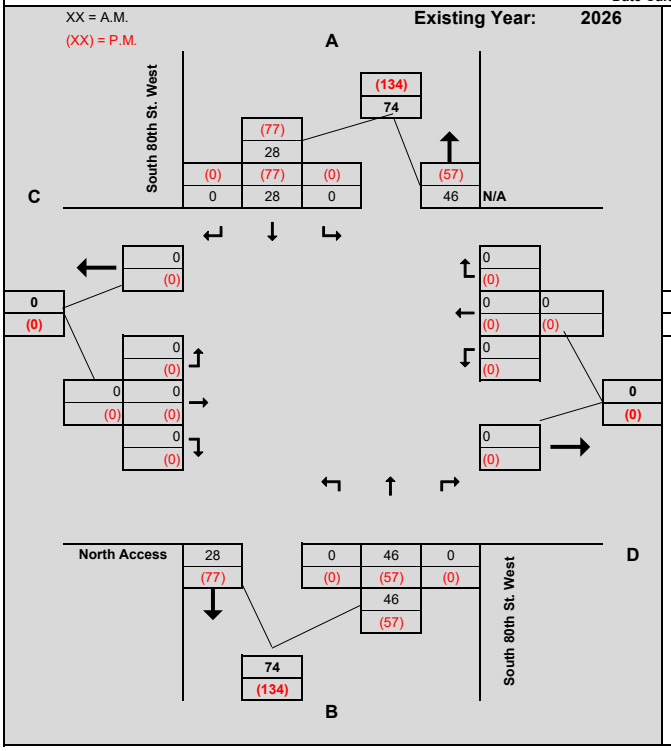
Background AM & PM Peak Hour Traffic Volumes

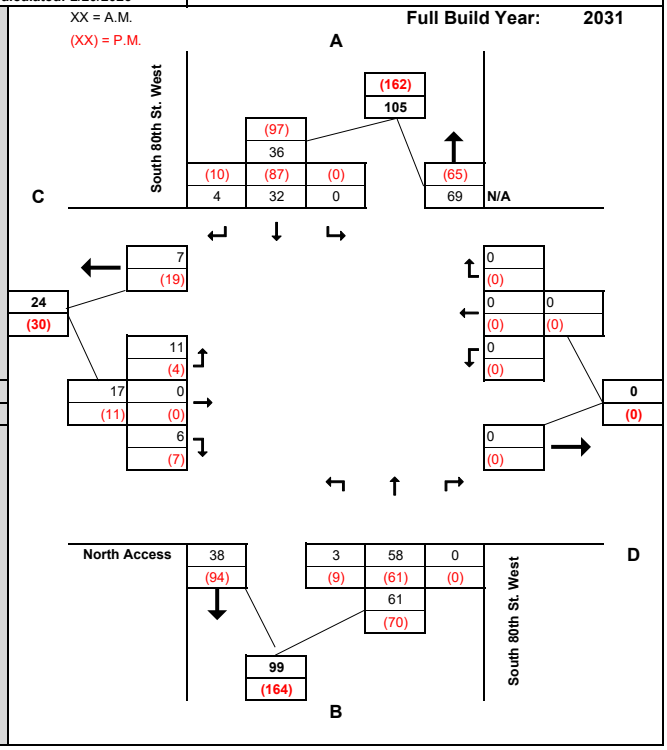
Shop House Acres Major Subdivision

Forecasted by: IMEG
Phone: 406-248-9000

AM Peak Hour: 7:00 AM AM PHF: 0.92
PM Peak Hour: 4:45 PM PM PHF: 0.92
Date Traffic Collected:
Date Calculated: 2/20/2026

Project No: 25006765.00
Route: North Access & South 80th St. West
County: Yellowstone State: Montana
City of: Billings





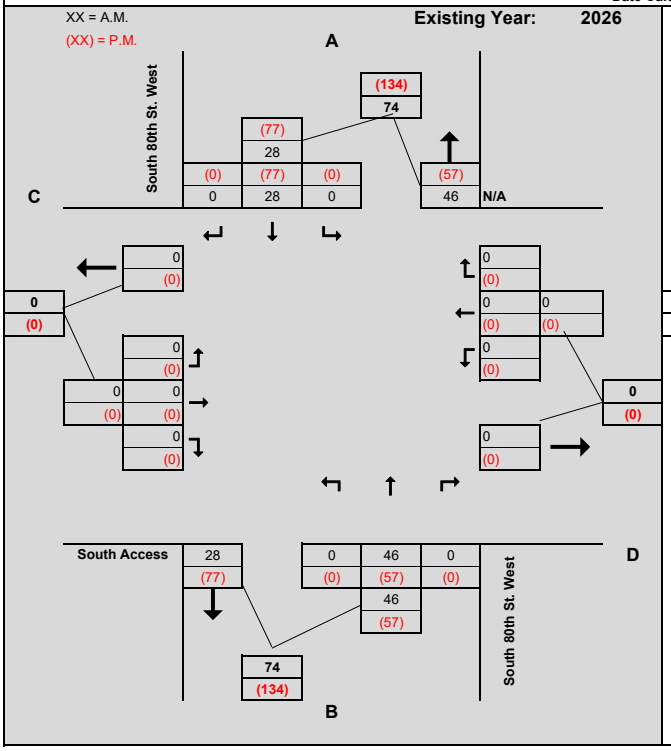
Background AM & PM Peak Hour Traffic Volumes

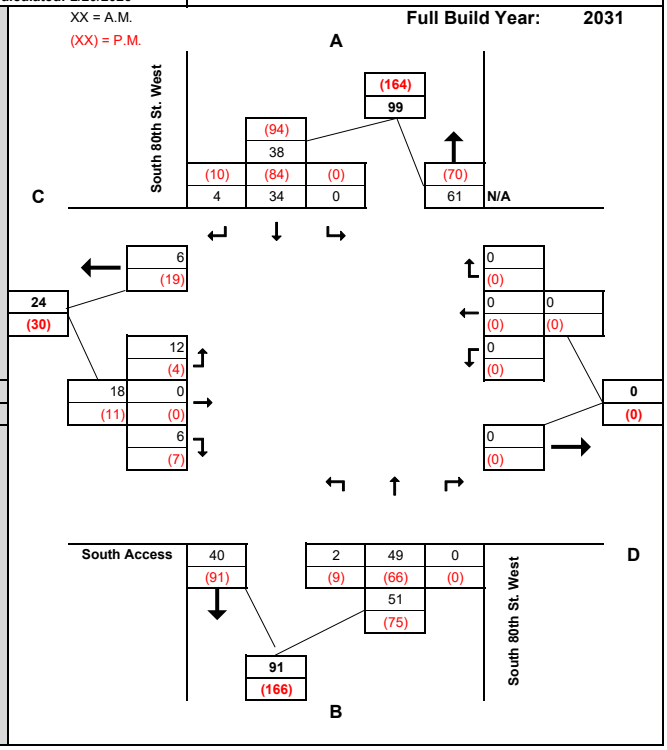
Shop House Acres Major Subdivision

Forecasted by: IMEG
Phone: 406-248-9000

AM Peak Hour: 7:00 AM AM PHF: 0.92
PM Peak Hour: 4:45 PM PM PHF: 0.92
Date Traffic Collected:
Date Calculated: 2/20/2026

Project No: 25006765.00
Route: South Access & South 80th St. West
County: Yellowstone State: Montana
City of: Billings





Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX C

Intersection Capacity Analysis

for

2026 Background Traffic
&
2031 Population Growth of Background Traffic
&
2031 Total Traffic

HCS Two-Way Stop-Control Report

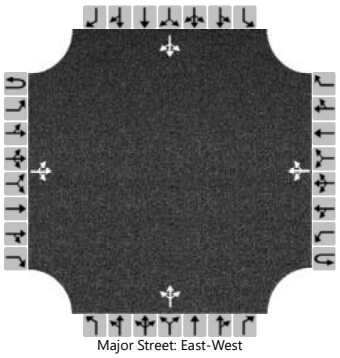
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2026 Background_AM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	King Ave West & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	King Ave West
North/South Street	South 80th St West
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	81	4		14	26	25		3	7	31		103	11	2
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		4				18					51				145	
Capacity, c (veh/h)		1552				1497					876				697	
v/c Ratio		0.00				0.01					0.06				0.21	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2				0.8	
95% Queue Length, Q_{95} (ft)		0.0				0.0					5.0				20.0	
Control Delay (s/veh)		7.3	0.0	0.0		7.4	0.1	0.1			9.4				11.5	
Level of Service (LOS)		A	A	A		A	A	A			A				B	
Approach Delay (s/veh)	0.3				1.7				9.4				11.5			
Approach LOS	A				A				A				B			

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HCS Two-Way Stop-Control Report

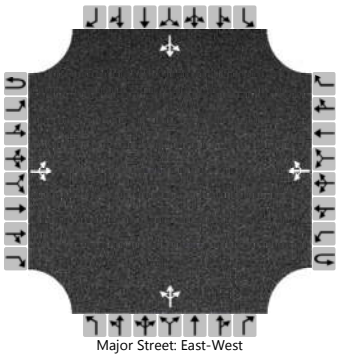
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2026 Background_PM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	King Ave West & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	King Ave West
North/South Street	South 80th St West
Peak Hour Factor	0.89
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		6	44	6		34	58	80		6	17	18		52	12	2
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		7				38					46				74	
Capacity, c (veh/h)		1437				1561					743				636	
v/c Ratio		0.00				0.02					0.06				0.12	
95% Queue Length, Q_{95} (veh)		0.0				0.1					0.2				0.4	
95% Queue Length, Q_{95} (ft)		0.0				2.5					5.0				10.0	
Control Delay (s/veh)		7.5	0.0	0.0		7.4	0.2	0.2			10.2				11.4	
Level of Service (LOS)		A	A	A		A	A	A			B				B	
Approach Delay (s/veh)	0.8				1.6				10.2				11.4			
Approach LOS	A				A				B				B			

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HCS Two-Way Stop-Control Report

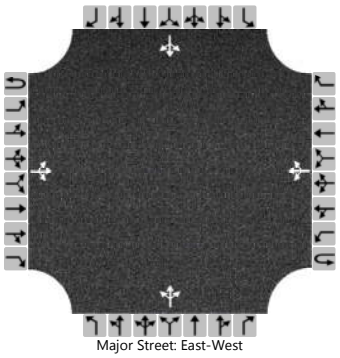
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2026 Background_AM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	Hesper Road & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	Hesper Road
North/South Street	South 80th St West
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		22	50	13		2	11	3		2	11	4		5	9	7
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		28				3					21				26	
Capacity, c (veh/h)		1613				1532					787				829	
v/c Ratio		0.02				0.00					0.03				0.03	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1				0.1	
95% Queue Length, Q_{95} (ft)		2.5				0.0					2.5				2.5	
Control Delay (s/veh)		7.3	0.1	0.1		7.4	0.0	0.0			9.7				9.5	
Level of Service (LOS)		A	A	A		A	A	A			A				A	
Approach Delay (s/veh)	2.0				0.9				9.7				9.5			
Approach LOS	A				A				A				A			

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HCS Two-Way Stop-Control Report

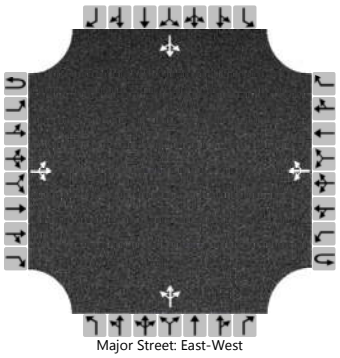
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2026 Background_PM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	Hesper Road & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	Hesper Road
North/South Street	South 80th St West
Peak Hour Factor	0.88
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		13	21	8		6	34	13		11	18	7		4	27	30
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		15				7					41				69	
Capacity, c (veh/h)		1565				1592					800				877	
v/c Ratio		0.01				0.00					0.05				0.08	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2				0.3	
95% Queue Length, Q_{95} (ft)		0.0				0.0					5.0				7.5	
Control Delay (s/veh)		7.3	0.1	0.1		7.3	0.0	0.0			9.7				9.5	
Level of Service (LOS)		A	A	A		A	A	A			A				A	
Approach Delay (s/veh)	2.3				0.9				9.7				9.5			
Approach LOS	A				A				A				A			

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HCS Two-Way Stop-Control Report

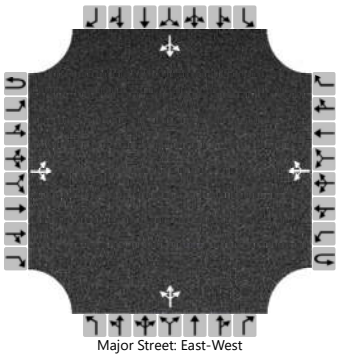
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Background_AM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	King Ave West & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	King Ave West
North/South Street	South 80th St West
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	85	5		15	28	27		4	8	33		108	12	3
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		5				19					56				154	
Capacity, c (veh/h)		1545				1490					859				678	
v/c Ratio		0.00				0.01					0.07				0.23	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2				0.9	
95% Queue Length, Q_{95} (ft)		0.0				0.0					5.0				22.5	
Control Delay (s/veh)		7.3	0.0	0.0		7.4	0.1	0.1			9.5				11.9	
Level of Service (LOS)		A	A	A		A	A	A			A				B	
Approach Delay (s/veh)	0.3				1.7				9.5				11.9			
Approach LOS	A				A				A				B			

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HCS Two-Way Stop-Control Report

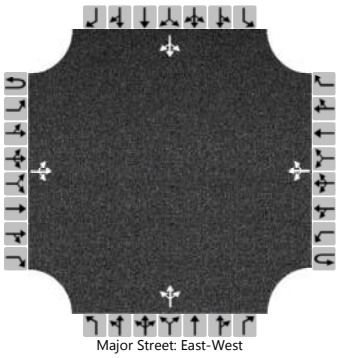
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Background_PM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	King Ave West & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	King Ave West
North/South Street	South 80th St West
Peak Hour Factor	0.89
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	46	7		36	61	84		7	18	19		55	13	3
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		8				40					49				80	
Capacity, c (veh/h)		1428				1557					727				620	
v/c Ratio		0.01				0.03					0.07				0.13	
95% Queue Length, Q_{95} (veh)		0.0				0.1					0.2				0.4	
95% Queue Length, Q_{95} (ft)		0.0				2.5					5.0				10.0	
Control Delay (s/veh)		7.5	0.0	0.0		7.4	0.2	0.2			10.3				11.7	
Level of Service (LOS)		A	A	A		A	A	A			B				B	
Approach Delay (s/veh)	0.9				1.6				10.3				11.7			
Approach LOS	A				A				B				B			

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HCS Two-Way Stop-Control Report

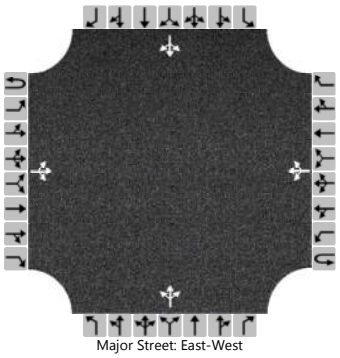
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Background_AM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	Hesper Road & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	Hesper Road
North/South Street	South 80th St West
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		28	63	17		3	14	4		3	14	5		7	12	9
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		35				4					28				35	
Capacity, c (veh/h)		1606				1505					744				784	
v/c Ratio		0.02				0.00					0.04				0.04	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1				0.1	
95% Queue Length, Q_{95} (ft)		2.5				0.0					2.5				2.5	
Control Delay (s/veh)		7.3	0.2	0.2		7.4	0.0	0.0			10.0				9.8	
Level of Service (LOS)		A	A	A		A	A	A			B				A	
Approach Delay (s/veh)	2.0				1.1				10.0				9.8			
Approach LOS	A				A				B				A			

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HCS Two-Way Stop-Control Report

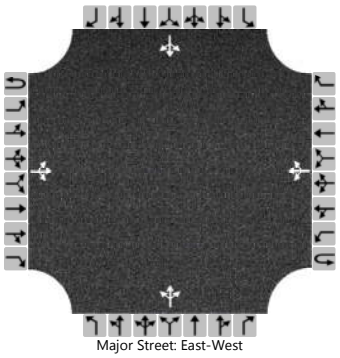
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Background_PM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	Hesper Road & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	Hesper Road
North/South Street	South 80th St West
Peak Hour Factor	0.88
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		17	27	10		8	43	17		14	23	9		5	34	38
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		19				9					52				88	
Capacity, c (veh/h)		1546				1580					755				845	
v/c Ratio		0.01				0.01					0.07				0.10	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2				0.3	
95% Queue Length, Q_{95} (ft)		0.0				0.0					5.0				7.5	
Control Delay (s/veh)		7.4	0.1	0.1		7.3	0.0	0.0			10.1				9.8	
Level of Service (LOS)		A	A	A		A	A	A			B				A	
Approach Delay (s/veh)	2.4				0.9				10.1				9.8			
Approach LOS	A				A				B				A			

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HCS Two-Way Stop-Control Report

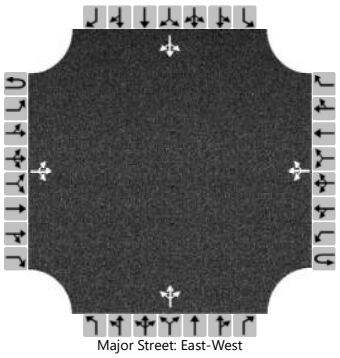
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Total_AM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	King Ave West & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	King Ave West
North/South Street	South 80th St West
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	85	10		16	28	27		5	12	51		108	14	3
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		5				20					85				156	
Capacity, c (veh/h)		1545				1482					858				640	
v/c Ratio		0.00				0.01					0.10				0.24	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.3				1.0	
95% Queue Length, Q_{95} (ft)		0.0				0.0					7.5				25.0	
Control Delay (s/veh)		7.3	0.0	0.0		7.5	0.1	0.1			9.7				12.4	
Level of Service (LOS)		A	A	A		A	A	A			A				B	
Approach Delay (s/veh)	0.3				1.8				9.7				12.4			
Approach LOS	A				A				A				B			

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HCS Two-Way Stop-Control Report

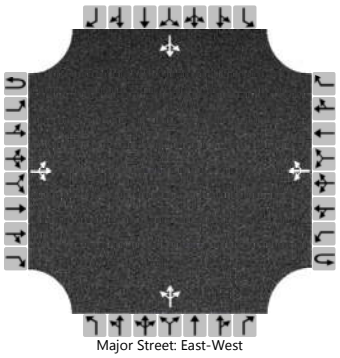
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Total_PM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	King Ave West & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	King Ave West
North/South Street	South 80th St West
Peak Hour Factor	0.89
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	46	9		49	61	84		8	21	23		55	18	3
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		8				55					58				85	
Capacity, c (veh/h)		1428				1554					703				580	
v/c Ratio		0.01				0.04					0.08				0.15	
95% Queue Length, Q_{95} (veh)		0.0				0.1					0.3				0.5	
95% Queue Length, Q_{95} (ft)		0.0				2.5					7.5				12.5	
Control Delay (s/veh)		7.5	0.0	0.0		7.4	0.3	0.3			10.6				12.3	
Level of Service (LOS)		A	A	A		A	A	A			B				B	
Approach Delay (s/veh)	0.9				2.1				10.6				12.3			
Approach LOS	A				A				B				B			

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HCS Two-Way Stop-Control Report

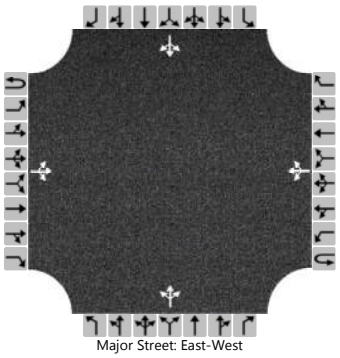
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Total_AM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	Hesper Road & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	Hesper Road
North/South Street	South 80th St West
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		31	63	17		3	14	5		3	15	5		10	17	13
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		39				4					29				50	
Capacity, c (veh/h)		1604				1505					731				776	
v/c Ratio		0.02				0.00					0.04				0.06	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1				0.2	
95% Queue Length, Q_{95} (ft)		2.5				0.0					2.5				5.0	
Control Delay (s/veh)		7.3	0.2	0.2		7.4	0.0	0.0			10.1				10.0	
Level of Service (LOS)		A	A	A		A	A	A			B				A	
Approach Delay (s/veh)	2.2				1.0				10.1				10.0			
Approach LOS	A				A				B				A			

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HCS Two-Way Stop-Control Report

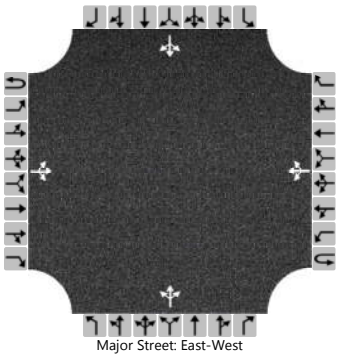
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Total_PM
Intersection Orientation	East-West
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	Hesper Road & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	Hesper Road
North/South Street	South 80th St West
Peak Hour Factor	0.88
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		22	27	10		8	43	22		14	31	9		6	40	45
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		25				9					61				103	
Capacity, c (veh/h)		1539				1580					727				832	
v/c Ratio		0.02				0.01					0.08				0.12	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.3				0.4	
95% Queue Length, Q_{95} (ft)		0.0				0.0					7.5				10.0	
Control Delay (s/veh)		7.4	0.1	0.1		7.3	0.0	0.0			10.4				9.9	
Level of Service (LOS)		A	A	A		A	A	A			B				A	
Approach Delay (s/veh)	2.8				0.8				10.4				9.9			
Approach LOS	A				A				B				A			

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HCS Two-Way Stop-Control Report

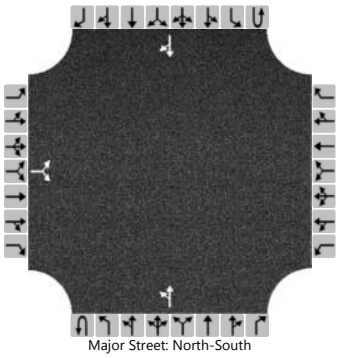
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Total_AM
Intersection Orientation	North-South
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	North Access & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	North Access
North/South Street	South 80th St West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		11		6						3	58				32	4
Percent Heavy Vehicles (%)		0		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			18							3						
Capacity, c (veh/h)			941							1584						
v/c Ratio			0.02							0.00						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
95% Queue Length, Q_{95} (ft)			2.5							0.0						
Control Delay (s/veh)			8.9							7.3	0.0					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		8.9								0.4						
Approach LOS		A								A						

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HCS Two-Way Stop-Control Report

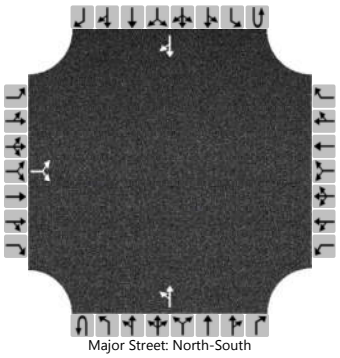
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Total_PM
Intersection Orientation	North-South
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	North Access & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	North Access
North/South Street	South 80th St West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		4		7						9	61				87	10
Percent Heavy Vehicles (%)		0		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			12							10						
Capacity, c (veh/h)			897							1498						
v/c Ratio			0.01							0.01						
95% Queue Length, Q_{95} (veh)			0.0							0.0						
95% Queue Length, Q_{95} (ft)			0.0							0.0						
Control Delay (s/veh)			9.1							7.4	0.1					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		9.1								1.0						
Approach LOS		A								A						

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HCS Two-Way Stop-Control Report

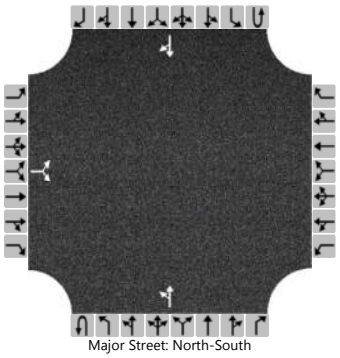
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Total_AM
Intersection Orientation	North-South
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	South Access & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	South Access
North/South Street	South 80th St West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		12		6						2	49				34	4
Percent Heavy Vehicles (%)		0		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			20							2						
Capacity, c (veh/h)			946							1581						
v/c Ratio			0.02							0.00						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
95% Queue Length, Q_{95} (ft)			2.5							0.0						
Control Delay (s/veh)			8.9							7.3	0.0					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		8.9								0.3						
Approach LOS		A								A						

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HCS Two-Way Stop-Control Report

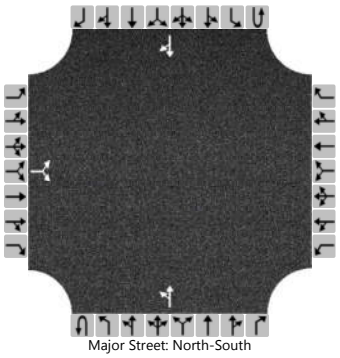
General Information

Analyst	MJH
Agency/Co.	IMEG
Date Performed	2/23/2026
Analysis Year	2026
Time Analyzed	2031 Total_PM
Intersection Orientation	North-South
Project Description	Shop House Acres Major Subd.

Site Information

Intersection	South Access & South 80th St West
Jurisdiction	Yellowstone County
East/West Street	South Access
North/South Street	South 80th St West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		4		7						9	66				84	10
Percent Heavy Vehicles (%)		0		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			12							10						
Capacity, c (veh/h)			898							1503						
v/c Ratio			0.01							0.01						
95% Queue Length, Q_{95} (veh)			0.0							0.0						
95% Queue Length, Q_{95} (ft)			0.0							0.0						
Control Delay (s/veh)			9.1							7.4	0.1					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		9.1								0.9						
Approach LOS		A								A						

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Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX D

ITE Trip Generation Worksheets, 12th Edition

Single-Family Detached Housing
(210)

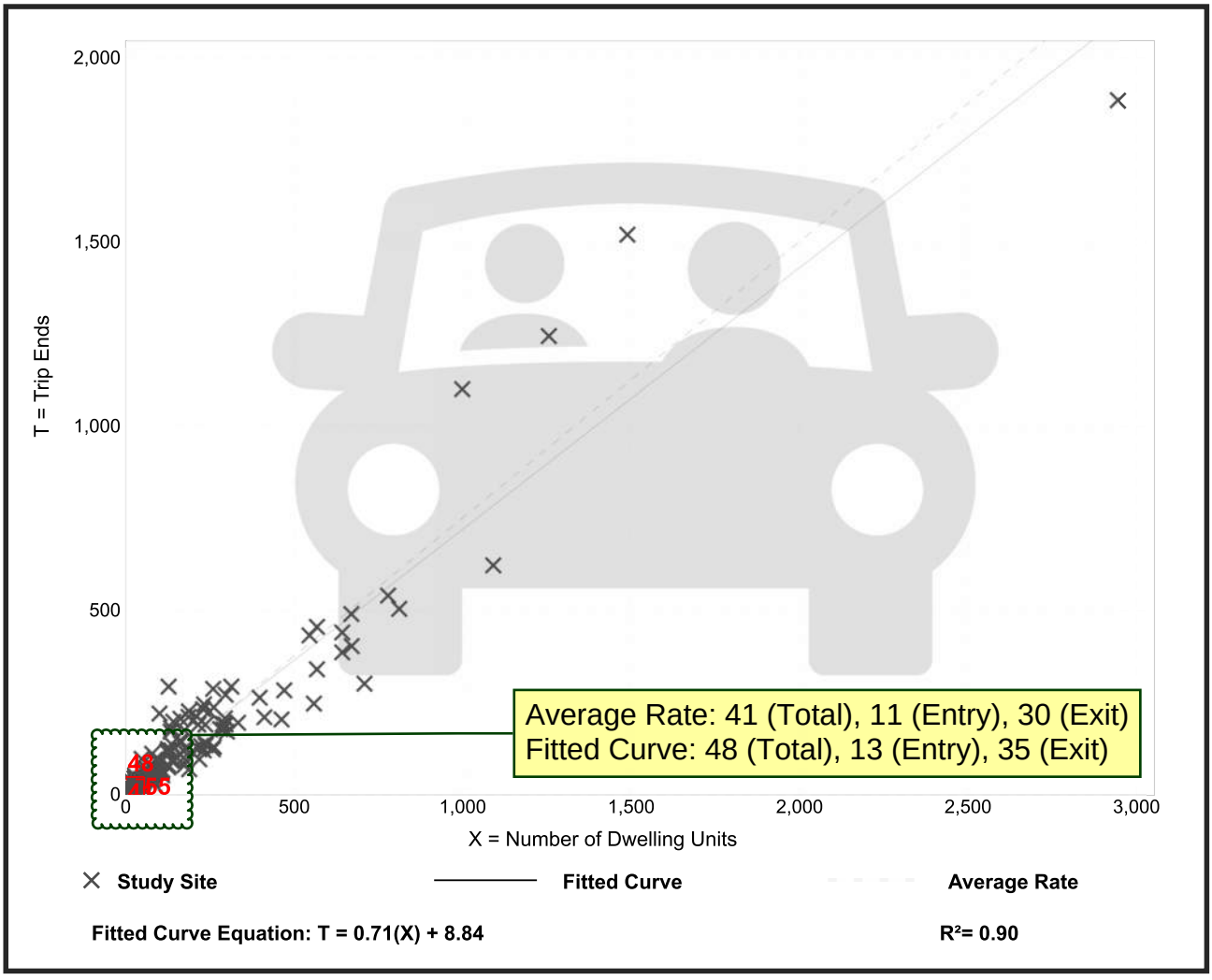
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 132
Avg. Num. of Dwelling Units: 232
Directional Distribution: 27% entering, 73% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.75	0.32 - 2.27	0.26

Data Plot and Equation



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Single-Family Detached Housing
(210)

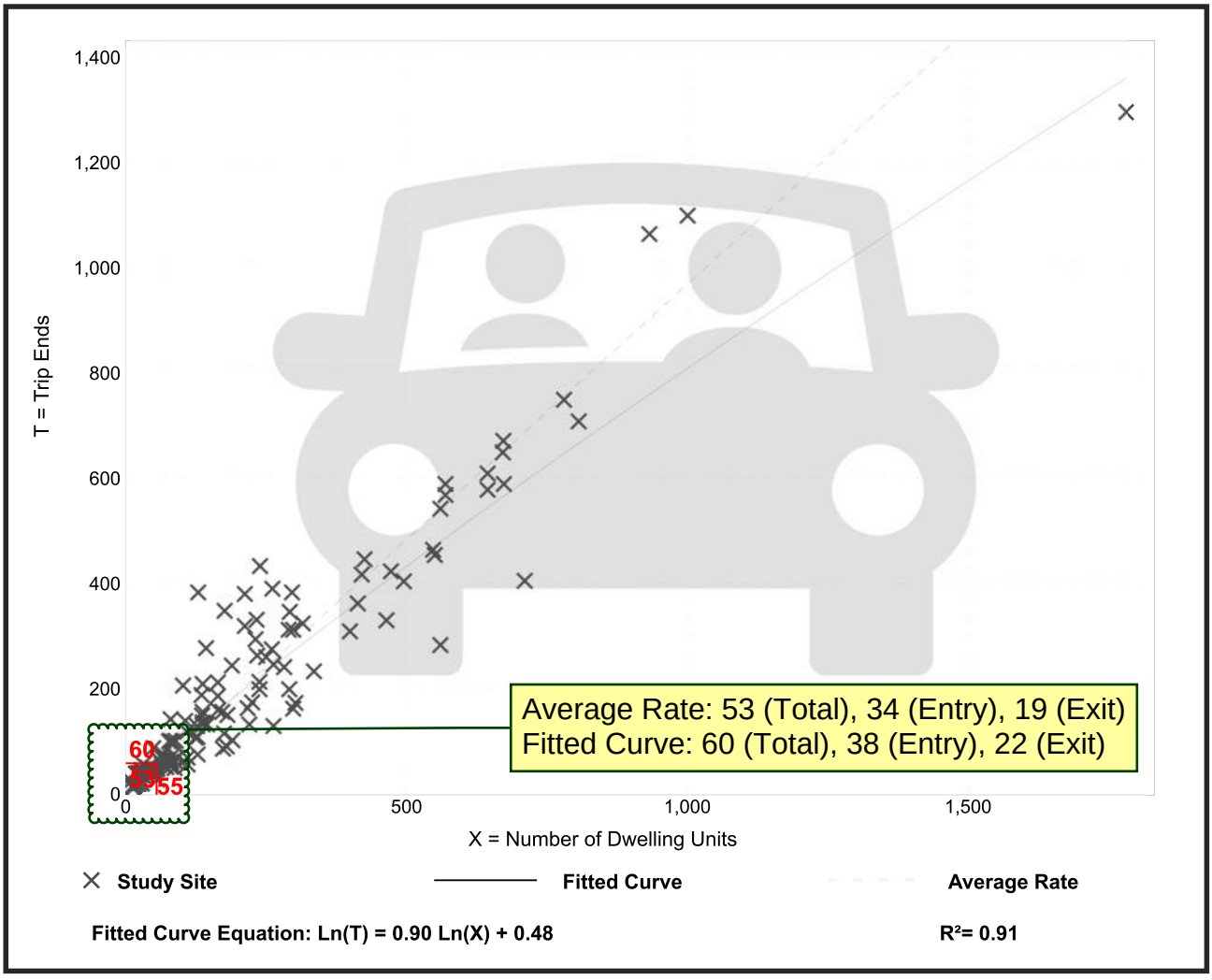
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 138
Avg. Num. of Dwelling Units: 214
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.97	0.49 - 2.98	0.32

Data Plot and Equation



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Land Use: 210
Single-Family Detached Housing

Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates, based on a small sample of sites, are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 215), and higher than those for senior adult housing—single-family (Land Use 251). (Source 1008)

Additional Data

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alabama, Arizona, British Columbia (CAN), California, Delaware, Illinois, Kentucky, Massachusetts, Minnesota, Montana, New Jersey, New York, North Carolina, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Vermont, and West Virginia.

Source Numbers

356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077, 1078, 1079, 1204, 1221, 1225, 1236, 1251, 1265, 1267

Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX E

Traffic Signal Warrant Analysis

HCS Warrants Report

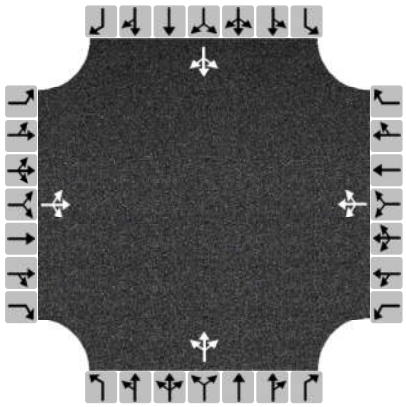
Project Information

Analyst	MJH	Date	2/24/2026
Agency	IMEG	Analysis Year	2026
Jurisdiction	Yellowstone County	Time Period Analyzed	2026 Background
Units	U.S. Customary	MUTCD Method	MUTCD 11 (2023)
Project Description	Shop House Acres Major Subd. - Intersection #1) King Ave. West & South 80th St. West		

General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7:00	Coordinated Signal System	No
Major Street Speed (mi/h)	0	Nearest Signal (ft)	0
Adequate Trials of Crash Exp. Alt.	No		

Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	0	1	0	0	1	0	0	1	0	0	1	0
Lane Usage		LTR			LTR			LTR			LTR	
Vehicle Volumes Averages (veh/h)	2	42	3	19	38	43	4	7	18	44	7	2
Pedestrian median refuge available	No			No			No			No		
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay Averages (s/veh)	0.5			1.6			9.3			10.4		
Delay Averages (veh-hrs)	0.0			0.0			0.1			0.2		

School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	No
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	1

Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)	-	Tractor-Trailer Trucks (%)	0

Volume Summary

Hours	Major Volume (veh/h)	Minor Volume (veh/h)	Total Volume (veh/h)	Peds/h	Gaps/h	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (80%)	4A ** (100%)	4B ** (100%)
7:00 - 8:00	141	111	288	0	0	No	No	No	No	No	No	No	No	No
8:00 - 9:00	126	45	201	0	0	No	No	No	No	No	No	No	No	No
9:00 - 10:00	117	43	181	0	0	No	No	No	No	No	No	No	No	No
10:00 - 11:00	109	56	195	0	0	No	No	No	No	No	No	No	No	No
11:00 - 12:00	152	44	233	0	0	No	No	No	No	No	No	No	No	No
12:00 - 13:00	149	50	218	0	0	No	No	No	No	No	No	No	No	No
13:00 - 14:00	149	50	218	0	0	No	No	No	No	No	No	No	No	No
14:00 - 15:00	142	56	230	0	0	No	No	No	No	No	No	No	No	No
15:00 - 16:00	196	50	280	0	0	No	No	No	No	No	No	No	No	No
16:00 - 17:00	214	57	306	0	0	No	No	No	No	No	No	No	No	No
17:00 - 18:00	191	58	295	0	0	No	No	No	No	No	No	No	No	No
18:00 - 19:00	115	23	156	0	0	No	No	No	No	No	No	No	No	No
Total	1801	643	2801	0	0	0	0	0	0	0	0	0	0	0

** Warrant 4 should not be applied where the nearest traffic signal or stop-sign control is < 300 ft, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Pedestrian Volume

15th % pedestrian speed < 3.5 ft/s		Pedestrian refuge present?	EB		WB	

Hours	Major Street Vehicular Volume (veh/h)			Major Street Pedestrian Volume (ped/h)			4A ** (100%)	4B ** (100%)
	EB	WB	Total	EB	WB	Total		
7:00 - 8:00	92	49	141	0	0	0	No	No
8:00 - 9:00	57	69	126	0	0	0	No	No
9:00 - 10:00	44	73	117	0	0	0	No	No
10:00 - 11:00	39	70	109	0	0	0	No	No
11:00 - 12:00	52	100	152	0	0	0	No	No
12:00 - 13:00	47	102	149	0	0	0	No	No
13:00 - 14:00	47	102	149	0	0	0	No	No
14:00 - 15:00	42	100	142	0	0	0	No	No
15:00 - 16:00	51	145	196	0	0	0	No	No
16:00 - 17:00	63	151	214	0	0	0	No	No
17:00 - 18:00	26	165	191	0	0	0	No	No
18:00 - 19:00	21	94	115	0	0	0	No	No
Totals	581	1220	1801	0	0	0	0	0

** Warrant 4 should not be applied where the nearest traffic signal or stop-sign control is < 300 ft, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Warrants

Warrant 1: Eight-Hour Vehicular Volume	
A. Minimum Vehicular Volumes (Both major approaches --and-- more critical minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- more critical minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- more critical minor approach)	
Warrant 2: Four-Hour Vehicular Volume	

Four-Hour Vehicular Volume (Both major approaches --and-- more critical minor approach)	
Warrant 3: Peak Hour	
A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- more critical minor approach)	
Warrant 4: Pedestrian Volume	
A. Four Hour Volumes --or--	
B. Peak-Hour Volumes	
Warrant 5: School Crossing	
Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	
Warrant 6: Coordinated Signal System	
Degree of Platooning (Predominant direction or both directions)	
Warrant 7: Crash Experience	
A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported Crash History --and--	
B1. Angle Crashes and Pedestrian Crashes within a 1-year Period (All Severities)	
B2. Angle Crashes and Pedestrian Crashes within a 1-year Period (Fatal-and-Injury)	
B3. Angle Crashes and Pedestrian Crashes within a 3-year Period (All Severities)	
B4. Angle Crashes and Pedestrian Crashes within a 3-year Period (Fatal-and-Injury)	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	
Warrant 8: Roadway Network	
A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	
Warrant 9: Grade Crossing	
A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

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HCS Warrants Report

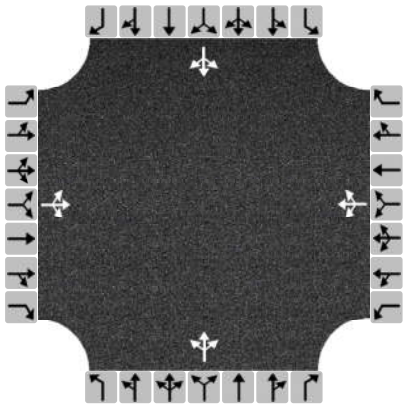
Project Information

Analyst	MJH	Date	2/24/2026
Agency	IMEG	Analysis Year	2026
Jurisdiction	Yellowstone County	Time Period Analyzed	2031 Background
Units	U.S. Customary	MUTCD Method	MUTCD 11 (2023)
Project Description	Shop House Acres Major Subd. - Intersection #1) King Ave. West & South 80th St. West		

General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7:00	Coordinated Signal System	No
Major Street Speed (mi/h)	0	Nearest Signal (ft)	0
Adequate Trials of Crash Exp. Alt.	No		

Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	0	1	0	0	1	0	0	1	0	0	1	0
Lane Usage		LTR			LTR			LTR			LTR	
Vehicle Volumes Averages (veh/h)	2	43	3	21	40	45	4	8	19	45	7	2
Pedestrian median refuge available	No			No			No			No		
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay Averages (s/veh)	0.5			1.6			9.3			10.5		
Delay Averages (veh-hrs)	0.0			0.0			0.1			0.2		

School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	No
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	1

Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)	-	Tractor-Trailer Trucks (%)	0

Volume Summary

Hours	Major Volume (veh/h)	Minor Volume (veh/h)	Total Volume (veh/h)	Peds/h	Gaps/h	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (80%)	4A ** (100%)	4B ** (100%)
7:00 - 8:00	147	115	299	0	0	No	No	No	No	No	No	No	No	No
8:00 - 9:00	131	47	209	0	0	No	No	No	No	No	No	No	No	No
9:00 - 10:00	121	45	188	0	0	No	No	No	No	No	No	No	No	No
10:00 - 11:00	113	58	202	0	0	No	No	No	No	No	No	No	No	No
11:00 - 12:00	159	46	243	0	0	No	No	No	No	No	No	No	No	No
12:00 - 13:00	162	44	240	0	0	No	No	No	No	No	No	No	No	No
13:00 - 14:00	156	52	228	0	0	No	No	No	No	No	No	No	No	No
14:00 - 15:00	147	58	238	0	0	No	No	No	No	No	No	No	No	No
15:00 - 16:00	204	52	292	0	0	No	No	No	No	No	No	No	No	No
16:00 - 17:00	223	59	318	0	0	No	No	No	No	No	No	No	No	No
17:00 - 18:00	199	60	307	0	0	No	No	No	No	No	No	No	No	No
18:00 - 19:00	120	24	163	0	0	No	No	No	No	No	No	No	No	No
Total	1882	660	2927	0	0	0	0	0	0	0	0	0	0	0

** Warrant 4 should not be applied where the nearest traffic signal or stop-sign control is < 300 ft, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Pedestrian Volume

15th % pedestrian speed < 3.5 ft/s		Pedestrian refuge present?	EB		WB	

Hours	Major Street Vehicular Volume (veh/h)			Major Street Pedestrian Volume (ped/h)			4A ** (100%)	4B ** (100%)
	EB	WB	Total	EB	WB	Total		
7:00 - 8:00	96	51	147	0	0	0	No	No
8:00 - 9:00	59	72	131	0	0	0	No	No
9:00 - 10:00	45	76	121	0	0	0	No	No
10:00 - 11:00	40	73	113	0	0	0	No	No
11:00 - 12:00	54	105	159	0	0	0	No	No
12:00 - 13:00	42	120	162	0	0	0	No	No
13:00 - 14:00	49	107	156	0	0	0	No	No
14:00 - 15:00	43	104	147	0	0	0	No	No
15:00 - 16:00	53	151	204	0	0	0	No	No
16:00 - 17:00	65	158	223	0	0	0	No	No
17:00 - 18:00	27	172	199	0	0	0	No	No
18:00 - 19:00	22	98	120	0	0	0	No	No
Totals	595	1287	1882	0	0	0	0	0

** Warrant 4 should not be applied where the nearest traffic signal or stop-sign control is < 300 ft, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Warrants

Warrant 1: Eight-Hour Vehicular Volume	
A. Minimum Vehicular Volumes (Both major approaches --and-- more critical minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- more critical minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- more critical minor approach)	
Warrant 2: Four-Hour Vehicular Volume	

Four-Hour Vehicular Volume (Both major approaches --and-- more critical minor approach)	
Warrant 3: Peak Hour	
A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- more critical minor approach)	
Warrant 4: Pedestrian Volume	
A. Four Hour Volumes --or--	
B. Peak-Hour Volumes	
Warrant 5: School Crossing	
Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	
Warrant 6: Coordinated Signal System	
Degree of Platooning (Predominant direction or both directions)	
Warrant 7: Crash Experience	
A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported Crash History --and--	
B1. Angle Crashes and Pedestrian Crashes within a 1-year Period (All Severities)	
B2. Angle Crashes and Pedestrian Crashes within a 1-year Period (Fatal-and-Injury)	
B3. Angle Crashes and Pedestrian Crashes within a 3-year Period (All Severities)	
B4. Angle Crashes and Pedestrian Crashes within a 3-year Period (Fatal-and-Injury)	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	
Warrant 8: Roadway Network	
A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	
Warrant 9: Grade Crossing	
A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

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HCS Warrants Report

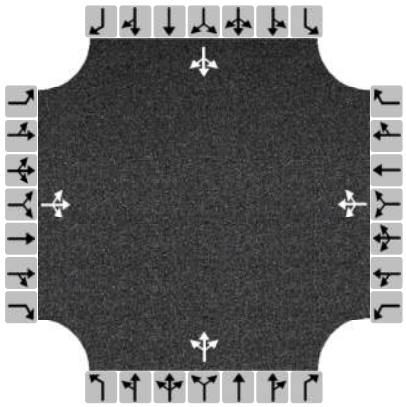
Project Information

Analyst	MJH	Date	2/24/2026
Agency	IMEG	Analysis Year	2026
Jurisdiction	Yellowstone County	Time Period Analyzed	2026 Background
Units	U.S. Customary	MUTCD Method	MUTCD 11 (2023)
Project Description	Shop House Acres Major Subd. - Intersection #2) Hesper Rd. & South 80th St. West		

General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7:00	Coordinated Signal System	No
Major Street Speed (mi/h)	45	Nearest Signal (ft)	0
Adequate Trials of Crash Exp. Alt.	No		

Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	0	1	0	0	1	0	0	1	0	0	1	0
Lane Usage		LTR			LTR			LTR			LTR	
Vehicle Volumes Averages (veh/h)	8	18	10	2	15	6	4	14	3	3	14	11
Pedestrian median refuge available	No			No			No			No		
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay Averages (s/veh)	1.9			0.8			9.4			9.2		
Delay Averages (veh-hrs)	0.0			0.0			0.1			0.1		

School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	No
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	5

Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)	-	Tractor-Trailer Trucks (%)	0

Volume Summary

Hours	Major Volume (veh/h)	Minor Volume (veh/h)	Total Volume (veh/h)	Peds/h	Gaps/h	1A (70%)	1A (56%)	1B (70%)	1B (56%)	2 (70%)	3A (70%)	3B (56%)	4A ** (70%)	4B ** (70%)
7:00 - 8:00	95	20	129	0	0	No	No	No	No	No	No	No	No	No
8:00 - 9:00	57	26	101	0	0	No	No	No	No	No	No	No	No	No
9:00 - 10:00	36	22	78	0	0	No	No	No	No	No	No	No	No	No
10:00 - 11:00	98	29	148	0	0	No	No	No	No	No	No	No	No	No
11:00 - 12:00	44	28	99	0	0	No	No	No	No	No	No	No	No	No
12:00 - 13:00	43	32	95	0	0	No	No	No	No	No	No	No	No	No
13:00 - 14:00	42	24	81	0	0	No	No	No	No	No	No	No	No	No
14:00 - 15:00	46	29	97	0	0	No	No	No	No	No	No	No	No	No
15:00 - 16:00	61	36	124	0	0	No	No	No	No	No	No	No	No	No
16:00 - 17:00	74	43	149	0	0	No	No	No	No	No	No	No	No	No
17:00 - 18:00	97	54	182	0	0	No	No	No	No	No	No	No	No	No
18:00 - 19:00	29	25	70	0	0	No	No	No	No	No	No	No	No	No
Total	722	368	1353	0	0	0	0	0	0	0	0	0	0	0

** Warrant 4 should not be applied where the nearest traffic signal or stop-sign control is < 300 ft, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Pedestrian Volume

15th % pedestrian speed < 3.5 ft/s		Pedestrian refuge present?	EB		WB	

Hours	Major Street Vehicular Volume (veh/h)			Major Street Pedestrian Volume (ped/h)			4A ** (70%)	4B ** (70%)
	EB	WB	Total	EB	WB	Total		
7:00 - 8:00	82	13	95	0	0	0	No	No
8:00 - 9:00	38	19	57	0	0	0	No	No
9:00 - 10:00	22	14	36	0	0	0	No	No
10:00 - 11:00	84	14	98	0	0	0	No	No
11:00 - 12:00	21	23	44	0	0	0	No	No
12:00 - 13:00	21	22	43	0	0	0	No	No
13:00 - 14:00	21	21	42	0	0	0	No	No
14:00 - 15:00	28	18	46	0	0	0	No	No
15:00 - 16:00	28	33	61	0	0	0	No	No
16:00 - 17:00	33	41	74	0	0	0	No	No
17:00 - 18:00	44	53	97	0	0	0	No	No
18:00 - 19:00	16	13	29	0	0	0	No	No
Totals	438	284	722	0	0	0	0	0

** Warrant 4 should not be applied where the nearest traffic signal or stop-sign control is < 300 ft, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Warrants

Warrant 1: Eight-Hour Vehicular Volume	
A. Minimum Vehicular Volumes (Both major approaches --and-- more critical minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- more critical minor approach) --or--	
56% Vehicular --and-- Interruption Volumes (Both major approaches --and-- more critical minor approach)	
Warrant 2: Four-Hour Vehicular Volume	

Four-Hour Vehicular Volume (Both major approaches --and-- more critical minor approach)	
Warrant 3: Peak Hour	
A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- more critical minor approach)	
Warrant 4: Pedestrian Volume	
A. Four Hour Volumes --or--	
B. Peak-Hour Volumes	
Warrant 5: School Crossing	
Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	
Warrant 6: Coordinated Signal System	
Degree of Platooning (Predominant direction or both directions)	
Warrant 7: Crash Experience	
A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported Crash History --and--	
B1. Angle Crashes and Pedestrian Crashes within a 1-year Period (All Severities)	
B2. Angle Crashes and Pedestrian Crashes within a 1-year Period (Fatal-and-Injury)	
B3. Angle Crashes and Pedestrian Crashes within a 3-year Period (All Severities)	
B4. Angle Crashes and Pedestrian Crashes within a 3-year Period (Fatal-and-Injury)	
C. 56% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	
Warrant 8: Roadway Network	
A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	
Warrant 9: Grade Crossing	
A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

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HCS Warrants Report

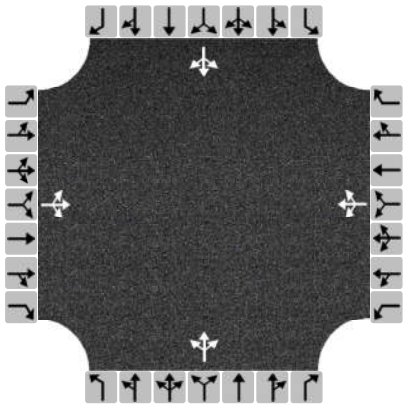
Project Information

Analyst	MJH	Date	2/24/2026
Agency	IMEG	Analysis Year	2026
Jurisdiction	Yellowstone County	Time Period Analyzed	2031 Background
Units	U.S. Customary	MUTCD Method	MUTCD 11 (2023)
Project Description	Shop House Acres Major Subd. - Intersection #2) Hesper Rd. & South 80th St. West		

General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7:00	Coordinated Signal System	No
Major Street Speed (mi/h)	45	Nearest Signal (ft)	0
Adequate Trials of Crash Exp. Alt.	No		

Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	0	1	0	0	1	0	0	1	0	0	1	0
Lane Usage		LTR			LTR			LTR			LTR	
Vehicle Volumes Averages (veh/h)	10	22	6	2	18	7	5	17	4	4	18	14
Pedestrian median refuge available	No			No			No			No		
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay Averages (s/veh)	1.9			0.8			9.5			9.3		
Delay Averages (veh-hrs)	0.0			0.0			0.1			0.1		

School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	No
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	5

Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)	-	Tractor-Trailer Trucks (%)	0

Volume Summary

Hours	Major Volume (veh/h)	Minor Volume (veh/h)	Total Volume (veh/h)	Peds/h	Gaps/h	1A (70%)	1A (56%)	1B (70%)	1B (56%)	2 (70%)	3A (70%)	3B (56%)	4A ** (70%)	4B ** (70%)
7:00 - 8:00	117	25	159	0	0	No	No	No	No	No	No	No	No	No
8:00 - 9:00	70	32	124	0	0	No	No	No	No	No	No	No	No	No
9:00 - 10:00	44	28	97	0	0	No	No	No	No	No	No	No	No	No
10:00 - 11:00	46	36	108	0	0	No	No	No	No	No	No	No	No	No
11:00 - 12:00	55	35	124	0	0	No	No	No	No	No	No	No	No	No
12:00 - 13:00	53	40	117	0	0	No	No	No	No	No	No	No	No	No
13:00 - 14:00	52	30	100	0	0	No	No	No	No	No	No	No	No	No
14:00 - 15:00	56	36	120	0	0	No	No	No	No	No	No	No	No	No
15:00 - 16:00	76	45	155	0	0	No	No	No	No	No	No	No	No	No
16:00 - 17:00	92	54	185	0	0	No	No	No	No	No	No	No	No	No
17:00 - 18:00	121	67	227	0	0	No	No	No	No	No	No	No	No	No
18:00 - 19:00	34	31	85	0	0	No	No	No	No	No	No	No	No	No
Total	816	459	1601	0	0	0	0	0	0	0	0	0	0	0

** Warrant 4 should not be applied where the nearest traffic signal or stop-sign control is < 300 ft, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Pedestrian Volume

15th % pedestrian speed < 3.5 ft/s		Pedestrian refuge present?	EB		WB	

Hours	Major Street Vehicular Volume (veh/h)			Major Street Pedestrian Volume (ped/h)			4A ** (70%)	4B ** (70%)
	EB	WB	Total	EB	WB	Total		
7:00 - 8:00	102	15	117	0	0	0	No	No
8:00 - 9:00	47	23	70	0	0	0	No	No
9:00 - 10:00	27	17	44	0	0	0	No	No
10:00 - 11:00	29	17	46	0	0	0	No	No
11:00 - 12:00	27	28	55	0	0	0	No	No
12:00 - 13:00	26	27	53	0	0	0	No	No
13:00 - 14:00	26	26	52	0	0	0	No	No
14:00 - 15:00	34	22	56	0	0	0	No	No
15:00 - 16:00	35	41	76	0	0	0	No	No
16:00 - 17:00	41	51	92	0	0	0	No	No
17:00 - 18:00	55	66	121	0	0	0	No	No
18:00 - 19:00	19	15	34	0	0	0	No	No
Totals	468	348	816	0	0	0	0	0

** Warrant 4 should not be applied where the nearest traffic signal or stop-sign control is < 300 ft, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Warrants

Warrant 1: Eight-Hour Vehicular Volume	
A. Minimum Vehicular Volumes (Both major approaches --and-- more critical minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- more critical minor approach) --or--	
56% Vehicular --and-- Interruption Volumes (Both major approaches --and-- more critical minor approach)	
Warrant 2: Four-Hour Vehicular Volume	

Four-Hour Vehicular Volume (Both major approaches --and-- more critical minor approach)	
Warrant 3: Peak Hour	
A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- more critical minor approach)	
Warrant 4: Pedestrian Volume	
A. Four Hour Volumes --or--	
B. Peak-Hour Volumes	
Warrant 5: School Crossing	
Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	
Warrant 6: Coordinated Signal System	
Degree of Platooning (Predominant direction or both directions)	
Warrant 7: Crash Experience	
A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported Crash History --and--	
B1. Angle Crashes and Pedestrian Crashes within a 1-year Period (All Severities)	
B2. Angle Crashes and Pedestrian Crashes within a 1-year Period (Fatal-and-Injury)	
B3. Angle Crashes and Pedestrian Crashes within a 3-year Period (All Severities)	
B4. Angle Crashes and Pedestrian Crashes within a 3-year Period (Fatal-and-Injury)	
C. 56% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	
Warrant 8: Roadway Network	
A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	
Warrant 9: Grade Crossing	
A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

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Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX F

Turn-Lane Warrant Analysis

2026 Existing Traffic Volumes - Right Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary									
Intersection	Approach	AM				PM			
		Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)	Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)
King Ave. West & South 80th St. West	WB	65	25	90	N	172	80	90	N
	EB	88	4	90	N	56	6	90	N

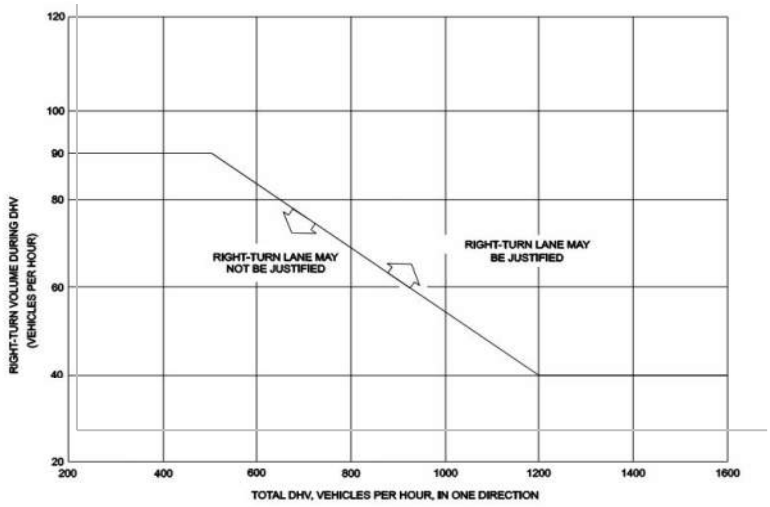
2026 Existing Traffic Volumes - Left Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary										
Intersection	Approach	AM					PM			
		Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)	Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)
King Ave. West & South 80th St. West	WB	65	14	21.5%	88	N	172	34	19.8%	56	N
	EB	88	3	3.4%	65	N	56	6	10.7%	172	N

2031 Existing Traffic Volumes - Right Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary									
Intersection	Approach	AM				PM			
		Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)	Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)
King Ave. West & South 80th St. West	WB	70	27	90	N	181	84	90	N
	EB	94	5	90	N	60	7	90	N

2031 Existing Traffic Volumes - Left Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary										
Intersection	Approach	AM					PM			
		Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)	Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)
King Ave. West & South 80th St. West	WB	70	15	21.4%	94	N	181	36	19.9%	60	N
	EB	94	4	4.3%	70	N	60	7	11.7%	181	N

2031 Total Traffic Volumes - Right Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary									
Intersection	Approach	AM				PM			
		Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)	Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)
King Ave. West & South 80th St. West	WB	71	27	90	N	194	84	90	N
	EB	99	10	90	N	62	9	90	N

2031 Total Traffic Volumes - Left Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary										
Intersection	Approach	AM					PM			
		Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)	Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)
King Ave. West & South 80th St. West	WB	71	16	22.5%	99	N	194	49	25.3%	62	N
	EB	99	4	4.0%	71	N	62	7	11.3%	194	N



Note: Figure is only applicable on highways with a design speed of 50 mph (80 km/h) or greater.

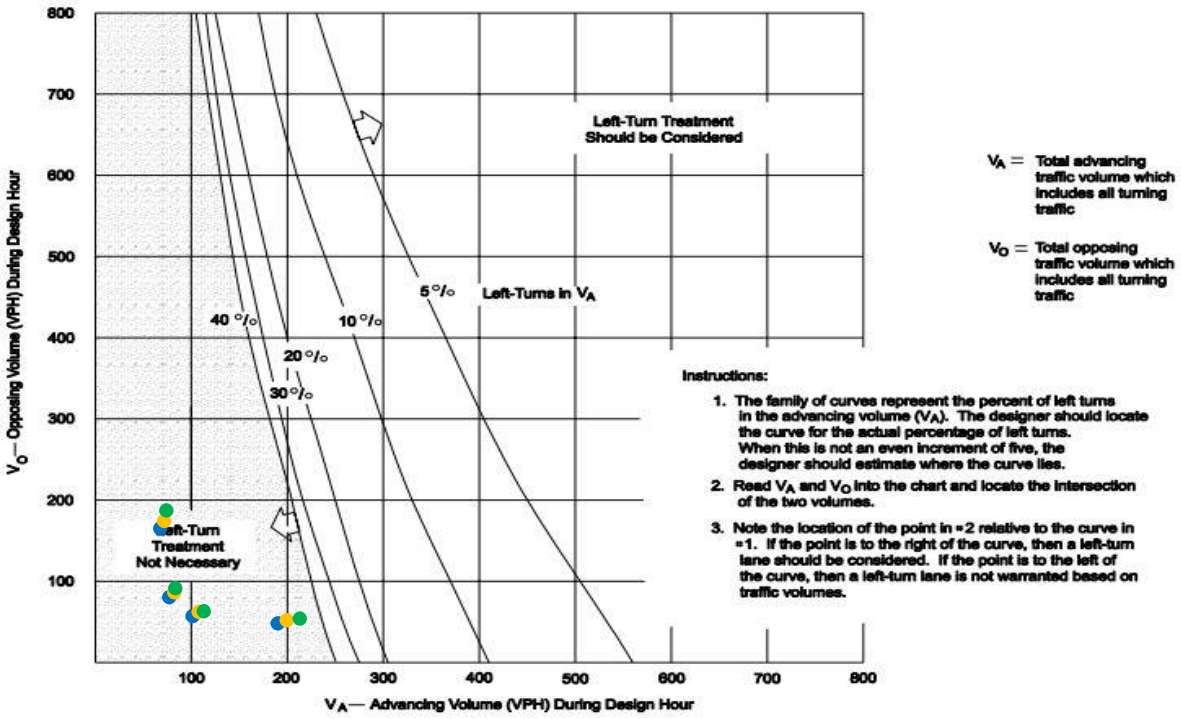
GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 4-LANE HIGHWAYS

Figure 28.4B

King Ave. West & South 80th St. West

2026 BACKGROUND TRAFFIC
2031 BACKGROUND TRAFFIC
2031 TOTAL TRAFFIC

Note: Points outside the limits of the chart are not plotted and need to be verified if a right-turn may be needed



VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (60 MPH)
(US Customary)

Figure 28.4C

King Ave. West & South 80th St. West

2026 BACKGROUND TRAFFIC
2031 BACKGROUND TRAFFIC
2031 TOTAL TRAFFIC

Note: Points outside the limits of the chart are not plotted and are assumed to indicate a left-turn may be needed

2026 Existing Traffic Volumes - Right Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary									
Intersection	Approach	AM				PM			
		Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)	Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)
Hesper Road & South 80th St. West	WB	16	3	118	N	53	13	113	N
	EB	85	13	109	N	42	8	114	N

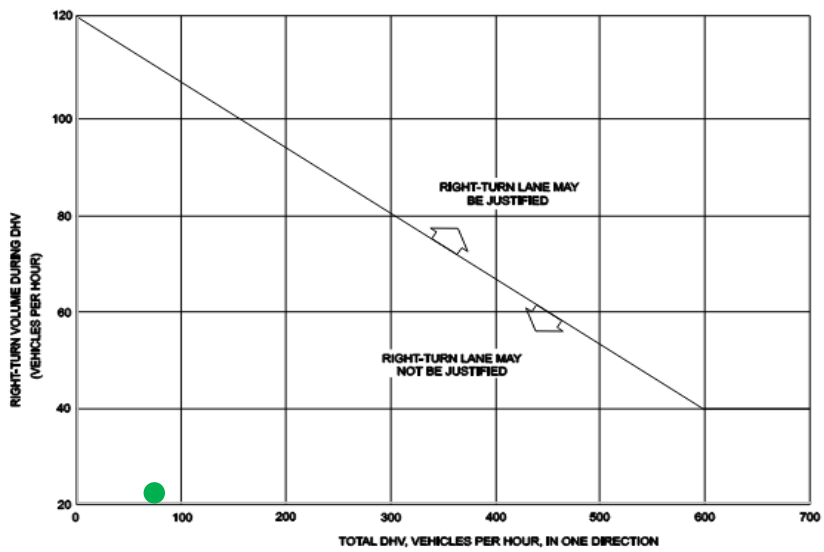
2026 Existing Traffic Volumes - Left Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary										
Intersection	Approach	AM					PM				
		Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)	Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)
Hesper Road & South 80th St. West	WB	16	2	12.5%	85	N	53	6	11.3%	42	N
	EB	85	22	25.9%	16	N	42	13	31.0%	53	N

2031 Existing Traffic Volumes - Right Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary									
Intersection	Approach	AM				PM			
		Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)	Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)
Hesper Road & South 80th St. West	WB	21	4	117	N	68	17	111	N
	EB	108	17	106	N	54	10	113	N

2031 Existing Traffic Volumes - Left Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary										
Intersection	Approach	AM					PM				
		Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)	Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)
Hesper Road & South 80th St. West	WB	21	3	14.3%	108	N	68	8	11.8%	54	N
	EB	108	28	25.9%	21	N	54	17	31.5%	68	N

2031 Total Traffic Volumes - Right Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary									
Intersection	Approach	AM				PM			
		Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)	Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)
Hesper Road & South 80th St. West	WB	22	5	117	N	73	22	110	N
	EB	111	17	105	N	59	10	112	N

2031 Total Traffic Volumes - Left Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary										
Intersection	Approach	AM					PM				
		Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)	Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)
Hesper Road & South 80th St. West	WB	22	3	13.6%	111	N	73	8	11.0%	59	N
	EB	111	31	27.9%	22	N	59	22	37.3%	73	N

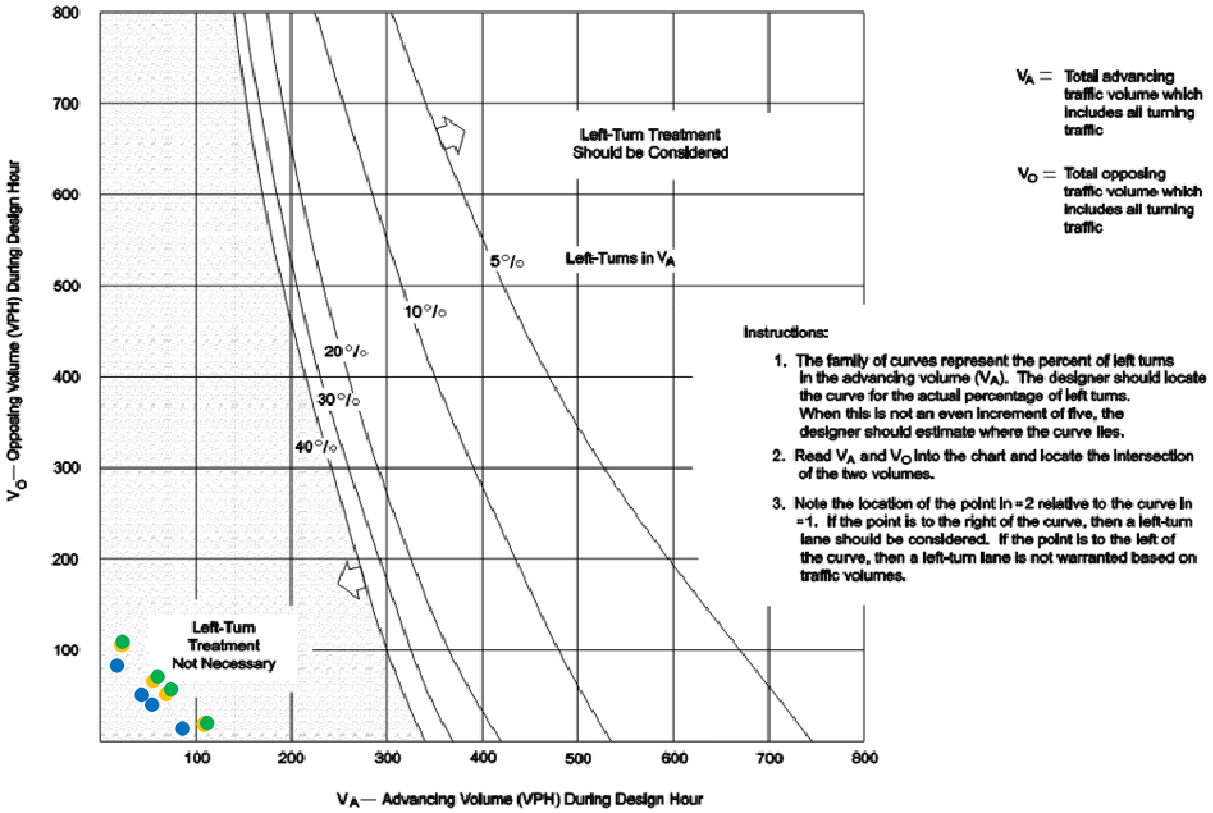


Note: For highways with a design speed below 50 mph (80 km/h) with a DHV < 300 and where right turns are > 40, an adjustment should be used. To read the vertical axis of the chart, subtract 20 from the actual number of right turns.

Hesper Road & South 80th St. West

2026 BACKGROUND TRAFFIC
2031 BACKGROUND TRAFFIC
2031 TOTAL TRAFFIC

Note: Points outside the limits of the chart are not plotted and need to be verified if a right-turn may be needed



VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)
(US Customary)

Figure 28.4F

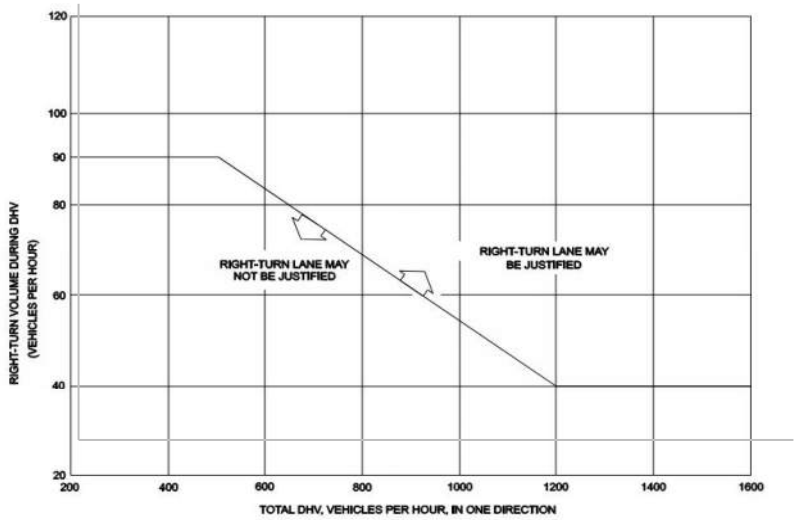
Hesper Road & South 80th St. West

2026 BACKGROUND TRAFFIC
2031 BACKGROUND TRAFFIC
2031 TOTAL TRAFFIC

Note: Points outside the limits of the chart are not plotted and are assumed to indicate a left-turn may be needed

2031 Total Traffic Volumes - Right Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary									
Intersection	Approach	AM				PM			
		Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)	Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)
North Access & South 80th St. West	NB	61	0	90	N	70	0	90	N
	SB	36	4	90	N	97	10	90	N

2031 Total Traffic Volumes - Left Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary											
Intersection	Approach	AM					PM				
		Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)	Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)
North Access & South 80th St. West	NB	61	3	4.9%	36	N	70	9	12.9%	97	N
	SB	36	0	0.0%	61	N	97	0	0.0%	70	N



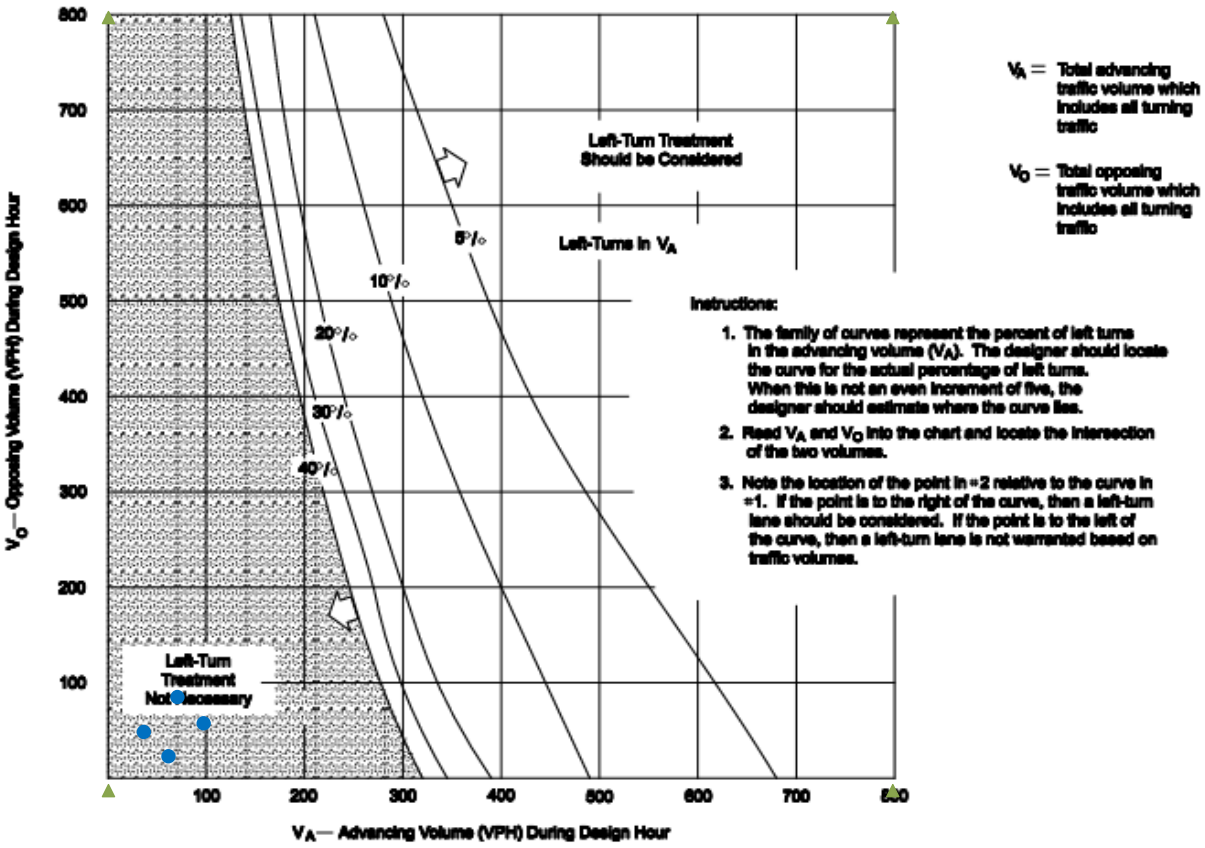
Note: Figure is only applicable on highways with a design speed of 50 mph (80 km/h) or greater.

GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 4-LANE HIGHWAYS

Figure 28.4B

North Access & South 80th St. West

2031 TOTAL TRAFFIC [redacted] Note: Points outside the limits of the chart are not plotted and need to be verified if a right-turn may be needed



VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (50 MPH) (US Customary)

Figure 28.4E

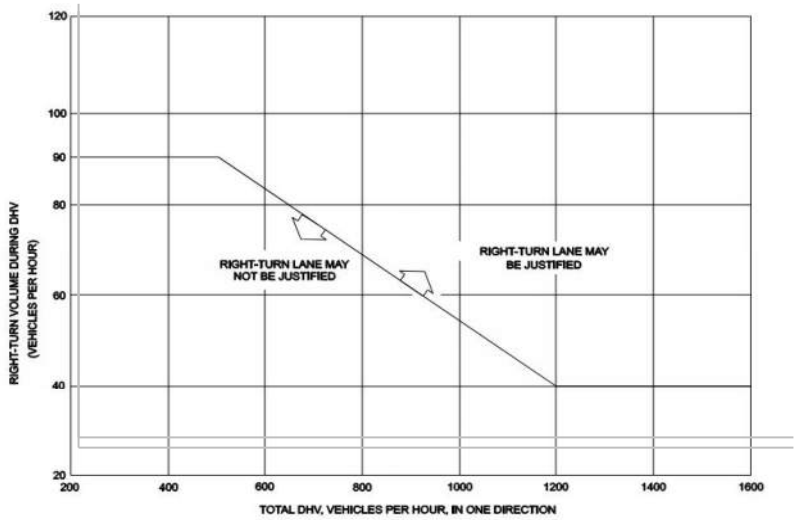
North Access & South 80th St. West

2031 TOTAL TRAFFIC

Note: Points outside the limits of the chart are not plotted and are assumed to indicate a left-turn may be needed

2031 Total Traffic Volumes - Right Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary									
Intersection	Approach	AM				PM			
		Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)	Total DHV	RT Vol During DHV	Required RT Vol for Warranted Lane	Warranted RT Lane (Y/N)
South Access & South 80th St. West	NB	51	0	90	N	75	0	90	N
	SB	38	4	90	N	94	10	90	N

2031 Total Traffic Volumes - Left Turn Lanes at Unsignalized Intersections on 2-Lane Highways Summary											
Intersection	Approach	AM					PM				
		Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)	Va = Tot Advancing Traffic Vol	Va(L) = Tot LT vol in advancing traffic	% LT in Va	Vo = Tot opposing traffic Vol	Warranted LT Lane (Y/N)
South Access & South 80th St. West	NB	51	2	3.9%	38	N	75	9	12.0%	94	N
	SB	38	0	0.0%	51	N	94	0	0.0%	75	N



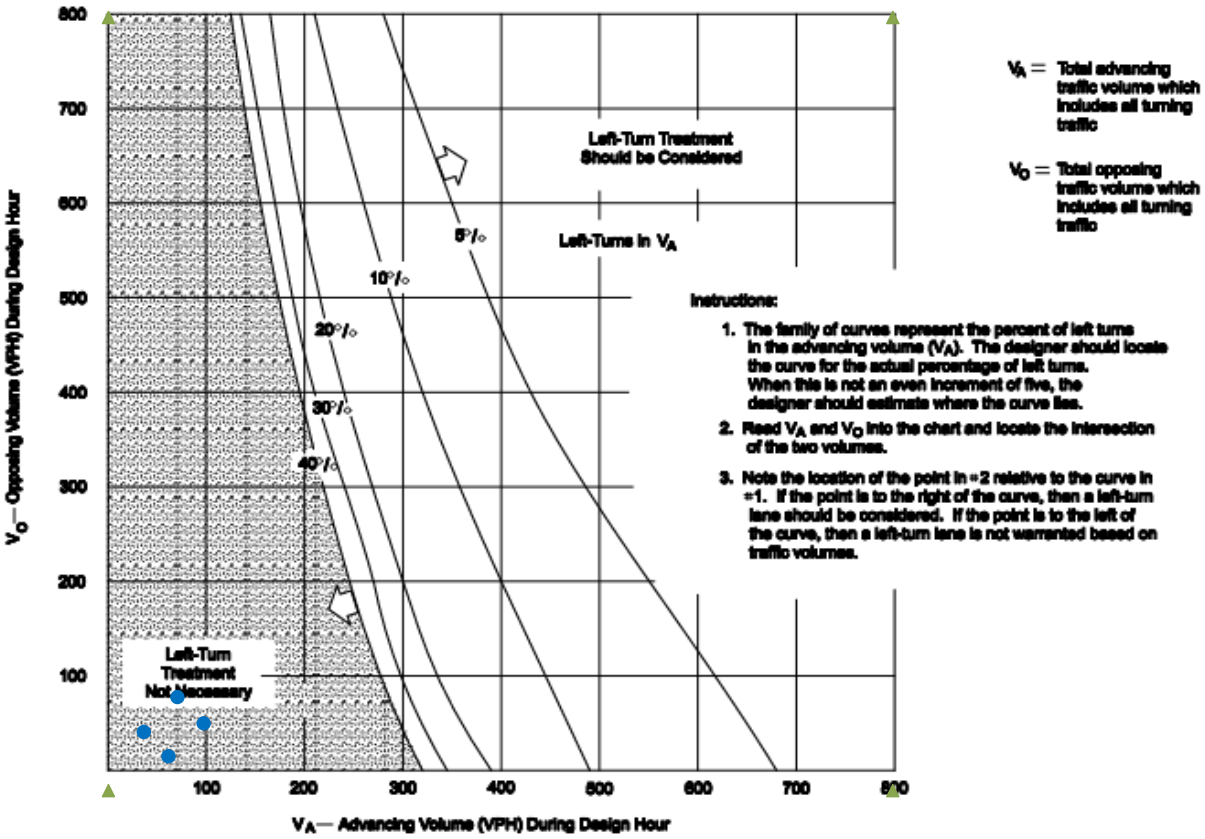
Note: Figure is only applicable on highways with a design speed of 50 mph (80 km/h) or greater.

GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 4-LANE HIGHWAYS

Figure 28.4B

South Access & South 80th St. West

2031 TOTAL TRAFFIC [redacted] Note: Points outside the limits of the chart are not plotted and need to be verified if a right-turn may be needed



VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (50 MPH)
(US Customary)

Figure 28.4E

South Access & South 80th St. West

2031 TOTAL TRAFFIC

Note: Points outside the limits of the chart are not plotted and are assumed to indicate a left-turn may be needed

Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX G

2024 Montana Department of Transportation

Seasonal Adjustment Factors

&

Appendix E of the Road Design Manual Produced by MDT

Montana Department of Transportation

Seasonal Factors By Day and Month for 1/1/2024 - 12/31/2024

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
REC_MA	Jan	2.436	2.279	2.183	2.374	2.395	2.105	2.203
	Feb	2.307	2.139	2.327	2.363	1.973	1.77	1.911
	Mar	1.847	1.852	1.818	1.708	1.664	1.499	1.741
	Apr	1.298	1.429	1.425	1.433	1.338	1.107	1.34
	May	0.917	0.923	1.036	1.102	1.01	0.822	0.919
	Jun	0.568	0.768	0.766	0.7	0.64	0.551	0.607
	Jul	0.452	0.589	0.612	0.573	0.552	0.471	0.477
	Aug	0.538	0.695	0.751	0.722	0.643	0.55	0.552
	Sep	0.646	0.726	0.813	0.807	0.774	0.665	0.672
	Oct	0.935	1.146	1.125	1.064	1.031	0.887	1.022
	Nov	1.694	1.704	1.694	1.601	1.647	1.419	1.56
	Dec	2.021	2.154	2.156	2.179	1.862	1.702	1.832

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
REC_PA	Jan	2.574	2.17	2.187	2.204	2.226	2.081	2.312
	Feb	2.047	2.052	2.159	1.995	1.867	1.641	1.816
	Mar	1.917	1.964	2.084	1.907	1.835	1.621	1.836
	Apr	1.482	1.566	1.595	1.633	1.554	1.413	1.441
	May	0.881	0.923	0.974	1.066	0.949	0.809	0.859
	Jun	0.622	0.684	0.676	0.636	0.605	0.558	0.632
	Jul	0.522	0.559	0.573	0.55	0.543	0.501	0.521
	Aug	0.58	0.616	0.652	0.645	0.598	0.555	0.567
	Sep	0.658	0.682	0.7	0.711	0.68	0.619	0.661
	Oct	1.003	1.138	1.119	1.109	1.081	0.9	0.969
	Nov	2.084	1.961	2.105	1.869	2.049	1.653	1.926
	Dec	2.165	2.105	2.151	2.383	2.011	1.809	2.004

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
RMA_RMC_12	Jan	1.841	1.546	1.474	1.442	1.492	1.436	1.606
	Feb	1.624	1.46	1.48	1.459	1.319	1.186	1.341
	Mar	1.396	1.269	1.269	1.202	1.155	1.05	1.256
	Apr	1.203	1.121	1.123	1.13	1.056	0.963	1.124
	May	1.001	0.968	0.993	1.008	0.939	0.819	0.927
	Jun	0.802	0.876	0.888	0.834	0.802	0.708	0.809
	Jul	0.713	0.771	0.803	0.745	0.722	0.683	0.711
	Aug	0.79	0.851	0.871	0.838	0.78	0.69	0.759
	Sep	0.862	0.857	0.898	0.887	0.826	0.739	0.837
	Oct	1.015	1.02	0.999	0.979	0.938	0.827	0.98
	Nov	1.277	1.15	1.128	1.066	1.137	0.973	1.156
	Dec	1.454	1.336	1.357	1.412	1.236	1.127	1.337

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
RMA_RMC_345	Jan	2.107	1.429	1.165	1.188	1.183	1.23	1.74
	~~Feb~~	~~1.8~~	~~1.212~~	~~1.19~~	~~1.187~~	1.123	1.144	1.483
	Mar	1.981	1.211	1.082	1.057	1.062	1.104	1.511
	Apr	1.437	1.008	0.965	0.98	0.933	0.926	1.209
	May	1.226	0.916	0.859	0.84	0.849	0.812	0.991
	Jun	1.173	0.785	0.852	0.772	0.744	0.773	1.029
	Jul	1.198	0.804	0.791	0.796	0.824	0.812	1.056
	Aug	1.185	0.852	0.829	0.792	0.786	0.774	1.043
	Sep	1.321	0.941	0.857	0.869	0.836	0.824	1.094
	Oct	1.291	0.853	0.868	0.848	0.834	0.814	1.08
	Nov	1.473	0.946	0.95	0.943	0.967	0.907	1.249
	Dec	1.738	1.117	1.193	1.214	1.087	1.021	1.319

Seasonal Factors By Day and Month for 1/1/2024 - 12/31/2024

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
RPA_1	**Jan**	2.093	1.571	1.428	1.47	1.564	1.462	1.822
	Feb	1.747	1.4	1.367	1.351	1.267	1.15	1.443
	Mar	1.496	1.281	1.244	1.183	1.151	1.065	1.34
	Apr	1.241	1.134	1.123	1.125	1.059	0.944	1.119
	May	1.029	0.978	0.98	1.004	0.923	0.775	0.946
	Jun	0.808	0.867	0.873	0.827	0.776	0.684	0.825
	Jul	0.67	0.723	0.763	0.71	0.692	0.619	0.688
	Aug	0.769	0.786	0.834	0.786	0.726	0.657	0.764
	Sep	0.889	0.879	0.89	0.882	0.833	0.729	0.843
	Oct	1.091	1.039	1.016	0.994	0.932	0.835	1.027
	Nov	1.436	1.177	1.162	1.087	1.205	1.035	1.27
	Dec	1.536	1.277	1.302	1.405	1.208	1.108	1.422

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
RPA_2	**Jan**	1.677	1.412	1.266	1.26	1.263	1.261	1.445
	Feb	1.537	1.285	1.31	1.29	1.191	1.113	1.355
	Mar	1.275	1.193	1.153	1.085	1.05	0.973	1.148
	Apr	1.139	1.099	1.11	1.109	1.046	0.95	1.082
	May	1.029	0.986	1.002	1.011	0.937	0.82	0.944
	Jun	0.862	0.926	0.907	0.846	0.822	0.741	0.847
	Jul	0.829	0.861	0.867	0.821	0.836	0.769	0.842
	Aug	0.859	0.901	0.905	0.879	0.832	0.731	0.842
	Sep	0.928	0.911	0.937	0.919	0.858	0.752	0.837
	Oct	0.938	1.003	1.002	0.934	0.913	0.784	0.876
	Nov	1.172	1.101	1.068	0.992	1.059	0.932	1.08
	Dec	1.297	1.226	1.27	1.287	1.145	1.047	1.139

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
RPA_3	**Jan**	2.024	1.567	1.385	1.717	1.573	1.462	1.729
	Feb	1.777	1.445	1.537	1.573	1.323	1.174	1.431
	Mar	1.46	1.258	1.256	1.154	1.102	1.055	1.363
	Apr	1.165	1.054	1.101	1.19	1.011	0.881	1.104
	May	1.009	0.925	1.015	1.029	0.911	0.783	0.94
	Jun	0.804	0.845	0.887	0.822	0.749	0.705	0.859
	Jul	0.729	0.746	0.786	0.742	0.78	0.701	0.82
	Aug	0.794	0.786	0.856	0.844	0.748	0.685	0.828
	Sep	0.932	0.879	0.908	0.924	0.84	0.752	0.884
	Oct	1.031	0.96	0.998	0.96	0.88	0.795	0.976
	Nov	1.219	1.076	1.145	1.012	1.102	0.966	1.179
	Dec	1.354	1.283	1.345	1.415	1.16	1.037	1.244

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
RPA_45	**Jan**	1.825	1.565	1.335	1.385	1.438	1.394	1.719
	Feb	1.604	1.369	1.377	1.366	1.28	1.204	1.456
	Mar	1.535	1.307	1.185	1.112	1.091	1.047	1.378
	Apr	1.261	1.097	1.066	3.263	0.994	0.924	1.234
	May	1.008	0.937	0.955	0.967	0.883	0.812	0.956
	Jun	0.86	0.875	0.905	0.858	0.801	0.781	0.913
	Jul	0.808	0.814	0.831	0.792	0.81	0.755	0.867
	Aug	0.865	0.845	0.864	0.842	0.801	0.729	0.881
	Sep	0.935	0.875	0.871	0.877	0.826	0.744	0.892
	Oct	0.969	0.918	0.911	0.896	0.85	0.756	0.964
	Nov	1.18	1.059	1.082	0.982	1.074	0.925	1.122
	Dec	1.378	1.323	1.31	1.361	1.161	1.046	1.222

Seasonal Factors By Day and Month for 1/1/2024 - 12/31/2024

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
RURAL INNER INTERSTATE	**Jan**	1.643	1.477	1.38	1.381	1.379	1.336	1.496
	Feb	1.385	1.383	1.388	1.368	1.251	1.143	1.319
	Mar	1.145	1.243	1.208	1.146	1.059	0.984	1.105
	Apr	1.034	1.434	1.086	1.106	1	0.904	0.984
	May	0.965	0.992	1.032	1.032	0.927	0.799	0.889
	Jun	0.796	0.927	0.927	0.864	0.795	0.716	0.84
	Jul	0.716	1.025	0.832	0.843	0.781	0.712	0.767
	Aug	0.759	0.869	0.887	0.841	0.78	0.702	0.78
	Sep	0.861	0.896	0.938	0.912	0.852	0.736	0.807
	Oct	0.906	1.019	1.019	0.964	0.918	0.786	0.908
	Nov	1.135	1.224	1.17	0.995	1.23	0.986	1.052
	Dec	1.226	1.307	1.328	1.344	1.164	1.033	1.07

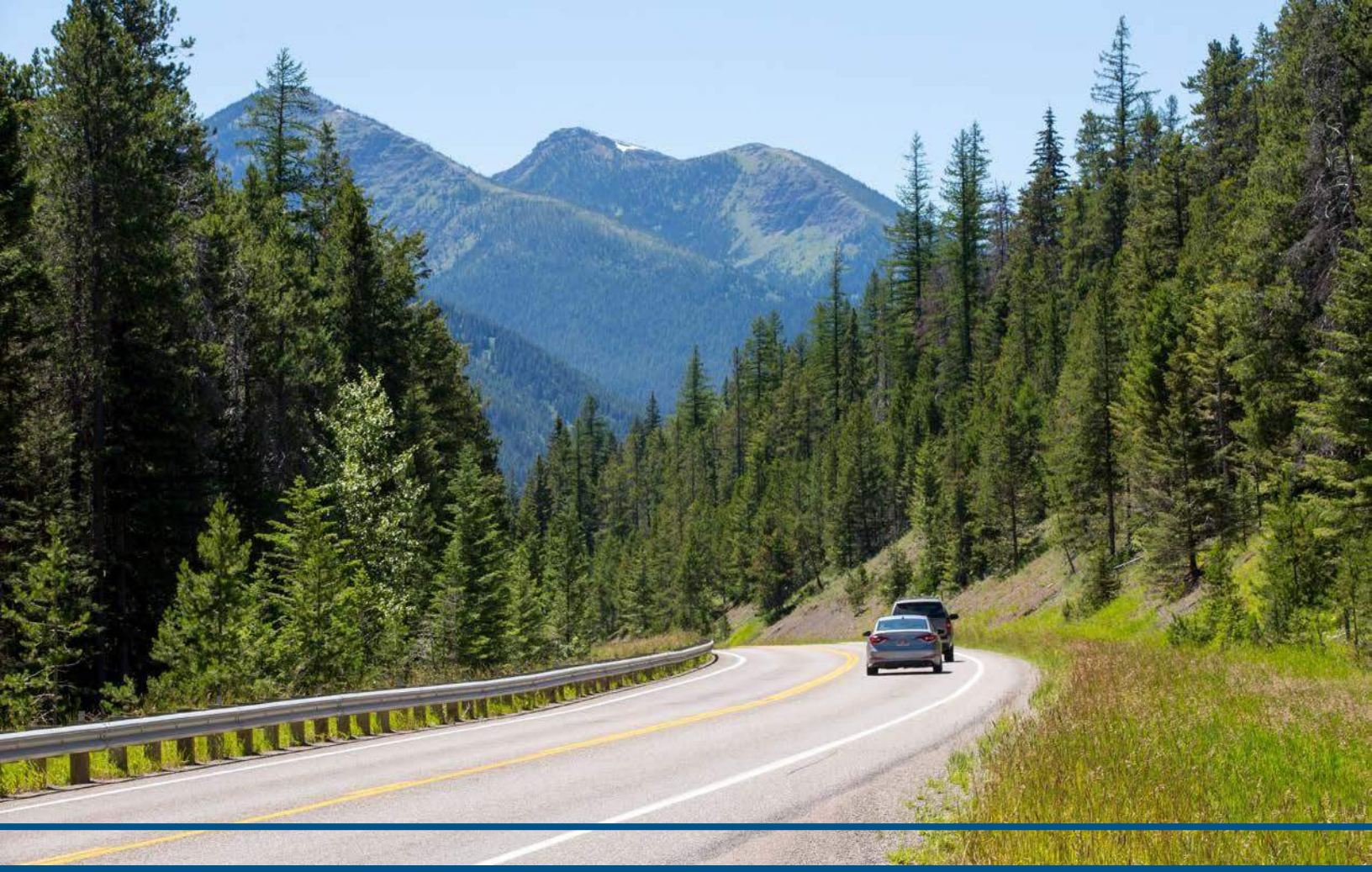
Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
RURAL OUTER INTERSTATE	**Jan**	1.63	1.514	1.413	1.422	1.48	1.418	1.558
	Feb	1.438	1.405	1.418	1.338	1.251	1.199	1.348
	Mar	1.229	1.26	1.216	1.138	1.052	1.004	1.166
	Apr	1.08	1.081	1.088	1.075	1.011	0.936	1.092
	May	0.961	0.953	1.019	0.995	0.909	0.824	0.994
	Jun	0.825	0.874	0.917	0.849	0.795	0.745	0.854
	Jul	0.721	0.769	0.821	0.761	0.792	0.732	0.78
	Aug	0.77	0.823	0.861	0.819	0.755	0.717	0.803
	Sep	0.895	0.898	0.935	0.918	0.857	0.8	0.921
	Oct	0.954	1.006	1.026	0.982	0.914	0.84	1.019
	Nov	1.193	1.218	1.188	1.096	1.222	1.033	1.134
	Dec	1.213	1.357	1.413	1.499	1.222	1.116	1.202

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
UI	**Jan**	1.777	1.344	1.146	1.155	1.192	1.191	1.457
	Feb	1.581	1.207	1.179	1.176	1.107	1.074	1.291
	Mar	1.456	1.124	1.067	1.01	0.994	0.945	1.175
	Apr	1.256	1.011	0.975	0.971	0.935	0.888	1.093
	May	1.17	1.004	0.976	0.958	0.922	0.841	1.031
	Jun	1.03	0.908	0.889	0.842	0.822	0.801	0.963
	Jul	0.974	0.825	0.824	0.794	0.859	0.804	0.943
	Aug	1.015	0.861	0.858	0.836	0.847	0.777	0.95
	Sep	1.124	0.93	0.894	0.889	0.847	0.802	0.963
	Oct	1.158	0.954	0.925	0.898	0.882	0.824	1.03
	Nov	1.368	1.045	1.009	0.973	1.067	0.961	1.173
	Dec	1.381	1.101	1.112	1.177	1.023	0.953	1.139

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
UPA	**Jan**	1.801	1.213	1.037	1.037	1.083	1.086	1.431
	Feb	1.62	1.079	1.016	1.01	1.006	0.962	1.241
	Mar	1.534	1.021	0.976	0.949	0.946	0.916	1.204
	Apr	1.388	0.95	0.915	0.912	0.893	0.871	1.098
	May	1.307	0.997	0.896	0.893	0.876	0.831	1.065
	Jun	1.217	0.896	0.863	0.847	0.837	0.822	1.039
	Jul	1.204	0.861	0.841	0.827	0.908	0.856	1.064
	Aug	1.223	0.889	0.867	0.85	0.836	0.824	1.055
	Sep	1.298	0.98	0.886	0.88	0.864	0.837	1.067
	Oct	1.348	0.953	0.905	0.896	0.888	0.858	1.096
	Nov	1.485	0.986	0.943	0.94	1.063	0.949	1.235
	Dec	1.529	1.002	1.013	1.111	0.979	0.933	1.217

Seasonal Factors By Day and Month for 1/1/2024 - 12/31/2024

Seasonal Factors								
Group	**Month**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
UMA_UC	**Jan**	1.765	1.187	1.005	1.005	1.03	1.057	1.47
	Feb	1.677	1.112	1.031	1.02	0.998	0.994	1.368
	Mar	1.594	1.02	0.969	0.957	0.969	0.966	1.299
	Apr	1.356	0.915	0.874	0.882	0.869	0.878	1.146
	May	1.241	0.922	0.847	0.841	0.839	0.813	1.048
	Jun	1.219	0.895	0.847	0.819	0.818	0.848	1.069
	Jul	1.256	0.877	0.845	0.842	0.917	0.898	1.148
	Aug	1.257	0.905	0.874	0.861	0.851	0.866	1.132
	Sep	1.321	0.947	0.861	0.855	0.845	0.842	1.11
	Oct	1.321	0.917	0.88	0.872	0.87	0.872	1.16
	Nov	1.51	0.969	0.933	0.934	1.034	0.98	1.315
	Dec	1.552	1.022	1.03	1.109	0.998	0.962	1.293



ROAD DESIGN MANUAL

September 2016

MONTANA DEPARTMENT OF TRANSPORTATION

Appendix E

Level of Service Criteria

The design team should coordinate with the Traffic and Safety Bureau for all traffic operational analyses conducted for the project and additional traffic operational information that may be needed for the design. The objective of conducting traffic operations analyses is to design the highway mainline and intersections to accommodate the selected design hourly volume (DHV) at the selected level of service (LOS). Appendix E provides the minimum LOS Criteria for various types of facilities. The detailed calculations, highway factors and methodologies are presented in the *Highway Capacity Manual* (*HCM*). During the analysis, the design service volume (or flow rate) of the facility is calculated. For various types of highway facilities, the *HCM* documents the measures of effectiveness that should be used in capacity analyses to determine level of service. For each facility type, the *HCM* provides the analytical tools necessary to calculate the numerical value of its respective measure of effectiveness. Additional design criteria for each facility type are presented in the *MDT Geometric Design Standards.*

Type of Facility	Level of Service Targets
Rural	
Freeways (NHS — Interstate)	B
Principal Arterials (NHS — Non-Interstate)	Level/Rolling: B; Mountainous: C
Minor Arterials	Level/Rolling: B; Mountainous: C
Collector Roads	C
Urban	
Freeways (NHS — Interstate)	B
Principal Arterials (NHS — Non-Interstate)	C
Minor Arterials	C
Collector Roads	D

Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX H

Miovision Data – Peak Hour Movement

&

Miovision Data – Hourly Counts

King Ave & 80th St W - TMC

Thu Feb 12, 2026
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg	80th St W						King Ave						80th St W						King Ave						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2026-02-12 12:00AM	0	0	0	0	**0**	0	0	0	1	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
12:15AM	0	0	0	0	**0**	0	0	0	1	0	**1**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**2**
12:30AM	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
12:45AM	0	0	0	0	**0**	0	1	1	0	0	**2**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	**3**
Hourly Total	0	0	0	0	**0**	0	1	2	2	0	**5**	0	0	1	0	0	**1**	0	0	1	0	0	**1**	0	**7**
1:00AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
1:15AM	0	0	0	0	**0**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
1:30AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
1:45AM	0	0	0	0	**0**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
Hourly Total	0	0	0	0	**0**	0	2	0	0	0	**2**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**2**
2:00AM	0	0	0	0	**0**	0	0	0	1	0	**1**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**2**
2:15AM	0	0	0	0	**0**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
2:30AM	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**2**
2:45AM	0	0	0	0	**0**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
Hourly Total	0	0	0	0	**0**	0	2	1	1	0	**4**	0	0	0	0	0	**0**	0	0	2	0	0	**2**	0	**6**
3:00AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
3:15AM	0	0	1	0	**1**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**2**
3:30AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**1**
3:45AM	0	0	2	0	**2**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	4	0	0	**4**	0	**6**
Hourly Total	0	0	3	0	**3**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	5	0	0	**5**	0	**9**
4:00AM	0	0	3	0	**3**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**5**
4:15AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	1	0	0	0	**1**	0	0	1	0	0	**1**	0	**2**
4:30AM	0	1	1	0	**2**	0	0	0	0	0	**0**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	**3**
4:45AM	0	0	1	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	3	0	0	**3**	0	**4**
Hourly Total	0	1	5	0	**6**	0	1	0	0	0	**1**	0	2	0	0	0	**2**	0	0	5	0	0	**5**	0	**14**
5:00AM	0	0	3	0	**3**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**3**
5:15AM	0	0	4	0	**4**	0	0	2	0	0	**2**	0	0	0	0	0	**0**	0	0	4	0	0	**4**	0	**10**
5:30AM	0	0	4	0	**4**	0	1	0	0	0	**1**	0	1	0	0	0	**1**	0	0	2	0	0	**2**	0	**8**
5:45AM	0	0	10	0	**10**	0	3	0	1	0	**4**	0	1	1	0	0	**2**	0	0	3	0	0	**3**	0	**19**
Hourly Total	0	0	21	0	**21**	0	4	2	1	0	**7**	0	2	1	0	0	**3**	0	0	9	0	0	**9**	0	**40**
6:00AM	0	2	14	0	**16**	0	3	2	1	0	**6**	0	0	1	0	0	**1**	0	0	8	0	0	**8**	0	**31**
6:15AM	0	1	6	1	**8**	0	4	3	1	0	**8**	0	0	0	1	0	**1**	0	1	8	0	0	**9**	0	**26**
6:30AM	0	2	10	0	**12**	0	1	3	2	0	**6**	0	7	1	0	0	**8**	0	0	12	0	0	**12**	0	**38**
6:45AM	0	1	10	0	**11**	0	5	3	3	0	**11**	0	2	1	0	0	**3**	0	1	15	0	0	**16**	0	**41**
Hourly Total	0	6	40	1	**47**	0	13	11	7	0	**31**	0	9	3	1	0	**13**	0	2	43	0	0	**45**	0	**136**
7:00AM	0	1	12	0	**13**	0	4	3	4	0	**11**	0	4	1	1	0	**6**	0	0	20	0	0	**20**	0	**50**
7:15AM	0	1	28	0	**29**	0	3	1	3	0	**7**	0	8	2	0	0	**10**	0	1	23	0	0	**24**	0	**70**
7:30AM	0	4	36	0	**40**	0	4	5	1	0	**10**	0	10	1	1	0	**12**	0	1	20	1	0	**22**	0	**84**
7:45AM	0	3	14	0	**17**	0	7	7	2	0	**16**	0	2	1	1	0	**4**	0	0	16	0	0	**16**	0	**53**
Hourly Total	0	9	90	0	**99**	0	18	16	10	0	**44**	0	24	5	3	0	**32**	0	2	79	1	0	**82**	0	**257**
8:00AM	0	1	13	0	**14**	0	8	10	6	0	**24**	0	7	2	0	0	**9**	0	1	13	1	0	**15**	0	**62**
8:15AM	0	3	7	0	**10**	0	7	4	2	0	**13**	0	1	2	0	0	**3**	0	1	17	0	0	**18**	0	**44**
8:30AM	0	4	6	0	**10**	0	3	4	0	0	**7**	0	9	0	1	0	**10**	0	0	16	0	0	**16**	0	**43**
8:45AM	0	0	6	0	**6**	0	7	8	3	0	**18**	0	3	1	1	0	**5**	0	0	1	1	0	**2**	0	**31**
Hourly Total	0	8	32	0	**40**	0	25	26	11	0	**62**	0	20	5	2	0	**27**	0	2	47	2	0	**51**	0	**180**
9:00AM	2	0	8	0	**10**	0	5	7	4	0	**16**	0	2	2	0	0	**4**	0	0	12	1	0	**13**	0	**43**
9:15AM	0	0	9	0	**9**	0	3	7	1	0	**11**	0	1	0	0	0	**1**	0	2	5	2	0	**9**	0	**30**
9:30AM	2	1	6	0	**9**	0	7	11	4	0	**22**	0	8	1	0	0	**9**	0	1	6	1	0	**8**	0	**48**
9:45AM	0	2	9	0	**11**	0	9	5	2	0	**16**	0	4	1	0	0	**5**	0	1	7	1	0	**9**	0	**41**
Hourly Total	4	3	32	0	**39**	0	24	30	11	0	**65**	0	15	4	0	0	**19**	0	4	30	5	0	**39**	0	**162**
10:00AM	2	0	12	0	**14**	0	6	4	3	0	**13**	0	1	0	2	0	**3**	0	1	9	0	0	**10**	0	**40**
10:15AM	1	1	10	0	**12**	0	4	4	5	0	**13**	0	6	1	2	0	**9**	0	1	4	0	0	**5**	0	**39**
10:30AM	0	2	6	0	**8**	0	7	5	7	0	**19**	0	6	1	1	0	**8**	0	1	12	0	0	**13**	0	**48**
10:45AM	0	3	13	0	**16**	0	4	4	9	0	**17**	0	4	2	1	0	**7**	0	0	6	1	0	**7**	0	**47**
Hourly Total	3	6	41	0	**50**	0	21	17	24	0	**62**	0	17	4	6	0	**27**	0	3	31	1	0	**35**	0	**174**
11:00AM	1	0	12	0	**13**	0	7	12	3	0	**22**	0	4	2	4	0	**10**	0	1	12	1	0	**14**	0	**59**
11:15AM	1	0	9	0	**10**	0	7	9	3	0	**19**	0	5	2	0	0	**7**	0	1	6	1	0	**8**	0	**44**
11:30AM	0	3	6	0	**9**	0	10	13	5	0	**28**	0	4	0	2	0	**6**	0	1	12	1	0	**14**	0	**57**

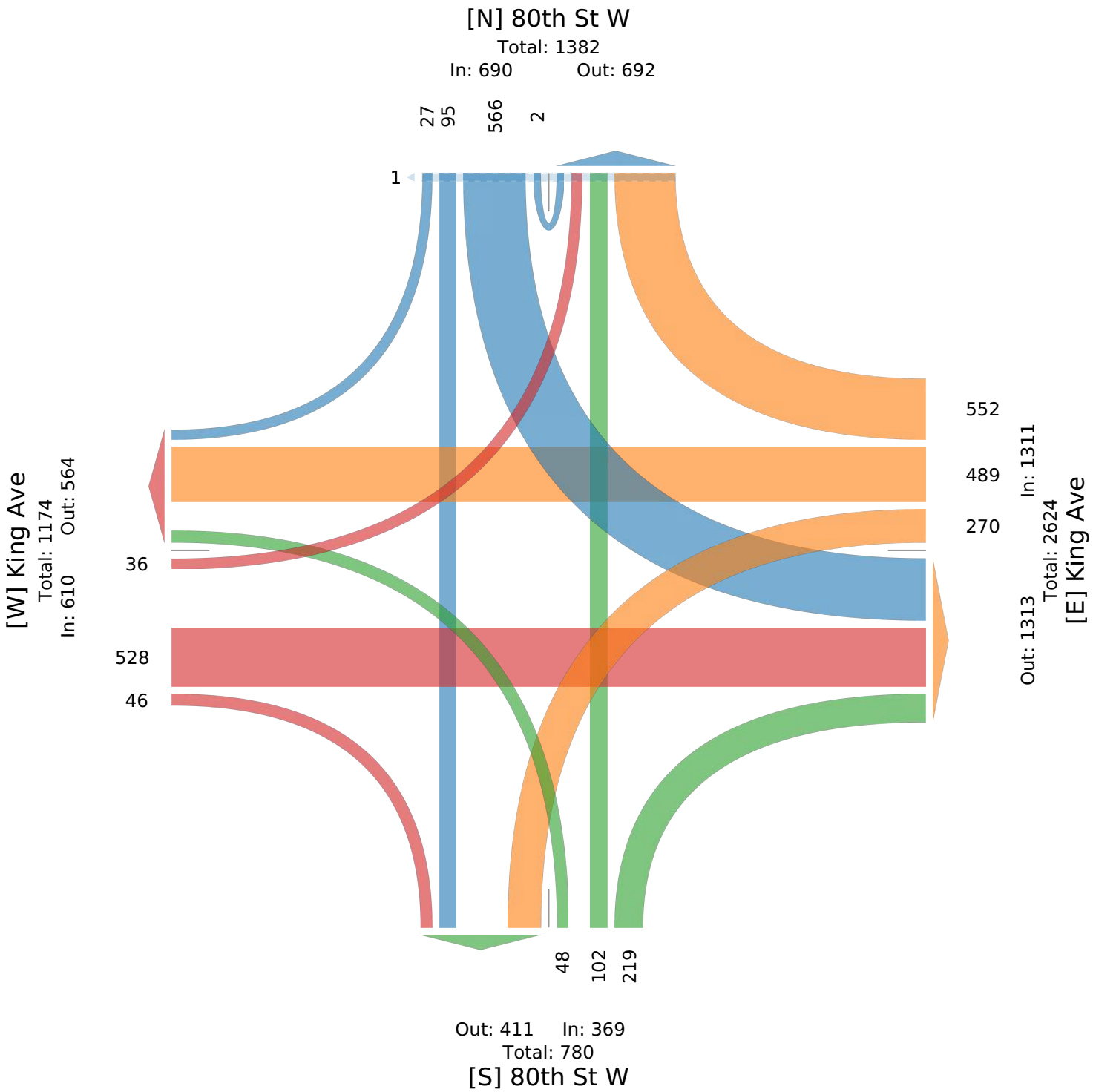
Leg	80th St W						King Ave						80th St W						King Ave						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
11:45AM	1	1	6	0	**8**	0	8	7	5	0	**20**	0	8	1	0	0	**9**	0	2	7	1	0	**10**	0	**47**
Hourly Total	3	4	33	0	**40**	0	32	41	16	0	**89**	0	21	5	6	0	**32**	0	5	37	4	0	**46**	0	**207**
12:00PM	1	4	6	0	**11**	0	8	11	9	0	**28**	0	5	2	0	0	**7**	0	0	9	0	0	**9**	0	**55**
12:15PM	0	1	11	0	**12**	0	12	11	3	0	**26**	0	2	5	0	0	**7**	0	0	9	0	0	**9**	0	**54**
12:30PM	1	1	3	0	**5**	0	7	5	6	0	**18**	0	5	3	0	0	**8**	0	1	6	0	0	**7**	0	**38**
12:45PM	2	2	7	0	**11**	0	13	13	4	0	**30**	0	2	2	3	0	**7**	0	1	8	2	0	**11**	0	**59**
Hourly Total	4	8	27	0	**39**	0	40	40	22	0	**102**	0	14	12	3	0	**29**	0	2	32	2	0	**36**	0	**206**
1:00PM	1	1	9	0	**11**	0	6	7	4	0	**17**	0	6	0	0	0	**6**	0	1	7	1	0	**9**	0	**43**
1:15PM	1	4	8	0	**13**	0	8	9	5	0	**22**	0	1	1	1	0	**3**	0	1	12	1	0	**14**	0	**52**
1:30PM	0	2	9	0	**11**	0	12	7	3	0	**22**	0	2	2	2	0	**6**	0	0	11	0	0	**11**	0	**50**
1:45PM	2	0	8	0	**10**	0	16	10	4	0	**30**	0	3	0	0	0	**3**	0	0	8	0	0	**8**	0	**51**
Hourly Total	4	7	34	0	**45**	0	42	33	16	0	**91**	0	12	3	3	0	**18**	0	2	38	2	0	**42**	0	**196**
2:00PM	0	1	9	0	**10**	0	8	7	7	0	**22**	0	4	2	2	0	**8**	0	0	4	2	0	**6**	0	**46**
2:15PM	0	4	9	0	**13**	0	11	9	3	0	**23**	0	6	7	1	0	**14**	0	0	10	1	0	**11**	0	**61**
2:30PM	0	4	9	0	**13**	0	14	6	1	0	**21**	0	2	0	3	0	**5**	0	1	10	0	0	**11**	0	**50**
2:45PM	0	1	13	0	**14**	0	13	4	6	0	**23**	0	1	0	0	0	**1**	0	2	7	1	0	**10**	0	**48**
Hourly Total	0	10	40	0	**50**	0	46	26	17	0	**89**	0	13	9	6	0	**28**	0	3	31	4	0	**38**	0	**205**
3:00PM	0	1	9	0	**10**	0	10	7	6	0	**23**	0	5	4	0	0	**9**	0	0	15	1	0	**16**	0	**58**
3:15PM	0	4	8	0	**12**	0	10	11	5	0	**26**	0	3	2	3	0	**8**	0	1	8	0	0	**9**	0	**55**
3:30PM	0	2	8	0	**10**	0	23	20	6	0	**49**	0	4	1	1	0	**6**	0	0	6	0	0	**6**	0	**71**
3:45PM	3	3	7	0	**13**	1	10	12	9	0	**31**	0	4	4	0	0	**8**	0	0	13	2	0	**15**	0	**67**
Hourly Total	3	10	32	0	**45**	1	53	50	26	0	**129**	0	16	11	4	0	**31**	0	1	42	3	0	**46**	0	**251**
4:00PM	0	1	8	0	**9**	0	11	14	5	0	**30**	0	6	3	0	0	**9**	0	2	9	2	0	**13**	0	**61**
4:15PM	1	0	9	0	**10**	0	22	15	4	0	**41**	0	4	4	0	0	**8**	0	1	12	2	0	**15**	0	**74**
4:30PM	0	3	14	0	**17**	0	14	12	6	0	**32**	0	7	2	2	0	**11**	0	1	11	2	0	**14**	0	**74**
4:45PM	0	4	11	0	**15**	0	13	12	6	0	**31**	0	3	1	0	0	**4**	0	2	11	1	0	**14**	0	**64**
Hourly Total	1	8	42	0	**51**	0	60	53	21	0	**134**	0	20	10	2	0	**32**	0	6	43	7	0	**56**	0	**273**
5:00PM	0	3	12	0	**15**	0	22	12	14	0	**48**	0	2	8	3	0	**13**	0	1	5	0	0	**6**	0	**82**
5:15PM	0	4	14	0	**18**	0	11	15	6	0	**32**	0	6	3	2	0	**11**	0	2	5	0	0	**7**	0	**68**
5:30PM	0	0	11	0	**11**	0	19	14	10	0	**43**	0	8	3	0	0	**11**	0	3	4	0	0	**7**	0	**72**
5:45PM	2	1	5	1	**9**	0	12	7	5	0	**24**	0	3	1	2	0	**6**	0	1	2	0	0	**3**	0	**42**
Hourly Total	2	8	42	1	**53**	0	64	48	35	0	**147**	0	19	15	7	0	**41**	0	7	16	0	0	**23**	0	**264**
6:00PM	0	0	4	0	**4**	0	12	9	1	0	**22**	0	2	0	0	0	**2**	0	0	5	1	0	**6**	0	**34**
6:15PM	0	1	6	0	**7**	0	9	9	2	0	**20**	0	3	1	2	0	**6**	0	1	0	0	0	**1**	0	**34**
6:30PM	0	1	4	0	**5**	0	6	12	3	0	**21**	0	2	2	0	0	**4**	0	1	8	0	0	**9**	0	**39**
6:45PM	0	0	5	0	**5**	0	9	9	3	0	**21**	0	5	0	0	0	**5**	0	0	2	1	0	**3**	0	**34**
Hourly Total	0	2	19	0	**21**	0	36	39	9	0	**84**	0	12	3	2	0	**17**	0	2	15	2	0	**19**	0	**141**
7:00PM	1	1	3	0	**5**	0	11	8	3	0	**22**	0	0	1	1	0	**2**	0	0	3	0	0	**3**	0	**32**
7:15PM	0	0	3	0	**3**	0	6	6	5	0	**17**	0	1	2	1	0	**4**	0	0	6	0	0	**6**	0	**30**
7:30PM	0	0	3	0	**3**	0	10	6	0	0	**16**	0	0	0	0	0	**0**	0	1	1	1	0	**3**	0	**22**
7:45PM	0	2	4	0	**6**	0	4	4	4	0	**12**	0	0	2	0	0	**2**	0	0	0	0	0	**0**	0	**20**
Hourly Total	1	3	13	0	**17**	0	31	24	12	0	**67**	0	1	5	2	0	**8**	0	1	10	1	0	**12**	0	**104**
8:00PM	0	1	4	0	**5**	0	2	2	3	0	**7**	0	0	1	0	0	**1**	0	1	2	0	0	**3**	0	**16**
8:15PM	0	0	2	0	**2**	0	7	4	4	0	**15**	0	0	1	0	0	**1**	0	0	3	0	0	**3**	0	**21**
8:30PM	0	0	0	0	**0**	0	3	3	5	0	**11**	0	0	1	0	0	**1**	0	1	2	0	0	**3**	0	**15**
8:45PM	1	0	0	0	**1**	0	4	2	1	0	**7**	0	0	3	0	0	**3**	0	0	0	0	0	**0**	0	**11**
Hourly Total	1	1	6	0	**8**	0	16	11	13	0	**40**	0	0	6	0	0	**6**	0	2	7	0	0	**9**	0	**63**
9:00PM	0	0	1	0	**1**	0	4	2	2	0	**8**	0	1	0	0	0	**1**	0	0	1	0	0	**1**	0	**11**
9:15PM	0	0	4	0	**4**	0	3	5	4	0	**12**	0	0	0	1	0	**1**	0	0	0	1	0	**1**	0	**18**
9:30PM	0	0	2	0	**2**	0	4	1	3	0	**8**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**11**
9:45PM	0	1	1	0	**2**	0	3	2	2	0	**7**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**9**
Hourly Total	0	1	8	0	**9**	0	14	10	11	0	**35**	0	1	0	1	0	**2**	0	0	2	1	0	**3**	0	**49**
10:00PM	0	0	2	0	**2**	0	2	3	0	0	**5**	0	1	0	0	0	**1**	0	1	1	1	0	**3**	0	**11**
10:15PM	0	0	2	0	**2**	0	1	0	2	0	**3**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**5**
10:30PM	0	0	0	0	**0**	0	2	0	1	0	**3**	0	0	0	0	0	**0**	0	1	1	0	0	**2**	0	**5**
10:45PM	0	0	0	0	**0**	0	2	1	1	0	**4**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**4**
Hourly Total	0	0	4	0	**4**	0	7	4	4	0	**15**	0	1	0	0	0	**1**	0	2	2	1	0	**5**	0	**25**
11:00PM	1	0	1	0	**2**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**3**
11:15PM	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
11:30PM	0	0	1	0	**1**	0	0	2	1	0	**3**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**4**
11:45PM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**1**
Hourly Total	1	0	2	0	**3**	0	0	4	1	0	**5**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**9**
Total	27	95	566	2	**690**	1	552	489	270	0	**1311**	0	219	102	48	0	**369**	0	46	528	36	0	**610**	0	**2980**
% Approach	3.9%	13.8%	82.0%	0.3%	**-**	-	42.1%	37.3%	20.6%	0%	**-**	-	59.3%	27.6%	13.0%	0%	**-**	-	7.5%	86.6%	5.9%	0%	**-**	-	-
% Total	0.9%	3.2%	19.0%	0.1%	**23.2%**	-	18.5%	16.4%	9.1%	0%	**44.0%**	-	7.3%	3.4%	1.6%	0%	**12.4%**	-	1.5%	17.7%	1.2%	0%	**20.5%**	-	-
Motorcycles	0	0	1	0	**1**	-	0	4	0	0	**4**	-	0	1	1	0	**2**	-	0	2	0	0	**2**	-	9

Leg	80th St W						King Ave						80th St W						King Ave						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	**Int**
% Motorcycles	0%	0%	0.2%	0%	**0.1%**	-	0%	0.8%	0%	0%	**0.3%**	-	0%	1.0%	2.1%	0%	**0.5%**	-	0%	0.4%	0%	0%	**0.3%**	-	0.3%
Lights	23	91	543	2	**659**	-	526	451	259	0	**1236**	-	212	100	46	0	**358**	-	44	498	34	0	**576**	-	2829
% Lights	85.2%	95.8%	95.9%	100%	**95.5%**	-	95.3%	92.2%	95.9%	0%	**94.3%**	-	96.8%	98.0%	95.8%	0%	**97.0%**	-	95.7%	94.3%	94.4%	0%	**94.4%**	-	94.9%
Single-Unit Trucks	3	2	14	0	**19**	-	14	21	6	0	**41**	-	5	1	1	0	**7**	-	2	15	2	0	**19**	-	86
% Single-Unit Trucks	11.1%	2.1%	2.5%	0%	**2.8%**	-	2.5%	4.3%	2.2%	0%	**3.1%**	-	2.3%	1.0%	2.1%	0%	**1.9%**	-	4.3%	2.8%	5.6%	0%	**3.1%**	-	2.9%
Articulated Trucks	0	0	2	0	**2**	-	3	8	1	0	**12**	-	2	0	0	0	**2**	-	0	8	0	0	**8**	-	24
% Articulated Trucks	0%	0%	0.4%	0%	**0.3%**	-	0.5%	1.6%	0.4%	0%	**0.9%**	-	0.9%	0%	0%	0%	**0.5%**	-	0%	1.5%	0%	0%	**1.3%**	-	0.8%
Buses	1	1	2	0	**4**	-	5	5	4	0	**14**	-	0	0	0	0	**0**	-	0	5	0	0	**5**	-	23
% Buses	3.7%	1.1%	0.4%	0%	**0.6%**	-	0.9%	1.0%	1.5%	0%	**1.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0.9%	0%	0%	**0.8%**	-	0.8%
Bicycles on Road	0	1	4	0	**5**	-	4	0	0	0	**4**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	9
% Bicycles on Road	0%	1.1%	0.7%	0%	**0.7%**	-	0.7%	0%	0%	0%	**0.3%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Pedestrians	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

King Ave & 80th St W - TMC
Thu Feb 12, 2026
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US



King Ave & 80th St W - TMC

Thu Feb 12, 2026
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

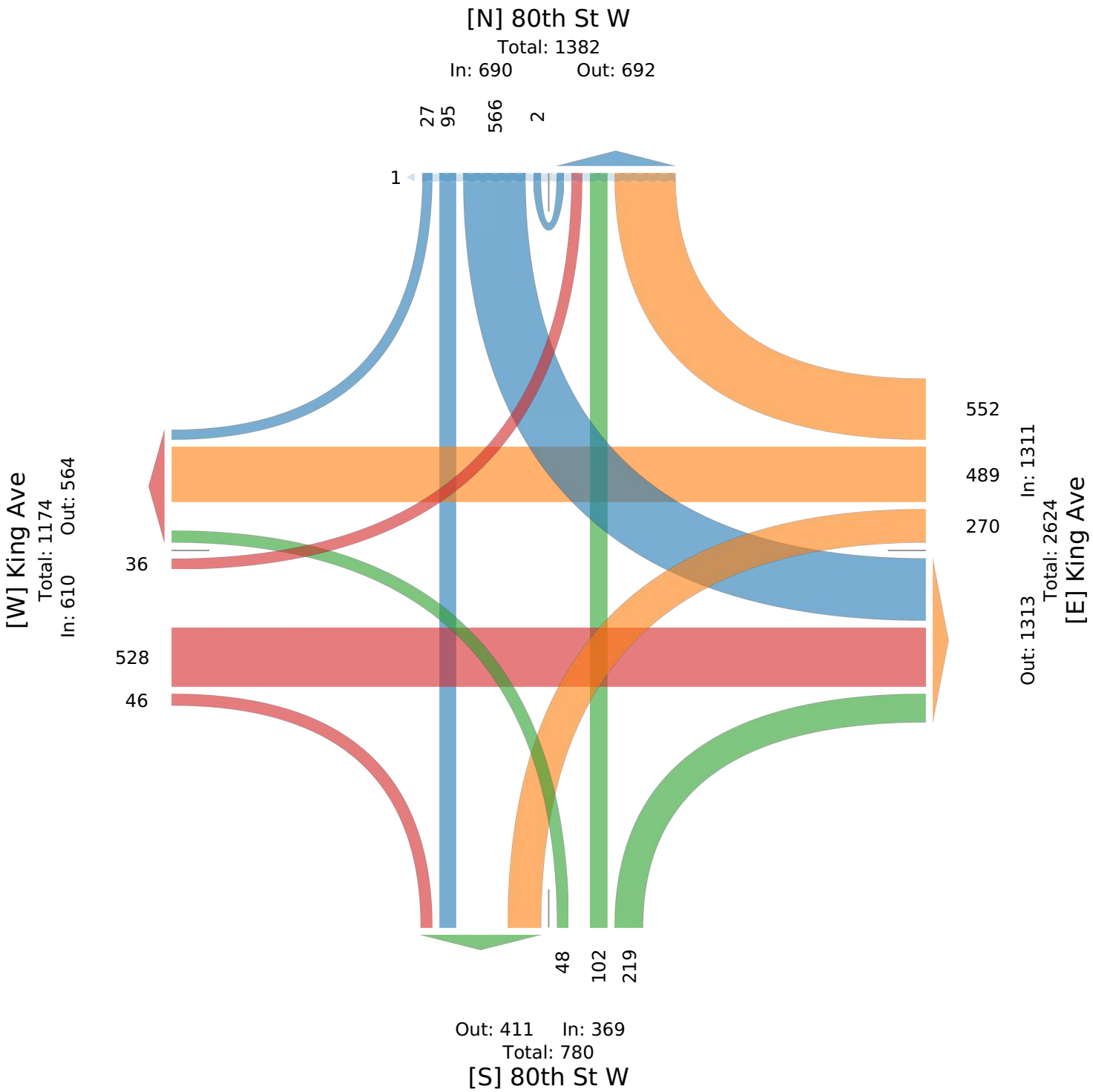
Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg	80th St W						King Ave						80th St W						King Ave						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2026-02-12 12:00AM	0	0	0	0	**0**	0	1	2	2	0	**5**	0	0	1	0	0	**1**	0	0	1	0	0	**1**	0	**7**
1:00AM	0	0	0	0	**0**	0	2	0	0	0	**2**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**2**
2:00AM	0	0	0	0	**0**	0	2	1	1	0	**4**	0	0	0	0	0	**0**	0	0	2	0	0	**2**	0	**6**
3:00AM	0	0	3	0	**3**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	5	0	0	**5**	0	**9**
4:00AM	0	1	5	0	**6**	0	1	0	0	0	**1**	0	2	0	0	0	**2**	0	0	5	0	0	**5**	0	**14**
5:00AM	0	0	21	0	**21**	0	4	2	1	0	**7**	0	2	1	0	0	**3**	0	0	9	0	0	**9**	0	**40**
6:00AM	0	6	40	1	**47**	0	13	11	7	0	**31**	0	9	3	1	0	**13**	0	2	43	0	0	**45**	0	**136**
7:00AM	0	9	90	0	**99**	0	18	16	10	0	**44**	0	24	5	3	0	**32**	0	2	79	1	0	**82**	0	**257**
8:00AM	0	8	32	0	**40**	0	25	26	11	0	**62**	0	20	5	2	0	**27**	0	2	47	2	0	**51**	0	**180**
9:00AM	4	3	32	0	**39**	0	24	30	11	0	**65**	0	15	4	0	0	**19**	0	4	30	5	0	**39**	0	**162**
10:00AM	3	6	41	0	**50**	0	21	17	24	0	**62**	0	17	4	6	0	**27**	0	3	31	1	0	**35**	0	**174**
11:00AM	3	4	33	0	**40**	0	32	41	16	0	**89**	0	21	5	6	0	**32**	0	5	37	4	0	**46**	0	**207**
12:00PM	4	8	27	0	**39**	0	40	40	22	0	**102**	0	14	12	3	0	**29**	0	2	32	2	0	**36**	0	**206**
1:00PM	4	7	34	0	**45**	0	42	33	16	0	**91**	0	12	3	3	0	**18**	0	2	38	2	0	**42**	0	**196**
2:00PM	0	10	40	0	**50**	0	46	26	17	0	**89**	0	13	9	6	0	**28**	0	3	31	4	0	**38**	0	**205**
3:00PM	3	10	32	0	**45**	1	53	50	26	0	**129**	0	16	11	4	0	**31**	0	1	42	3	0	**46**	0	**251**
4:00PM	1	8	42	0	**51**	0	60	53	21	0	**134**	0	20	10	2	0	**32**	0	6	43	7	0	**56**	0	**273**
5:00PM	2	8	42	1	**53**	0	64	48	35	0	**147**	0	19	15	7	0	**41**	0	7	16	0	0	**23**	0	**264**
6:00PM	0	2	19	0	**21**	0	36	39	9	0	**84**	0	12	3	2	0	**17**	0	2	15	2	0	**19**	0	**141**
7:00PM	1	3	13	0	**17**	0	31	24	12	0	**67**	0	1	5	2	0	**8**	0	1	10	1	0	**12**	0	**104**
8:00PM	1	1	6	0	**8**	0	16	11	13	0	**40**	0	0	6	0	0	**6**	0	2	7	0	0	**9**	0	**63**
9:00PM	0	1	8	0	**9**	0	14	10	11	0	**35**	0	1	0	1	0	**2**	0	0	2	1	0	**3**	0	**49**
10:00PM	0	0	4	0	**4**	0	7	4	4	0	**15**	0	1	0	0	0	**1**	0	2	2	1	0	**5**	0	**25**
11:00PM	1	0	2	0	**3**	0	0	4	1	0	**5**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**9**
Total	27	95	566	2	**690**	1	552	489	270	0	**1311**	0	219	102	48	0	**369**	0	46	528	36	0	**610**	0	**2980**
% Approach	3.9%	13.8%	82.0%	0.3%	**-**	-	42.1%	37.3%	20.6%	0%	**-**	-	59.3%	27.6%	13.0%	0%	**-**	-	7.5%	86.6%	5.9%	0%	**-**	-	-
% Total	0.9%	3.2%	19.0%	0.1%	**23.2%**	-	18.5%	16.4%	9.1%	0%	**44.0%**	-	7.3%	3.4%	1.6%	0%	**12.4%**	-	1.5%	17.7%	1.2%	0%	**20.5%**	-	-
Motorcycles	0	0	1	0	**1**	-	0	4	0	0	**4**	-	0	1	1	0	**2**	-	0	2	0	0	**2**	-	9
% Motorcycles	0%	0%	0.2%	0%	**0.1%**	-	0%	0.8%	0%	0%	**0.3%**	-	0%	1.0%	2.1%	0%	**0.5%**	-	0%	0.4%	0%	0%	**0.3%**	-	0.3%
Lights	23	91	543	2	**659**	-	526	451	259	0	**1236**	-	212	100	46	0	**358**	-	44	498	34	0	**576**	-	2829
% Lights	85.2%	95.8%	95.9%	100%	**95.5%**	-	95.3%	92.2%	95.9%	0%	**94.3%**	-	96.8%	98.0%	95.8%	0%	**97.0%**	-	95.7%	94.3%	94.4%	0%	**94.4%**	-	94.9%
Single-Unit Trucks	3	2	14	0	**19**	-	14	21	6	0	**41**	-	5	1	1	0	**7**	-	2	15	2	0	**19**	-	86
% Single-Unit Trucks	11.1%	2.1%	2.5%	0%	**2.8%**	-	2.5%	4.3%	2.2%	0%	**3.1%**	-	2.3%	1.0%	2.1%	0%	**1.9%**	-	4.3%	2.8%	5.6%	0%	**3.1%**	-	2.9%
Articulated Trucks	0	0	2	0	**2**	-	3	8	1	0	**12**	-	2	0	0	0	**2**	-	0	8	0	0	**8**	-	24
% Articulated Trucks	0%	0%	0.4%	0%	**0.3%**	-	0.5%	1.6%	0.4%	0%	**0.9%**	-	0.9%	0%	0%	0%	**0.5%**	-	0%	1.5%	0%	0%	**1.3%**	-	0.8%
Buses	1	1	2	0	**4**	-	5	5	4	0	**14**	-	0	0	0	0	**0**	-	0	5	0	0	**5**	-	23
% Buses	3.7%	1.1%	0.4%	0%	**0.6%**	-	0.9%	1.0%	1.5%	0%	**1.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0.9%	0%	0%	**0.8%**	-	0.8%
Bicycles on Road	0	1	4	0	**5**	-	4	0	0	0	**4**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	9
% Bicycles on Road	0%	1.1%	0.7%	0%	**0.7%**	-	0.7%	0%	0%	0%	**0.3%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Pedestrians	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

King Ave & 80th St W - TMC
Thu Feb 12, 2026
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US



King Ave & 80th St W - TMC

Thu Feb 12, 2026
AM Peak (7:15 AM - 8:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg	80th St W						King Ave						80th St W						King Ave						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2026-02-12 7:15AM	0	1	28	0	**29**	0	3	1	3	0	**7**	0	8	2	0	0	**10**	0	1	23	0	0	**24**	0	**70**
7:30AM	0	4	36	0	**40**	0	4	5	1	0	**10**	0	10	1	1	0	**12**	0	1	20	1	0	**22**	0	**84**
7:45AM	0	3	14	0	**17**	0	7	7	2	0	**16**	0	2	1	1	0	**4**	0	0	16	0	0	**16**	0	**53**
8:00AM	0	1	13	0	**14**	0	8	10	6	0	**24**	0	7	2	0	0	**9**	0	1	13	1	0	**15**	0	**62**
Total	0	9	91	0	**100**	0	22	23	12	0	**57**	0	27	6	2	0	**35**	0	3	72	2	0	**77**	0	**269**
% Approach	0%	9.0%	91.0%	0%	**-**	-	38.6%	40.4%	21.1%	0%	**-**	-	77.1%	17.1%	5.7%	0%	**-**	-	3.9%	93.5%	2.6%	0%	**-**	-	-
% Total	0%	3.3%	33.8%	0%	**37.2%**	-	8.2%	8.6%	4.5%	0%	**21.2%**	-	10.0%	2.2%	0.7%	0%	**13.0%**	-	1.1%	26.8%	0.7%	0%	**28.6%**	-	-
PHF	-	0.563	0.632	-	**0.625**	-	0.688	0.575	0.500	-	**0.594**	-	0.675	0.750	0.500	-	**0.729**	-	0.750	0.783	0.500	-	**0.802**	-	0.801
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Lights	0	8	90	0	**98**	-	21	22	12	0	**55**	-	27	6	2	0	**35**	-	3	66	2	0	**71**	-	259
% Lights	0%	88.9%	98.9%	0%	**98.0%**	-	95.5%	95.7%	100%	0%	**96.5%**	-	100%	100%	100%	0%	**100%**	-	100%	91.7%	100%	0%	**92.2%**	-	96.3%
Single-Unit Trucks	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	3	0	0	**3**	-	4
% Single-Unit Trucks	0%	0%	0%	0%	**0%**	-	0%	4.3%	0%	0%	**1.8%**	-	0%	0%	0%	0%	**0%**	-	0%	4.2%	0%	0%	**3.9%**	-	1.5%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	1
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	1.4%	0%	0%	**1.3%**	-	0.4%
Buses	0	1	1	0	**2**	-	1	0	0	0	**1**	-	0	0	0	0	**0**	-	0	2	0	0	**2**	-	5
% Buses	0%	11.1%	1.1%	0%	**2.0%**	-	4.5%	0%	0%	0%	**1.8%**	-	0%	0%	0%	0%	**0%**	-	0%	2.8%	0%	0%	**2.6%**	-	1.9%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

King Ave & 80th St W - TMC
Thu Feb 12, 2026
AM Peak (7:15 AM - 8:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
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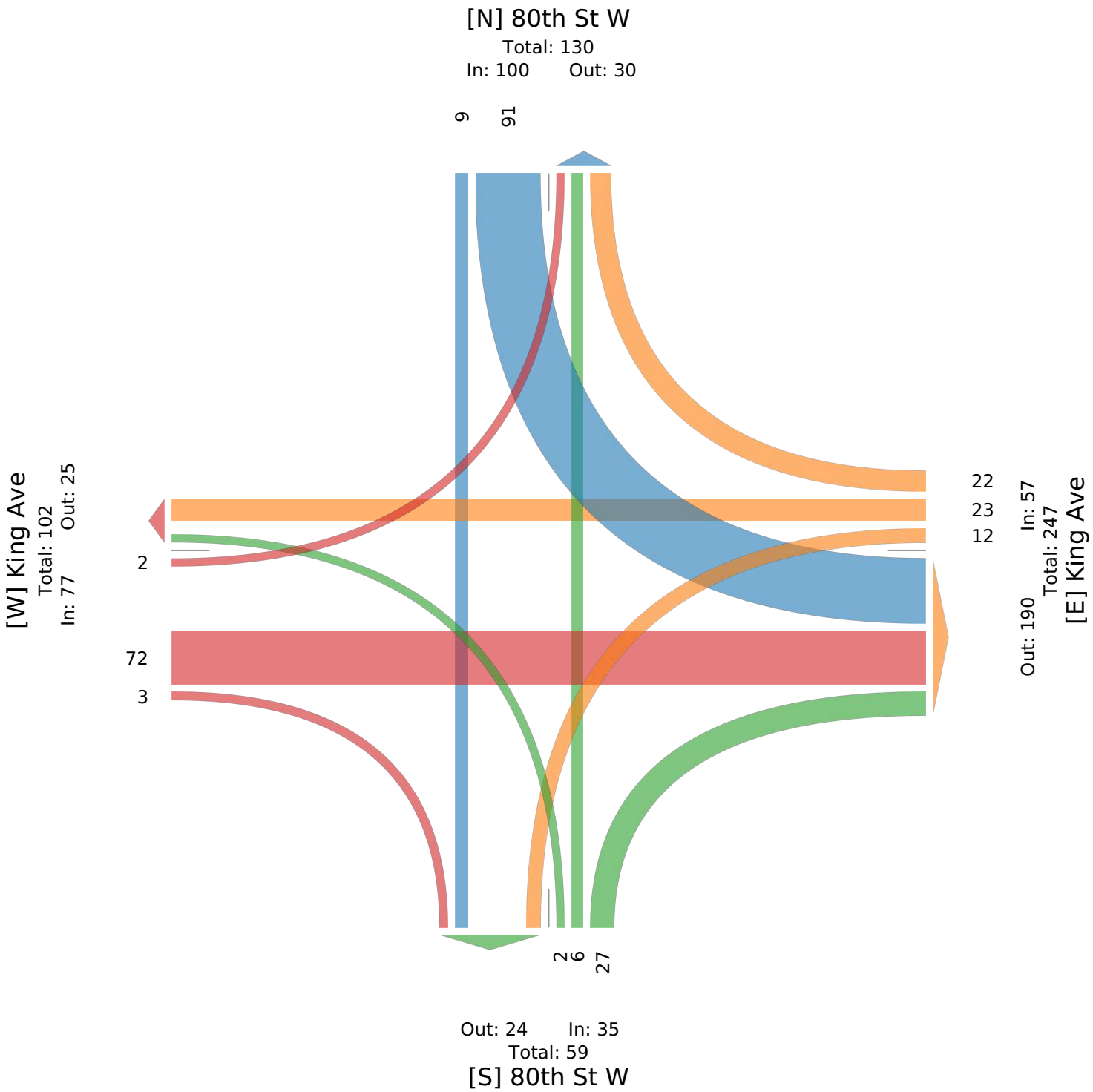


King Ave & 80th St W - TMC

Thu Feb 12, 2026
Midday Peak (11:30 AM - 12:30 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

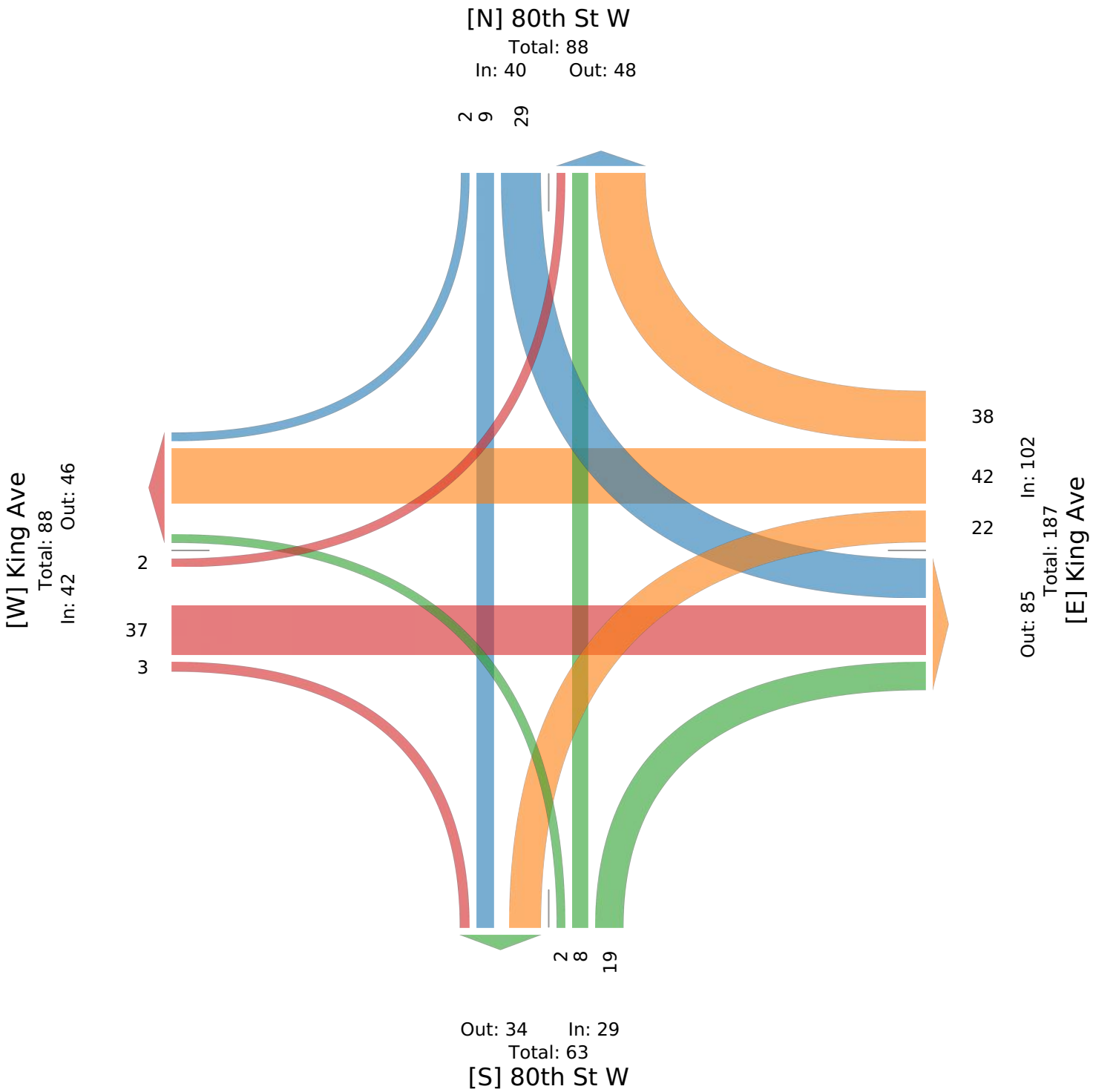
Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg	80th St W						King Ave						80th St W						King Ave						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2026-02-12 11:30AM	0	3	6	0	**9**	0	10	13	5	0	**28**	0	4	0	2	0	**6**	0	1	12	1	0	**14**	0	**57**
11:45AM	1	1	6	0	**8**	0	8	7	5	0	**20**	0	8	1	0	0	**9**	0	2	7	1	0	**10**	0	**47**
12:00PM	1	4	6	0	**11**	0	8	11	9	0	**28**	0	5	2	0	0	**7**	0	0	9	0	0	**9**	0	**55**
12:15PM	0	1	11	0	**12**	0	12	11	3	0	**26**	0	2	5	0	0	**7**	0	0	9	0	0	**9**	0	**54**
Total	2	9	29	0	**40**	0	38	42	22	0	**102**	0	19	8	2	0	**29**	0	3	37	2	0	**42**	0	**213**
% Approach	5.0%	22.5%	72.5%	0%	**-**	-	37.3%	41.2%	21.6%	0%	**-**	-	65.5%	27.6%	6.9%	0%	**-**	-	7.1%	88.1%	4.8%	0%	**-**	-	-
% Total	0.9%	4.2%	13.6%	0%	**18.8%**	-	17.8%	19.7%	10.3%	0%	**47.9%**	-	8.9%	3.8%	0.9%	0%	**13.6%**	-	1.4%	17.4%	0.9%	0%	**19.7%**	-	-
PHF	0.500	0.563	0.659	-	**0.833**	-	0.792	0.808	0.611	-	**0.911**	-	0.594	0.400	0.250	-	**0.806**	-	0.375	0.771	0.500	-	**0.750**	-	0.934
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Lights	0	9	27	0	**36**	-	36	38	21	0	**95**	-	19	8	2	0	**29**	-	3	34	2	0	**39**	-	199
% Lights	0%	100%	93.1%	0%	**90.0%**	-	94.7%	90.5%	95.5%	0%	**93.1%**	-	100%	100%	100%	0%	**100%**	-	100%	91.9%	100%	0%	**92.9%**	-	93.4%
Single-Unit Trucks	2	0	1	0	**3**	-	2	2	1	0	**5**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	9
% Single-Unit Trucks	100%	0%	3.4%	0%	**7.5%**	-	5.3%	4.8%	4.5%	0%	**4.9%**	-	0%	0%	0%	0%	**0%**	-	0%	2.7%	0%	0%	**2.4%**	-	4.2%
Articulated Trucks	0	0	1	0	**1**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	2	0	0	**2**	-	4
% Articulated Trucks	0%	0%	3.4%	0%	**2.5%**	-	0%	2.4%	0%	0%	**1.0%**	-	0%	0%	0%	0%	**0%**	-	0%	5.4%	0%	0%	**4.8%**	-	1.9%
Buses	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Buses	0%	0%	0%	0%	**0%**	-	0%	2.4%	0%	0%	**1.0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.5%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

King Ave & 80th St W - TMC
Thu Feb 12, 2026
Midday Peak (11:30 AM - 12:30 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US



King Ave & 80th St W - TMC

Thu Feb 12, 2026
PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

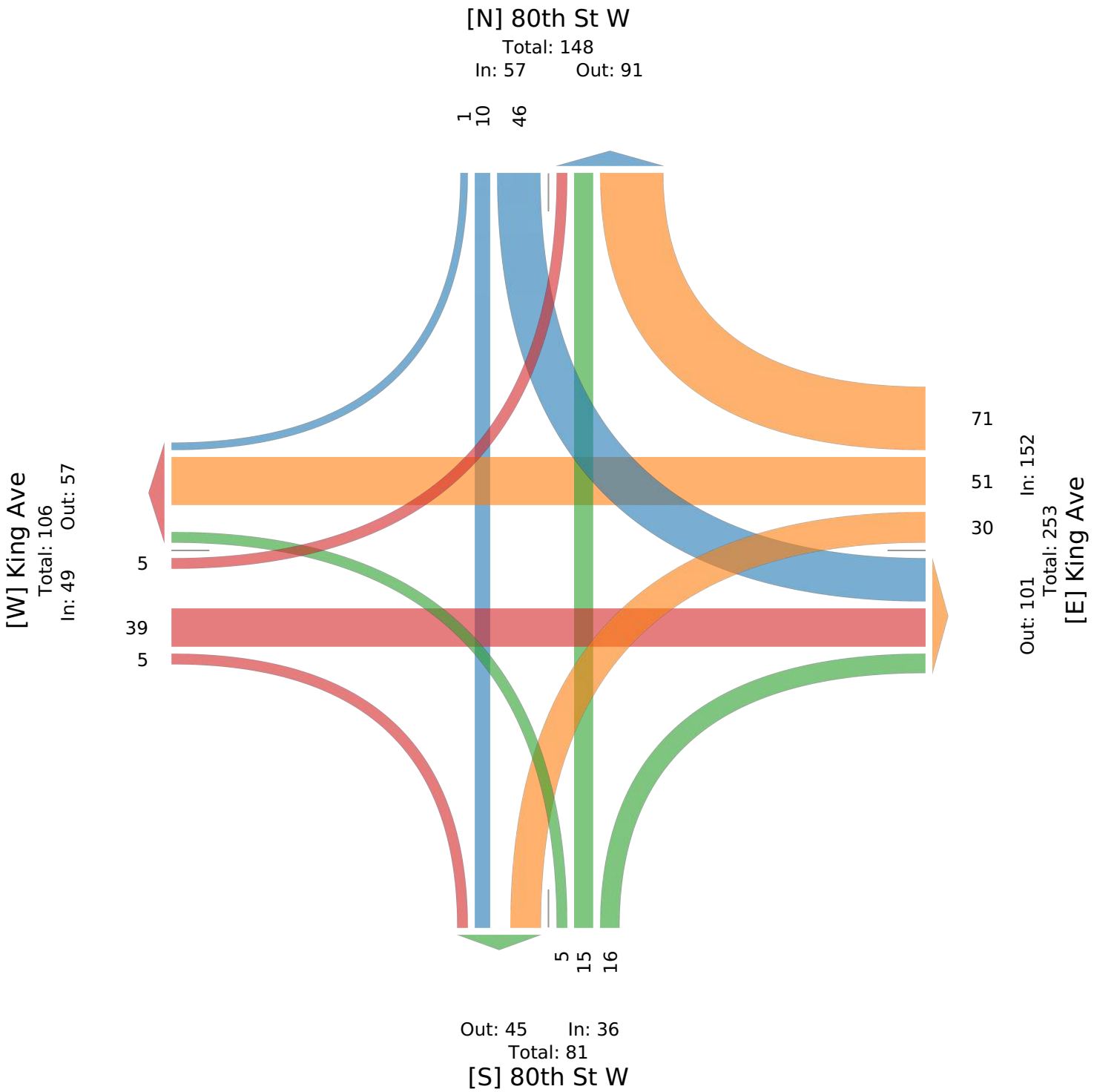
Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg / Direction	80th St W Southbound						King Ave Westbound						80th St W Northbound						King Ave Eastbound						
Time	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	**Int**
2026-02-12 4:15PM	1	0	9	0	**10**	0	22	15	4	0	**41**	0	4	4	0	0	**8**	0	1	12	2	0	**15**	0	**74**
4:30PM	0	3	14	0	**17**	0	14	12	6	0	**32**	0	7	2	2	0	**11**	0	1	11	2	0	**14**	0	**74**
4:45PM	0	4	11	0	**15**	0	13	12	6	0	**31**	0	3	1	0	0	**4**	0	2	11	1	0	**14**	0	**64**
5:00PM	0	3	12	0	**15**	0	22	12	14	0	**48**	0	2	8	3	0	**13**	0	1	5	0	0	**6**	0	**82**
Total	1	10	46	0	**57**	0	71	51	30	0	**152**	0	16	15	5	0	**36**	0	5	39	5	0	**49**	0	**294**
% Approach	1.8%	17.5%	80.7%	0%	**-**	-	46.7%	33.6%	19.7%	0%	**-**	-	44.4%	41.7%	13.9%	0%	**-**	-	10.2%	79.6%	10.2%	0%	**-**	-	-
% Total	0.3%	3.4%	15.6%	0%	**19.4%**	-	24.1%	17.3%	10.2%	0%	**51.7%**	-	5.4%	5.1%	1.7%	0%	**12.2%**	-	1.7%	13.3%	1.7%	0%	**16.7%**	-	-
PHF	0.250	0.625	0.821	-	**0.838**	-	0.773	0.850	0.536	-	**0.776**	-	0.571	0.469	0.417	-	**0.692**	-	0.625	0.813	0.625	-	**0.817**	-	0.887
Motorcycles	0	0	0	0	**0**	-	0	3	0	0	**3**	-	0	1	0	0	**1**	-	0	1	0	0	**1**	-	5
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	5.9%	0%	0%	**2.0%**	-	0%	6.7%	0%	0%	**2.8%**	-	0%	2.6%	0%	0%	**2.0%**	-	1.7%
Lights	1	10	44	0	**55**	-	68	47	29	0	**144**	-	16	13	5	0	**34**	-	5	35	5	0	**45**	-	278
% Lights	100%	100%	95.7%	0%	**96.5%**	-	95.8%	92.2%	96.7%	0%	**94.7%**	-	100%	86.7%	100%	0%	**94.4%**	-	100%	89.7%	100%	0%	**91.8%**	-	94.6%
Single-Unit Trucks	0	0	2	0	**2**	-	0	0	1	0	**1**	-	0	1	0	0	**1**	-	0	1	0	0	**1**	-	5
% Single-Unit Trucks	0%	0%	4.3%	0%	**3.5%**	-	0%	0%	3.3%	0%	**0.7%**	-	0%	6.7%	0%	0%	**2.8%**	-	0%	2.6%	0%	0%	**2.0%**	-	1.7%
Articulated Trucks	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	2.0%	0%	0%	**0.7%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Buses	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	2	0	0	**2**	-	2
% Buses	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	5.1%	0%	0%	**4.1%**	-	0.7%
Bicycles on Road	0	0	0	0	**0**	-	3	0	0	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	4.2%	0%	0%	0%	**2.0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	1.0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

King Ave & 80th St W - TMC
Thu Feb 12, 2026
PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377917, Location: 45.755208, -108.720208

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US



Hesper Rd & 80th St W - TMC

Thu Feb 12, 2026
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg	80th St W						Hesper Rd						80th St W						Hesper Rd						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2026-02-12 12:00AM	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
12:15AM	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
12:30AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
12:45AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	**1**
Hourly Total	2	0	0	0	**2**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	**3**
1:00AM	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
1:15AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
1:30AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
1:45AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
Hourly Total	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
2:00AM	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
2:15AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
2:30AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
2:45AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
Hourly Total	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
3:00AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
3:15AM	0	0	0	0	**0**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
3:30AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	1	0	0	0	**1**	0	**1**
3:45AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	**1**
Hourly Total	0	0	0	0	**0**	0	1	0	0	0	**1**	0	1	0	0	0	**1**	0	1	0	0	0	**1**	0	**3**
4:00AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
4:15AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**1**
4:30AM	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	**2**
4:45AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**1**
Hourly Total	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	2	0	0	**2**	0	**4**
5:00AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**1**
5:15AM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**1**
5:30AM	0	1	1	0	**2**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	3	1	0	**4**	0	**6**
5:45AM	0	2	0	0	**2**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	7	1	0	**8**	0	**11**
Hourly Total	0	3	1	0	**4**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	12	2	0	**14**	0	**19**
6:00AM	0	2	1	0	**3**	0	2	4	0	0	**6**	0	0	0	0	0	**0**	0	0	6	0	0	**6**	0	**15**
6:15AM	1	2	0	0	**3**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	1	4	1	0	**6**	0	**10**
6:30AM	0	1	1	0	**2**	0	0	0	0	0	**0**	0	0	1	1	0	**2**	0	1	13	5	0	**19**	0	**23**
6:45AM	1	3	1	0	**5**	0	1	4	0	0	**5**	0	0	2	0	0	**2**	0	2	9	1	0	**12**	0	**24**
Hourly Total	2	8	3	0	**13**	0	3	9	0	0	**12**	0	0	3	1	0	**4**	0	4	32	7	0	**43**	0	**72**
7:00AM	4	0	0	0	**4**	0	1	1	1	0	**3**	0	1	4	0	0	**5**	0	1	14	3	0	**18**	0	**30**
7:15AM	0	1	0	0	**1**	0	0	2	0	0	**2**	0	1	1	0	0	**2**	0	3	5	6	0	**14**	0	**19**
7:30AM	1	6	0	0	**7**	0	0	0	0	0	**0**	0	0	4	1	0	**5**	0	2	14	9	0	**25**	0	**37**
7:45AM	1	1	4	0	**6**	0	1	6	0	1	**8**	0	1	0	0	0	**1**	0	5	11	1	0	**17**	0	**32**
Hourly Total	6	8	4	0	**18**	0	2	9	1	1	**13**	0	3	9	1	0	**13**	0	11	44	19	0	**74**	0	**118**
8:00AM	2	2	1	0	**5**	0	1	2	0	0	**3**	0	0	3	2	0	**5**	0	1	5	2	0	**8**	0	**21**
8:15AM	1	4	2	0	**7**	0	0	3	0	0	**3**	0	2	5	0	0	**7**	0	3	3	1	0	**7**	0	**24**
8:30AM	0	8	0	0	**8**	0	6	0	1	0	**7**	0	0	3	1	0	**4**	0	1	4	7	0	**12**	0	**31**
8:45AM	1	2	1	0	**4**	0	0	4	0	0	**4**	0	0	1	0	0	**1**	0	4	1	2	0	**7**	0	**16**
Hourly Total	4	16	4	0	**24**	0	7	9	1	0	**17**	0	2	12	3	0	**17**	0	9	13	12	0	**34**	0	**92**
9:00AM	1	0	2	0	**3**	0	1	2	1	0	**4**	0	0	3	3	0	**6**	0	0	5	1	0	**6**	0	**19**
9:15AM	0	3	0	0	**3**	0	2	2	0	1	**5**	0	0	0	0	0	**0**	0	1	6	2	0	**9**	0	**17**
9:30AM	2	4	1	0	**7**	0	0	1	0	0	**1**	0	0	5	1	0	**6**	0	0	0	1	0	**1**	0	**15**
9:45AM	1	6	0	0	**7**	0	0	3	1	0	**4**	0	1	5	0	0	**6**	0	0	4	0	0	**4**	0	**21**
Hourly Total	4	13	3	0	**20**	0	3	8	2	1	**14**	0	1	13	4	0	**18**	0	1	15	4	0	**20**	0	**72**
10:00AM	0	1	0	0	**1**	0	0	3	1	0	**4**	0	1	1	1	0	**3**	0	0	3	2	0	**5**	0	**13**
10:15AM	1	2	1	0	**4**	0	1	2	0	0	**3**	0	2	7	1	0	**10**	0	0	1	1	0	**2**	0	**19**
10:30AM	4	6	2	0	**12**	0	1	1	0	0	**2**	0	0	2	0	0	**2**	0	4	2	4	0	**10**	0	**26**
10:45AM	3	3	3	0	**9**	0	2	2	0	0	**4**	0	0	4	0	0	**4**	0	1	1	2	0	**4**	0	**21**
Hourly Total	8	12	6	0	**26**	0	4	8	1	0	**13**	0	3	14	2	0	**19**	0	5	7	9	0	**21**	0	**79**
11:00AM	1	4	1	0	**6**	0	4	3	1	0	**8**	0	2	4	0	0	**6**	0	2	1	1	0	**4**	0	**24**
11:15AM	3	3	0	0	**6**	0	1	3	2	0	**6**	0	1	4	2	0	**7**	0	2	3	0	0	**5**	0	**24**
11:30AM	3	3	2	0	**8**	0	1	1	0	0	**2**	0	2	3	1	0	**6**	0	2	5	1	0	**8**	0	**24**
11:45AM	1	3	1	0	**5**	0	1	1	2	0	**4**	0	1	3	1	0	**5**	0	0	1	1	0	**2**	0	**16**

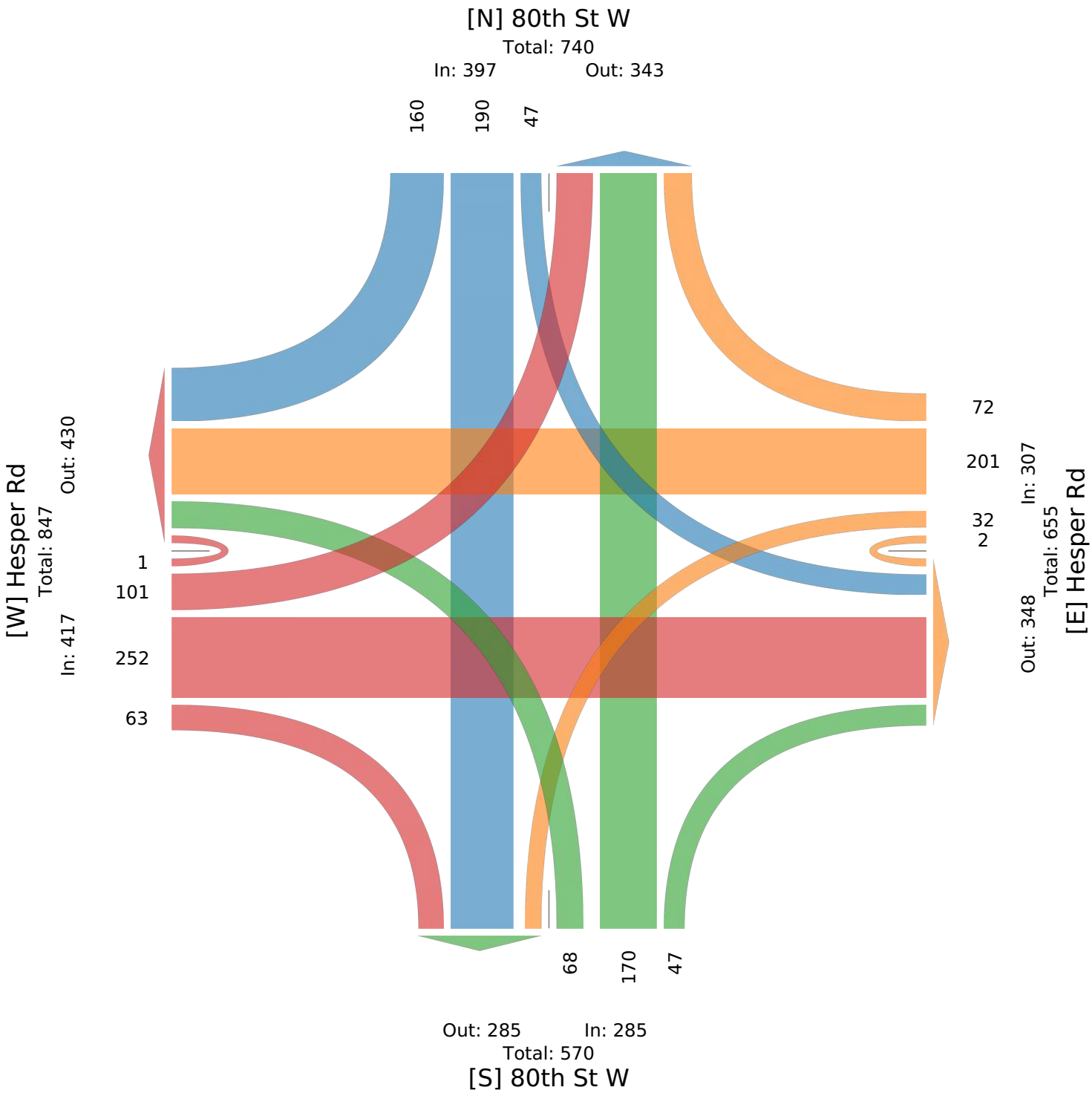
Leg	80th St W						Hesper Rd						80th St W						Hesper Rd						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
Hourly Total	8	13	4	0	**25**	0	7	8	5	0	**20**	0	6	14	4	0	**24**	0	6	10	3	0	**19**	0	**88**
12:00PM	4	5	4	0	**13**	0	2	0	1	0	**3**	0	0	3	0	0	**3**	0	1	4	1	0	**6**	0	**25**
12:15PM	2	2	0	0	**4**	0	3	6	1	0	**10**	0	1	3	0	0	**4**	0	1	2	0	0	**3**	0	**21**
12:30PM	4	2	1	0	**7**	0	1	0	0	0	**1**	0	0	4	1	0	**5**	0	1	3	4	0	**8**	0	**21**
12:45PM	0	4	0	0	**4**	0	2	2	2	0	**6**	0	1	4	1	0	**6**	0	0	2	0	0	**2**	0	**18**
Hourly Total	10	13	5	0	**28**	0	8	8	4	0	**20**	0	2	14	2	0	**18**	0	3	11	5	0	**19**	0	**85**
1:00PM	2	5	2	0	**9**	0	1	4	1	0	**6**	0	0	2	0	0	**2**	0	0	1	2	0	**3**	0	**20**
1:15PM	3	2	0	0	**5**	0	1	2	0	0	**3**	0	1	2	0	0	**3**	0	1	2	0	0	**3**	0	**14**
1:30PM	1	2	1	0	**4**	0	1	3	0	0	**4**	0	4	1	2	0	**7**	0	0	5	3	0	**8**	0	**23**
1:45PM	3	1	0	0	**4**	0	1	4	1	0	**6**	0	0	1	0	0	**1**	0	0	3	2	0	**5**	0	**16**
Hourly Total	9	10	3	0	**22**	0	4	13	2	0	**19**	0	5	6	2	0	**13**	0	1	11	7	0	**19**	0	**73**
2:00PM	0	5	0	0	**5**	0	0	2	0	0	**2**	0	1	6	0	0	**7**	0	1	6	1	0	**8**	0	**22**
2:15PM	2	4	1	0	**7**	0	2	2	0	0	**4**	0	0	4	2	0	**6**	0	2	2	0	0	**4**	0	**21**
2:30PM	2	4	1	0	**7**	0	3	2	0	0	**5**	0	2	3	1	0	**6**	0	0	8	0	0	**8**	0	**26**
2:45PM	3	2	2	0	**7**	0	0	4	1	0	**5**	0	0	1	0	0	**1**	0	1	4	1	0	**6**	0	**19**
Hourly Total	7	15	4	0	**26**	0	5	10	1	0	**16**	0	3	14	3	0	**20**	0	4	20	2	0	**26**	0	**88**
3:00PM	3	2	0	0	**5**	0	2	3	0	0	**5**	0	0	6	1	0	**7**	0	0	5	4	0	**9**	0	**26**
3:15PM	4	5	2	0	**11**	0	3	5	0	0	**8**	0	0	2	1	0	**3**	0	1	4	1	0	**6**	0	**28**
3:30PM	3	5	1	0	**9**	0	0	6	1	0	**7**	0	0	6	1	0	**7**	0	1	6	1	0	**8**	0	**31**
3:45PM	6	1	0	0	**7**	0	1	8	0	0	**9**	0	0	3	4	0	**7**	0	1	1	0	0	**2**	0	**25**
Hourly Total	16	13	3	0	**32**	0	6	22	1	0	**29**	0	0	17	7	0	**24**	0	3	16	6	0	**25**	0	**110**
4:00PM	2	7	1	0	**10**	0	1	4	1	0	**6**	0	0	5	3	0	**8**	0	1	6	3	0	**10**	0	**34**
4:15PM	4	3	0	0	**7**	0	0	6	1	0	**7**	0	1	4	1	0	**6**	0	0	3	2	0	**5**	0	**25**
4:30PM	4	4	1	0	**9**	0	5	10	1	0	**16**	0	1	2	2	0	**5**	0	2	4	2	0	**8**	0	**38**
4:45PM	7	5	1	0	**13**	0	0	5	2	0	**7**	0	2	5	3	0	**10**	0	1	6	0	0	**7**	0	**37**
Hourly Total	17	19	3	0	**39**	0	6	25	5	0	**36**	0	4	16	9	0	**29**	0	4	19	7	0	**30**	0	**134**
5:00PM	8	6	1	0	**15**	0	9	12	0	0	**21**	0	1	0	2	0	**3**	0	4	3	1	0	**8**	0	**47**
5:15PM	6	10	1	0	**17**	0	0	5	1	0	**6**	0	1	5	1	0	**7**	0	1	4	5	0	**10**	0	**40**
5:30PM	5	3	0	0	**8**	0	2	8	2	0	**12**	0	2	6	3	0	**11**	0	1	5	5	0	**11**	0	**42**
5:45PM	5	3	0	0	**8**	0	1	7	1	0	**9**	0	2	3	1	0	**6**	0	2	5	3	0	**10**	0	**33**
Hourly Total	24	22	2	0	**48**	0	12	32	4	0	**48**	0	6	14	7	0	**27**	0	8	17	14	0	**39**	0	**162**
6:00PM	2	0	0	0	**2**	0	0	2	1	0	**3**	0	1	0	2	0	**3**	0	0	4	0	0	**4**	0	**12**
6:15PM	2	2	0	0	**4**	0	0	2	1	0	**3**	0	1	2	2	0	**5**	0	0	3	1	0	**4**	0	**16**
6:30PM	3	1	1	0	**5**	0	1	4	0	0	**5**	0	4	3	2	0	**9**	0	1	5	0	0	**6**	0	**25**
6:45PM	3	1	0	0	**4**	0	0	1	0	0	**1**	0	1	3	1	0	**5**	0	0	0	1	0	**1**	0	**11**
Hourly Total	10	4	1	0	**15**	0	1	9	2	0	**12**	0	7	8	7	0	**22**	0	1	12	2	0	**15**	0	**64**
7:00PM	1	3	0	0	**4**	0	1	2	0	0	**3**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**7**
7:15PM	4	1	0	0	**5**	0	0	3	0	0	**3**	0	0	3	3	0	**6**	0	0	1	2	0	**3**	0	**17**
7:30PM	1	2	0	0	**3**	0	0	7	1	0	**8**	0	1	0	0	0	**1**	0	0	2	0	0	**2**	0	**14**
7:45PM	4	1	1	0	**6**	0	0	5	0	0	**5**	0	0	1	0	0	**1**	0	0	2	0	0	**2**	0	**14**
Hourly Total	10	7	1	0	**18**	0	1	17	1	0	**19**	0	1	4	3	0	**8**	0	0	5	2	0	**7**	0	**52**
8:00PM	1	2	0	0	**3**	0	0	2	0	0	**2**	0	1	1	1	0	**3**	0	0	1	0	0	**1**	0	**9**
8:15PM	4	0	0	0	**4**	0	0	1	0	0	**1**	0	0	1	2	0	**3**	0	0	2	0	0	**2**	0	**10**
8:30PM	3	2	0	0	**5**	0	0	2	0	0	**2**	0	0	1	1	0	**2**	0	0	1	0	0	**1**	0	**10**
8:45PM	1	2	0	0	**3**	0	1	1	0	0	**2**	0	1	3	2	0	**6**	0	1	0	0	0	**1**	0	**12**
Hourly Total	9	6	0	0	**15**	0	1	6	0	0	**7**	0	2	6	6	0	**14**	0	1	4	0	0	**5**	0	**41**
9:00PM	2	0	0	0	**2**	0	1	0	0	0	**1**	0	0	2	1	0	**3**	0	0	1	0	0	**1**	0	**7**
9:15PM	2	1	0	0	**3**	0	0	0	0	0	**0**	0	0	1	1	0	**2**	0	0	0	0	1	**1**	0	**6**
9:30PM	3	2	0	0	**5**	0	0	3	1	0	**4**	0	0	0	1	0	**1**	0	1	0	0	0	**1**	0	**11**
9:45PM	3	1	0	0	**4**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**5**
Hourly Total	10	4	0	0	**14**	0	1	4	1	0	**6**	0	0	3	3	0	**6**	0	1	1	0	1	**3**	0	**29**
10:00PM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	1	0	**1**	0	0	0	0	0	**0**	0	**1**
10:15PM	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	**2**
10:30PM	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
10:45PM	1	1	0	0	**2**	0	0	2	0	0	**2**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**4**
Hourly Total	2	2	0	0	**4**	0	0	2	0	0	**2**	0	0	0	1	0	**1**	0	0	1	0	0	**1**	0	**8**
11:00PM	0	0	0	0	**0**	0	0	1	1	0	**2**	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	**3**
11:15PM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	2	0	**2**	0	0	0	0	0	**0**	0	**2**
11:30PM	1	1	0	0	**2**	0	0	0	0	0	**0**	0	0	0	1	0	**1**	0	0	0	0	0	**0**	0	**3**
11:45PM	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**
Hourly Total	1	1	0	0	**2**	0	0	1	1	0	**2**	0	1	0	3	0	**4**	0	0	0	0	0	**0**	0	**8**
Total	160	190	47	0	**397**	0	72	201	32	2	**307**	0	47	170	68	0	**285**	0	63	252	101	1	**417**	0	**1406**
% Approach	40.3%	47.9%	11.8%	0%	**-**	-	23.5%	65.5%	10.4%	0.7%	**-**	-	16.5%	59.6%	23.9%	0%	**-**	-	15.1%	60.4%	24.2%	0.2%	**-**	-	-
% Total	11.4%	13.5%	3.3%	0%	**28.2%**	-	5.1%	14.3%	2.3%	0.1%	**21.8%**	-	3.3%	12.1%	4.8%	0%	**20.3%**	-	4.5%	17.9%	7.2%	0.1%	**29.7%**	-	-
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	1
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.6%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0.1%

Leg	80th St W						Hesper Rd						80th St W						Hesper Rd						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	**Int**
Lights	156	183	43	0	**382**	-	70	192	31	2	**295**	-	45	169	67	0	**281**	-	62	241	98	1	**402**	-	1360
% Lights	97.5%	96.3%	91.5%	0%	**96.2%**	-	97.2%	95.5%	96.9%	100%	**96.1%**	-	95.7%	99.4%	98.5%	0%	**98.6%**	-	98.4%	95.6%	97.0%	100%	**96.4%**	-	96.7%
Single-Unit Trucks	2	6	2	0	**10**	-	2	7	0	0	**9**	-	0	0	1	0	**1**	-	0	7	3	0	**10**	-	30
% Single-Unit Trucks	1.3%	3.2%	4.3%	0%	**2.5%**	-	2.8%	3.5%	0%	0%	**2.9%**	-	0%	0%	1.5%	0%	**0.4%**	-	0%	2.8%	3.0%	0%	**2.4%**	-	2.1%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1	0	0	0	**1**	-	1
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	1.6%	0%	0%	0%	**0.2%**	-	0.1%
Buses	2	1	2	0	**5**	-	0	2	1	0	**3**	-	2	0	0	0	**2**	-	0	4	0	0	**4**	-	14
% Buses	1.3%	0.5%	4.3%	0%	**1.3%**	-	0%	1.0%	3.1%	0%	**1.0%**	-	4.3%	0%	0%	0%	**0.7%**	-	0%	1.6%	0%	0%	**1.0%**	-	1.0%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Hesper Rd & 80th St W - TMC
Thu Feb 12, 2026
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US



Hesper Rd & 80th St W - TMC

Thu Feb 12, 2026
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

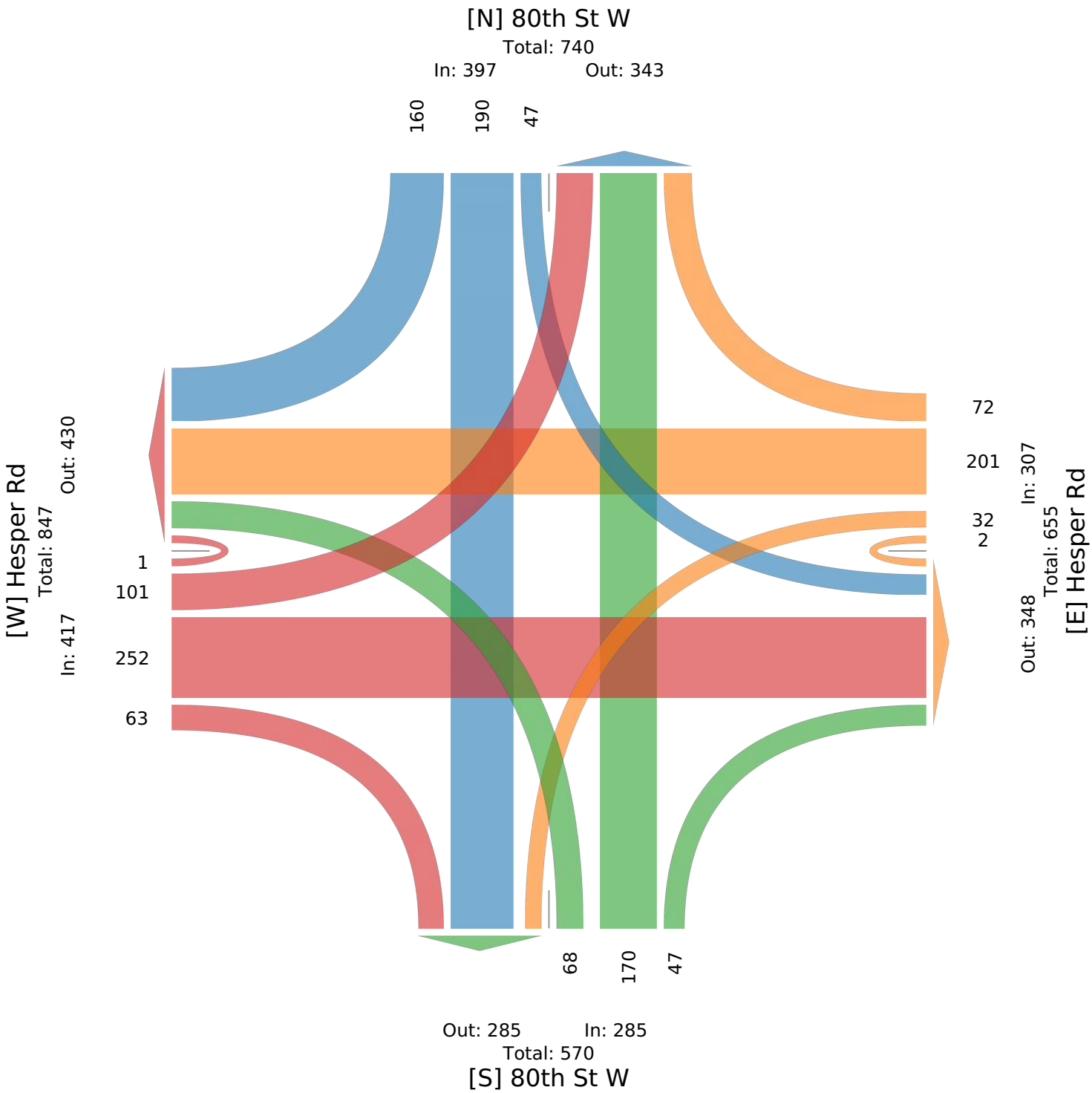
Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg	80th St W						Hesper Rd						80th St W						Hesper Rd						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2026-02-12 12:00AM	2	0	0	0	**2**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	**3**
1:00AM	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
2:00AM	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**
3:00AM	0	0	0	0	**0**	0	1	0	0	0	**1**	0	1	0	0	0	**1**	0	1	0	0	0	**1**	0	**3**
4:00AM	0	1	0	0	**1**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	2	0	0	**2**	0	**4**
5:00AM	0	3	1	0	**4**	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	12	2	0	**14**	0	**19**
6:00AM	2	8	3	0	**13**	0	3	9	0	0	**12**	0	0	3	1	0	**4**	0	4	32	7	0	**43**	0	**72**
7:00AM	6	8	4	0	**18**	0	2	9	1	1	**13**	0	3	9	1	0	**13**	0	11	44	19	0	**74**	0	**118**
8:00AM	4	16	4	0	**24**	0	7	9	1	0	**17**	0	2	12	3	0	**17**	0	9	13	12	0	**34**	0	**92**
9:00AM	4	13	3	0	**20**	0	3	8	2	1	**14**	0	1	13	4	0	**18**	0	1	15	4	0	**20**	0	**72**
10:00AM	8	12	6	0	**26**	0	4	8	1	0	**13**	0	3	14	2	0	**19**	0	5	7	9	0	**21**	0	**79**
11:00AM	8	13	4	0	**25**	0	7	8	5	0	**20**	0	6	14	4	0	**24**	0	6	10	3	0	**19**	0	**88**
12:00PM	10	13	5	0	**28**	0	8	8	4	0	**20**	0	2	14	2	0	**18**	0	3	11	5	0	**19**	0	**85**
1:00PM	9	10	3	0	**22**	0	4	13	2	0	**19**	0	5	6	2	0	**13**	0	1	11	7	0	**19**	0	**73**
2:00PM	7	15	4	0	**26**	0	5	10	1	0	**16**	0	3	14	3	0	**20**	0	4	20	2	0	**26**	0	**88**
3:00PM	16	13	3	0	**32**	0	6	22	1	0	**29**	0	0	17	7	0	**24**	0	3	16	6	0	**25**	0	**110**
4:00PM	17	19	3	0	**39**	0	6	25	5	0	**36**	0	4	16	9	0	**29**	0	4	19	7	0	**30**	0	**134**
5:00PM	24	22	2	0	**48**	0	12	32	4	0	**48**	0	6	14	7	0	**27**	0	8	17	14	0	**39**	0	**162**
6:00PM	10	4	1	0	**15**	0	1	9	2	0	**12**	0	7	8	7	0	**22**	0	1	12	2	0	**15**	0	**64**
7:00PM	10	7	1	0	**18**	0	1	17	1	0	**19**	0	1	4	3	0	**8**	0	0	5	2	0	**7**	0	**52**
8:00PM	9	6	0	0	**15**	0	1	6	0	0	**7**	0	2	6	6	0	**14**	0	1	4	0	0	**5**	0	**41**
9:00PM	10	4	0	0	**14**	0	1	4	1	0	**6**	0	0	3	3	0	**6**	0	1	1	0	1	**3**	0	**29**
10:00PM	2	2	0	0	**4**	0	0	2	0	0	**2**	0	0	0	1	0	**1**	0	0	1	0	0	**1**	0	**8**
11:00PM	1	1	0	0	**2**	0	0	1	1	0	**2**	0	1	0	3	0	**4**	0	0	0	0	0	**0**	0	**8**
Total	160	190	47	0	**397**	0	72	201	32	2	**307**	0	47	170	68	0	**285**	0	63	252	101	1	**417**	0	**1406**
% Approach	40.3%	47.9%	11.8%	0%	**-**	-	23.5%	65.5%	10.4%	0.7%	**-**	-	16.5%	59.6%	23.9%	0%	**-**	-	15.1%	60.4%	24.2%	0.2%	**-**	-	-
% Total	11.4%	13.5%	3.3%	0%	**28.2%**	-	5.1%	14.3%	2.3%	0.1%	**21.8%**	-	3.3%	12.1%	4.8%	0%	**20.3%**	-	4.5%	17.9%	7.2%	0.1%	**29.7%**	-	-
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	1
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.6%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Lights	156	183	43	0	**382**	-	70	192	31	2	**295**	-	45	169	67	0	**281**	-	62	241	98	1	**402**	-	1360
% Lights	97.5%	96.3%	91.5%	0%	**96.2%**	-	97.2%	95.5%	96.9%	100%	**96.1%**	-	95.7%	99.4%	98.5%	0%	**98.6%**	-	98.4%	95.6%	97.0%	100%	**96.4%**	-	96.7%
Single-Unit Trucks	2	6	2	0	**10**	-	2	7	0	0	**9**	-	0	0	1	0	**1**	-	0	7	3	0	**10**	-	30
% Single-Unit Trucks	1.3%	3.2%	4.3%	0%	**2.5%**	-	2.8%	3.5%	0%	0%	**2.9%**	-	0%	0%	1.5%	0%	**0.4%**	-	0%	2.8%	3.0%	0%	**2.4%**	-	2.1%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1	0	0	0	**1**	-	1
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	1.6%	0%	0%	0%	**0.2%**	-	0.1%
Buses	2	1	2	0	**5**	-	0	2	1	0	**3**	-	2	0	0	0	**2**	-	0	4	0	0	**4**	-	14
% Buses	1.3%	0.5%	4.3%	0%	**1.3%**	-	0%	1.0%	3.1%	0%	**1.0%**	-	4.3%	0%	0%	0%	**0.7%**	-	0%	1.6%	0%	0%	**1.0%**	-	1.0%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Hesper Rd & 80th St W - TMC
Thu Feb 12, 2026
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US



Hesper Rd & 80th St W - TMC

Thu Feb 12, 2026
AM Peak (7 AM - 8 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

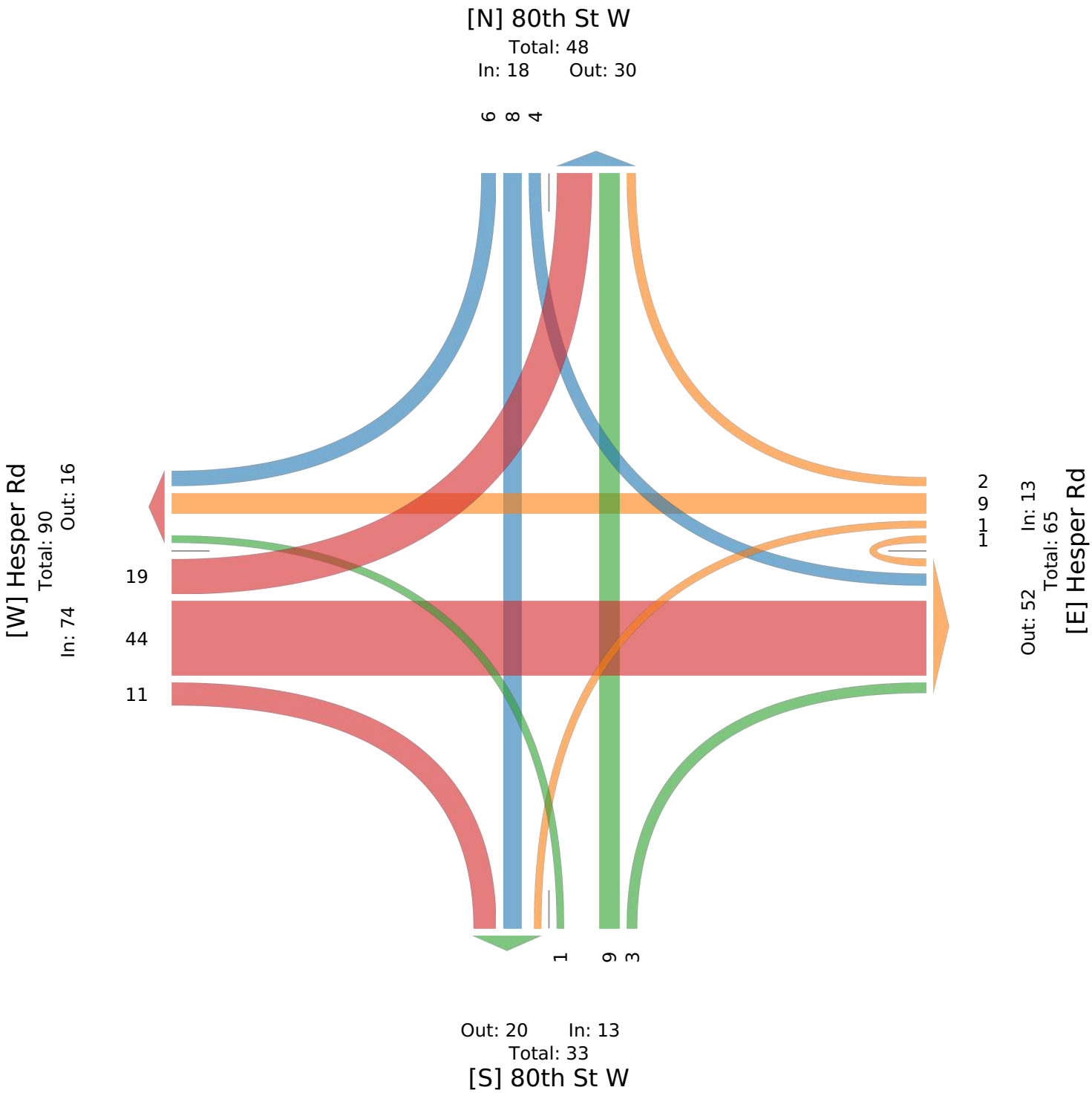
Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg	80th St W						Hesper Rd						80th St W						Hesper Rd						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	**Int**
2026-02-12 7:00AM	4	0	0	0	**4**	0	1	1	1	0	**3**	0	1	4	0	0	**5**	0	1	14	3	0	**18**	0	**30**
7:15AM	0	1	0	0	**1**	0	0	2	0	0	**2**	0	1	1	0	0	**2**	0	3	5	6	0	**14**	0	**19**
7:30AM	1	6	0	0	**7**	0	0	0	0	0	**0**	0	0	4	1	0	**5**	0	2	14	9	0	**25**	0	**37**
7:45AM	1	1	4	0	**6**	0	1	6	0	1	**8**	0	1	0	0	0	**1**	0	5	11	1	0	**17**	0	**32**
Total	6	8	4	0	**18**	0	2	9	1	1	**13**	0	3	9	1	0	**13**	0	11	44	19	0	**74**	0	**118**
% Approach	33.3%	44.4%	22.2%	0%	**-**	-	15.4%	69.2%	7.7%	7.7%	**-**	-	23.1%	69.2%	7.7%	0%	**-**	-	14.9%	59.5%	25.7%	0%	**-**	-	-
% Total	5.1%	6.8%	3.4%	0%	**15.3%**	-	1.7%	7.6%	0.8%	0.8%	**11.0%**	-	2.5%	7.6%	0.8%	0%	**11.0%**	-	9.3%	37.3%	16.1%	0%	**62.7%**	-	-
PHF	0.375	0.333	0.250	-	**0.643**	-	0.500	0.375	0.250	0.250	**0.406**	-	0.750	0.563	0.250	-	**0.650**	-	0.550	0.786	0.528	-	**0.740**	-	0.797
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Lights	6	8	2	0	**16**	-	2	8	1	1	**12**	-	3	9	1	0	**13**	-	11	43	19	0	**73**	-	114
% Lights	100%	100%	50.0%	0%	**88.9%**	-	100%	88.9%	100%	100%	**92.3%**	-	100%	100%	100%	0%	**100%**	-	100%	97.7%	100%	0%	**98.6%**	-	96.6%
Single-Unit Trucks	0	0	1	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Single-Unit Trucks	0%	0%	25.0%	0%	**5.6%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.8%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Buses	0	0	1	0	**1**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	3
% Buses	0%	0%	25.0%	0%	**5.6%**	-	0%	11.1%	0%	0%	**7.7%**	-	0%	0%	0%	0%	**0%**	-	0%	2.3%	0%	0%	**1.4%**	-	2.5%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Hesper Rd & 80th St W - TMC
Thu Feb 12, 2026
AM Peak (7 AM - 8 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US



Hesper Rd & 80th St W - TMC

Thu Feb 12, 2026
Midday Peak (11:15 AM - 12:15 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg / Direction	80th St W Southbound						Hesper Rd Westbound						80th St W Northbound						Hesper Rd Eastbound						
Time	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	**Int**
2026-02-12 11:15AM	3	3	0	0	**6**	0	1	3	2	0	**6**	0	1	4	2	0	**7**	0	2	3	0	0	**5**	0	**24**
11:30AM	3	3	2	0	**8**	0	1	1	0	0	**2**	0	2	3	1	0	**6**	0	2	5	1	0	**8**	0	**24**
11:45AM	1	3	1	0	**5**	0	1	1	2	0	**4**	0	1	3	1	0	**5**	0	0	1	1	0	**2**	0	**16**
12:00PM	4	5	4	0	**13**	0	2	0	1	0	**3**	0	0	3	0	0	**3**	0	1	4	1	0	**6**	0	**25**
Total	11	14	7	0	**32**	0	5	5	5	0	**15**	0	4	13	4	0	**21**	0	5	13	3	0	**21**	0	**89**
% Approach	34.4%	43.8%	21.9%	0%	**-**	-	33.3%	33.3%	33.3%	0%	**-**	-	19.0%	61.9%	19.0%	0%	**-**	-	23.8%	61.9%	14.3%	0%	**-**	-	**-**
% Total	12.4%	15.7%	7.9%	0%	**36.0%**	-	5.6%	5.6%	5.6%	0%	**16.9%**	-	4.5%	14.6%	4.5%	0%	**23.6%**	-	5.6%	14.6%	3.4%	0%	**23.6%**	-	**-**
PHF	0.688	0.700	0.438	-	**0.615**	-	0.625	0.417	0.625	-	**0.625**	-	0.500	0.813	0.500	-	**0.750**	-	0.625	0.650	0.750	-	**0.656**	-	0.890
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Lights	11	14	7	0	**32**	-	5	5	5	0	**15**	-	4	13	4	0	**21**	-	5	12	3	0	**20**	-	88
% Lights	100%	100%	100%	0%	**100%**	-	100%	100%	100%	0%	**100%**	-	100%	100%	100%	0%	**100%**	-	100%	92.3%	100%	0%	**95.2%**	-	98.9%
Single-Unit Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	1
% Single-Unit Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	7.7%	0%	0%	**4.8%**	-	1.1%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Buses	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Buses	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Hesper Rd & 80th St W - TMC
Thu Feb 12, 2026
Midday Peak (11:15 AM - 12:15 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
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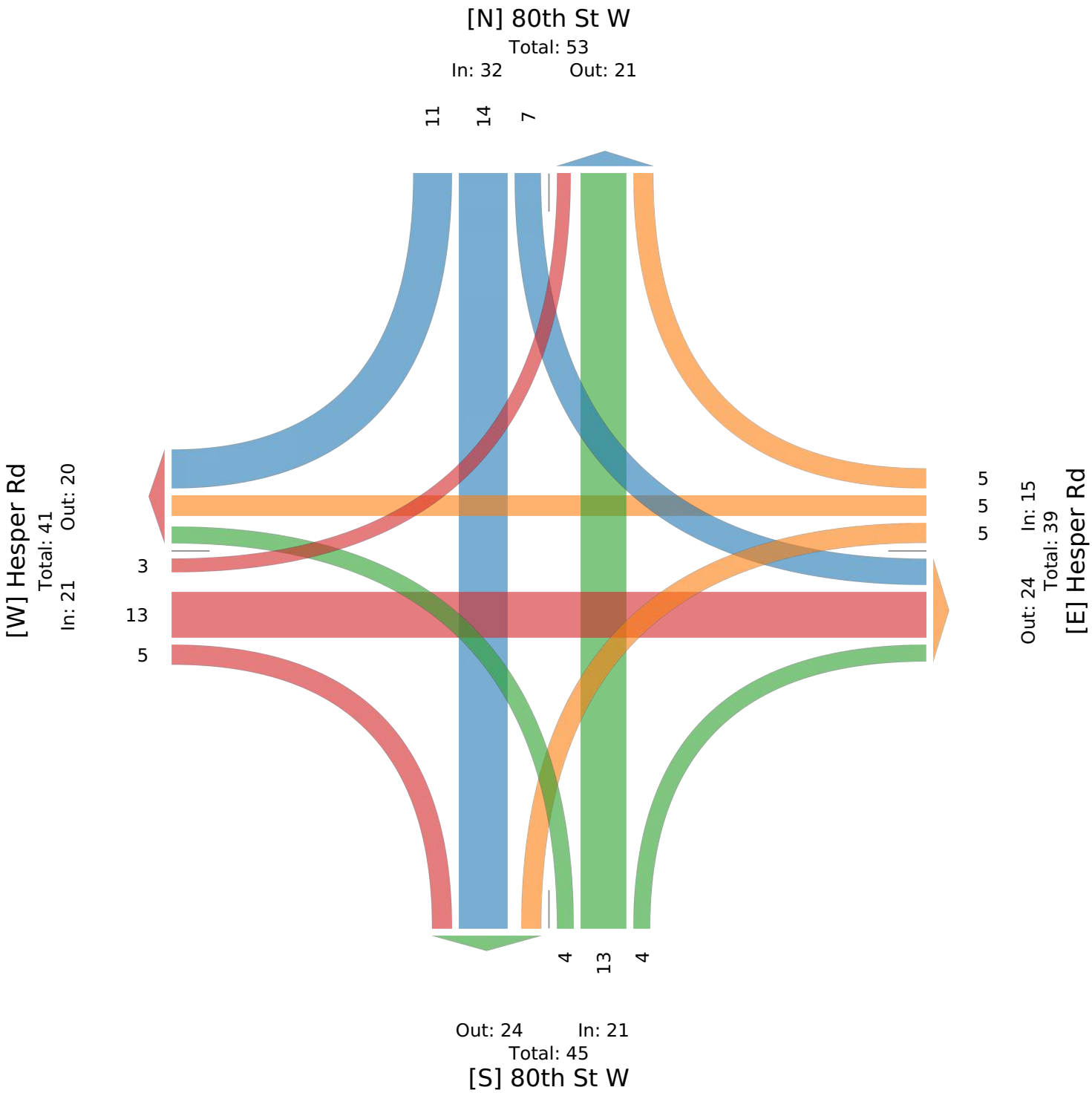

Hesper Rd & 80th St W - TMC

Thu Feb 12, 2026
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

Provided by: IMEG Corp.
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US

Leg / Direction	80th St W Southbound						Hesper Rd Westbound						80th St W Northbound						Hesper Rd Eastbound						
Time	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	**Int**
2026-02-12 4:45PM	7	5	1	0	**13**	0	0	5	2	0	**7**	0	2	5	3	0	**10**	0	1	6	0	0	**7**	0	**37**
5:00PM	8	6	1	0	**15**	0	9	12	0	0	**21**	0	1	0	2	0	**3**	0	4	3	1	0	**8**	0	**47**
5:15PM	6	10	1	0	**17**	0	0	5	1	0	**6**	0	1	5	1	0	**7**	0	1	4	5	0	**10**	0	**40**
5:30PM	5	3	0	0	**8**	0	2	8	2	0	**12**	0	2	6	3	0	**11**	0	1	5	5	0	**11**	0	**42**
Total	26	24	3	0	**53**	0	11	30	5	0	**46**	0	6	16	9	0	**31**	0	7	18	11	0	**36**	0	**166**
% Approach	49.1%	45.3%	5.7%	0%	**-**	-	23.9%	65.2%	10.9%	0%	**-**	-	19.4%	51.6%	29.0%	0%	**-**	-	19.4%	50.0%	30.6%	0%	**-**	-	**-**
% Total	15.7%	14.5%	1.8%	0%	**31.9%**	-	6.6%	18.1%	3.0%	0%	**27.7%**	-	3.6%	9.6%	5.4%	0%	**18.7%**	-	4.2%	10.8%	6.6%	0%	**21.7%**	-	**-**
PHF	0.813	0.600	0.750	-	**0.779**	-	0.306	0.625	0.625	-	**0.548**	-	0.750	0.667	0.750	-	**0.705**	-	0.438	0.750	0.550	-	**0.818**	-	0.883
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Lights	26	24	3	0	**53**	-	11	30	5	0	**46**	-	6	16	9	0	**31**	-	7	18	11	0	**36**	-	166
% Lights	100%	100%	100%	0%	**100%**	-	100%	100%	100%	0%	**100%**	-	100%	100%	100%	0%	**100%**	-	100%	100%	100%	0%	**100%**	-	100%
Single-Unit Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Single-Unit Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Buses	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Buses	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Hesper Rd & 80th St W - TMC
Thu Feb 12, 2026
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 1377915, Location: 45.740713, -108.720232

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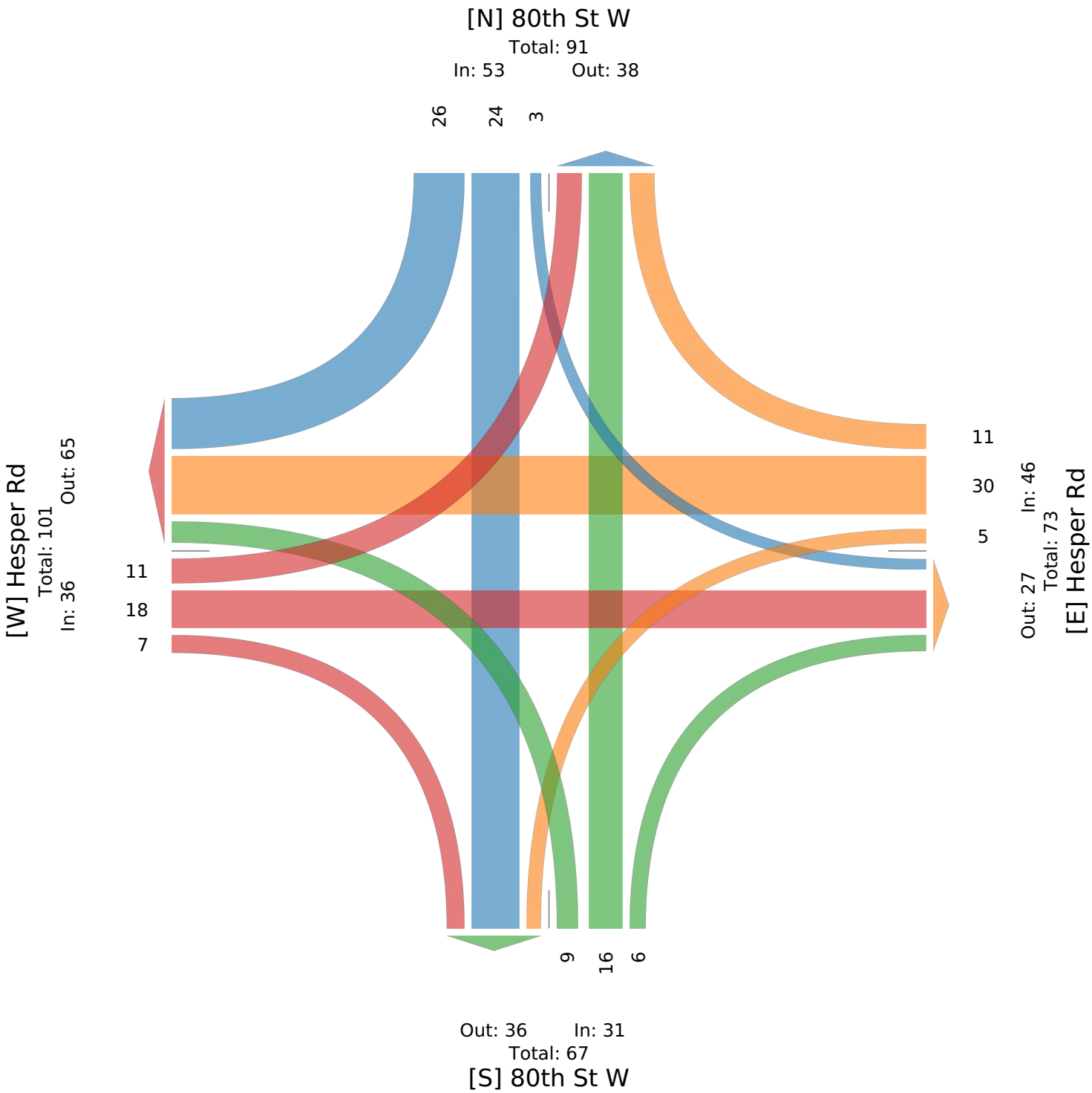
401 E. State Street, 4th Floor,
Rockford, IL, 61104, US



Shop House Acres Major Subdivision

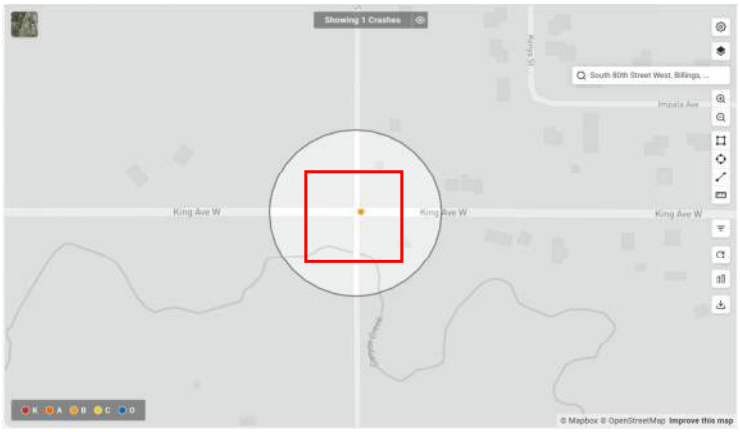
Traffic Impact Study

APPENDIX I

Intersection Crash Data (2020-2024)

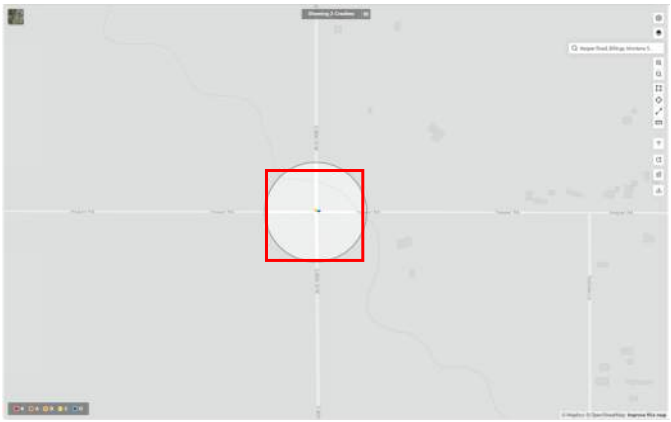
King Avenue West & South 80th Street West

Crash Record Number	Crash Date	Collision Type	Road Surface Condition	Crash Injury Severity	Type A Inj Crash?	Type B Inj Crash?	Type C Inj Crash?	Fatal Crash?
50197108	2/3/2024	Right Angle	Dry	Suspected Minor Injury	No	No	Yes	No



Hesper Road & South 80th Street West

Crash Record Number	Crash Date	Collision Type	Road Surface Condition	Crash Injury Severity	Type A Inj Crash?	Type B Inj Crash?	Type C Inj Crash?	Fatal Crash?
50144597	6/10/2024	Right Angle	Dry	No apparent Injury (property damage only crash)	No	No	No	No
50179153	9/23/2022	Right Angle	Dry	Possible injury crash	No	No	Yes	No



KABCO Injury Classification Scale and Definitions

STATE	INJURY CODES	CONVERSION	DEFINITIONS / INSTRUCTIONS / NOTES	SOURCE	LOCATION
MONTANA	???? to Present		*Documentation not available, years unknown.*	**MT Crash Investigator's Report Instruction Manual**	codes found on Manual pg19 *(PDF pg24).*
	0 – No Injury	O		15 INJURY CLASSIFICATION	
	1 – Possible Injury	C	Possible injury: A possible injury is any injury reported or claimed which is not a fatal injury, incapacitating injury, non-incapacitating evident injury.	15 INJURY CLASSIFICATION	
	2 – Non-incapacitating Evident Injury	B	Nonincapacitating evident injury: A nonincapacitating evident injury is any injury, other than a fatal injury or an incapacitating injury, which is evident to observers at the scene of the accident in which the injury occurred.	15 INJURY CLASSIFICATION	
	3 – Incapacitating Injury	A	Incapacitating injury: An incapacitating injury is any injury, other than a fatal injury, which prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred.	15 INJURY CLASSIFICATION	
	4 – Fatal Injury	K	Fatal Injury: A fatal injury is any injury that results in death. If any injury results in death within 30 days after the road vehicle accident in which the injury occurred, the injury classification should be changed to fatal injury.	15 INJURY CLASSIFICATION	
	5 – Injury, Severity Unknown			15 INJURY CLASSIFICATION	
	6 – Died Prior to Accident			15 INJURY CLASSIFICATION	
	9 – Unknown	U		15 INJURY CLASSIFICATION	

Found at: https://safety.fhwa.dot.gov/hsip/spm/conversion_tbl/pdfs/kabco_ctable_by_state.pdf

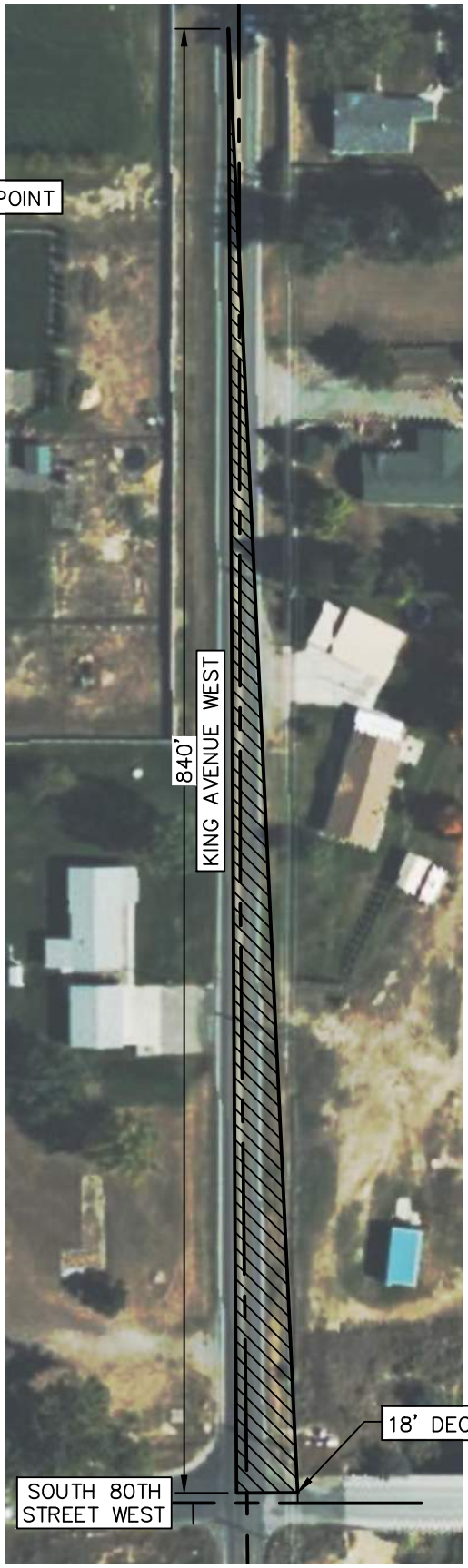
Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX J

Intersection Sight Distance Figures

SOUTH 80TH ST. WEST NB–RIGHT TURN



SOUTH 80TH ST. WEST NB–LEFT TURN

0 100

SCALE: 1" = 100'

3/6/26 G:\2025\25006765.00\DESIGN\CIVIL_CALCSSTUDYS\TRAFFIC STUDY\010 - APPENDICES (LWING)\APPENDIX J_SIGHT DISTANCE FIGURES\25006765.00_SHOP HOUSE ACRES_SIGHT DISTANCE.DWG

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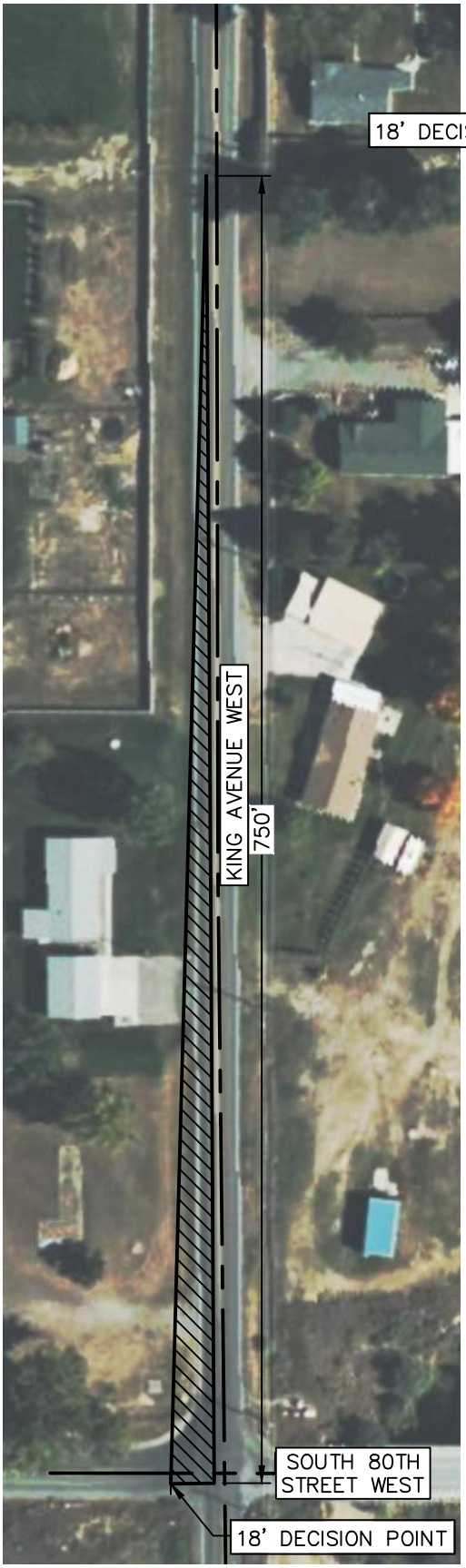
INTERSECTION #1 NB SIGHT DISTANCE

EXHIBIT

J - 1



SOUTH 80TH ST. WEST SB–RIGHT TURN

SOUTH 80TH ST. WEST SB–LEFT TURN

0 100

SCALE: 1" = 100'

3/6/26 G:\2025\25006765.00\DESIGN\CIVIL_CALCSSTUDYS\TRAFFIC STUDY\010 - APPENDICES (LWING)\APPENDIX J_SIGHT DISTANCE FIGURES\25006765.00_SHOP HOUSE ACRES_SIGHT DISTANCE.DWG

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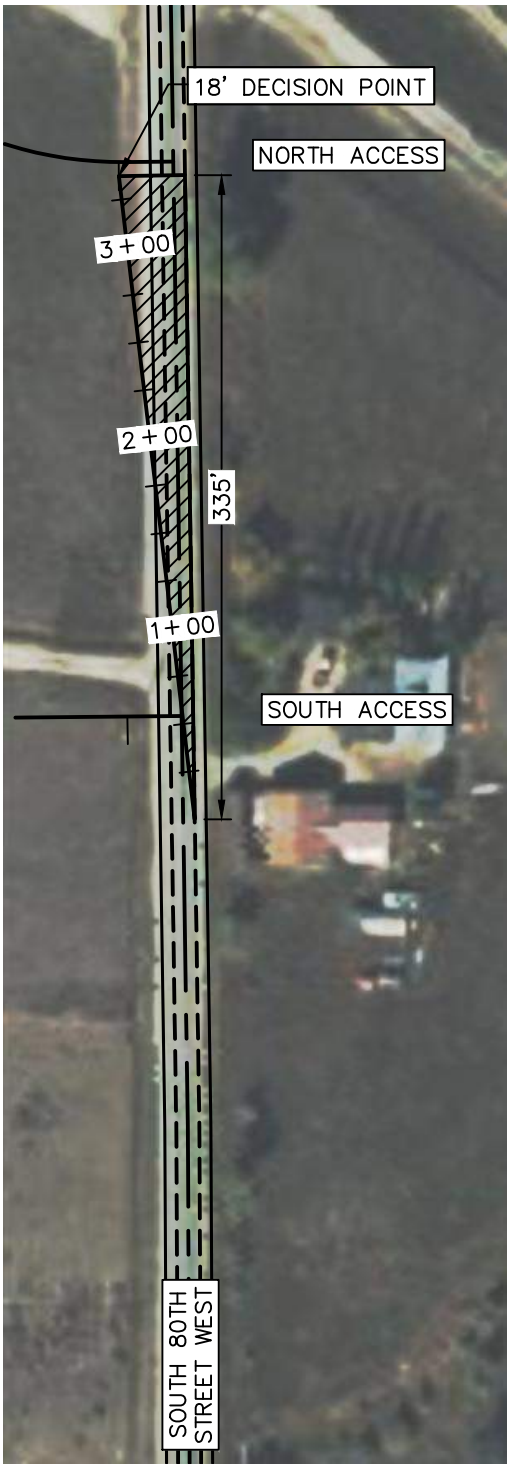
INTERSECTION #1 SB SIGHT DISTANCE

EXHIBIT

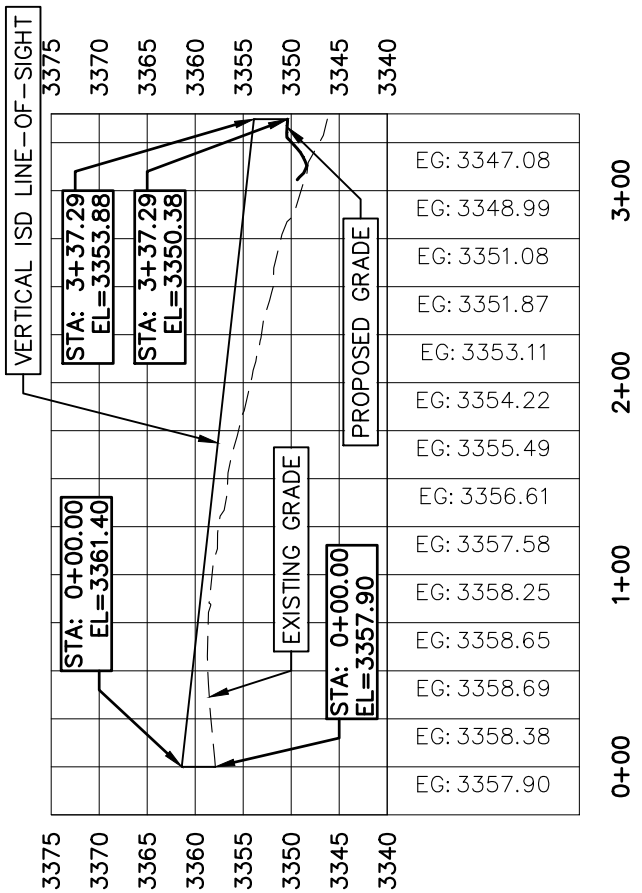
J - 2

0 100

SCALE: 1" = 100'



NORTH ACCESS LEFT TURN – CAR



NORTH ACCESS LEFT TURN – CAR PROFILE

SOUTH 80TH STREET WEST
POSTED SPEED=50MPH

ISD=1.47(SPEED [MPH]])(TIME GAP)
TIME GAP (CAR)[SEC.] = 7.5
DRIVER EYE HEIGHT = 3.5'
OBJECT HEIGHT = 3.5'

ISD (POSTED) = 550'
ISD (ADVISORY) = 335' = 30MPH

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NORTH ACCESS LT-CAR SIGHT DISTANCE

EXHIBIT

J - 3

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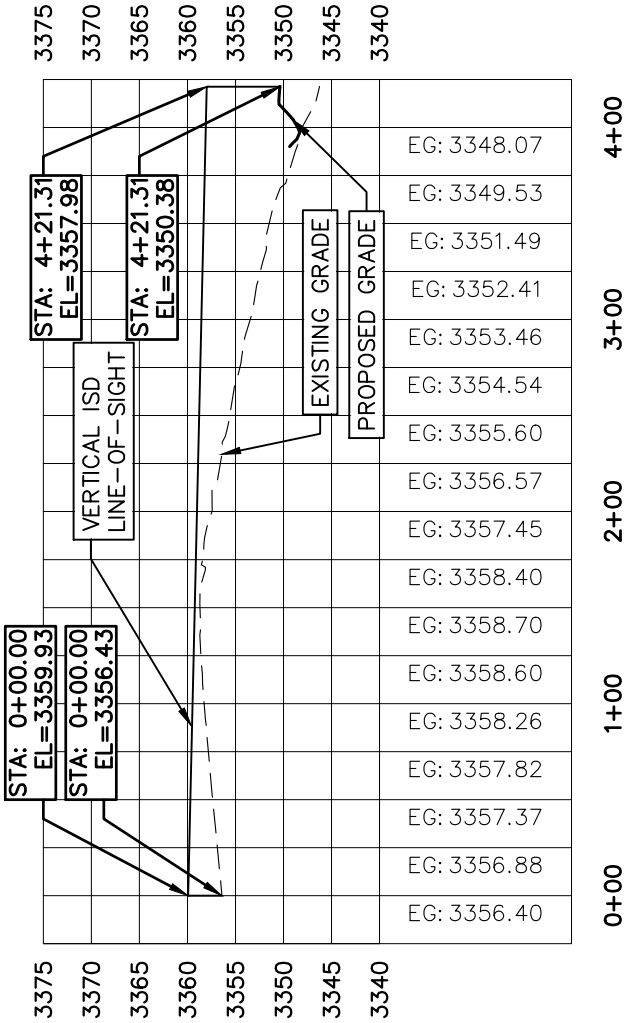
NORTH ACCESS LEFT TURN – TRUCK



NORTH ACCESS LEFT TURN – TRUCK PROFILE

SOUTH 80TH STREET WEST
POSTED SPEED=50MPH

ISD=1.47(SPEED [MPH]])(TIME GAP)
TIME GAP (TRUCK)[SEC.] = 9.5
DRIVER EYE HEIGHT = 7.6'
OBJECT HEIGHT = 3.5'

ISD (POSTED) = 700'
ISD (ADVISORY) = 420' = 30MOH

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NORTH ACCESS LT-TRUCK SIGHT DISTANCE

EXHIBIT
J - 4

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SOUTH 80TH STREET WEST
POSTED SPEED=50MPH

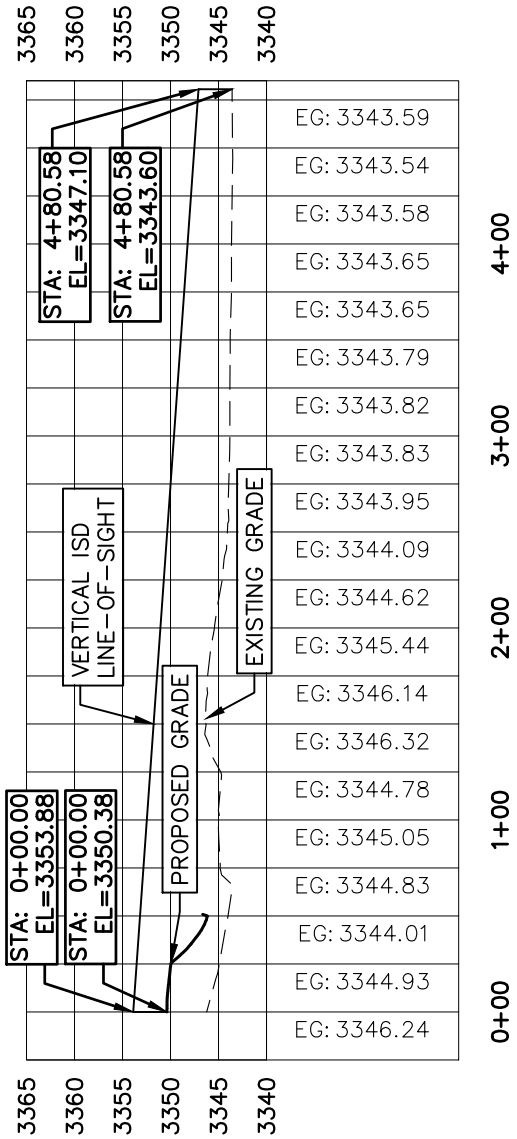
ISD=1.47(SPEED [MPH]])(TIME GAP)
TIME GAP (CAR)[SEC.] = 6.5
DRIVER EYE HEIGHT = 3.5'
OBJECT HEIGHT = 3.5'

ISD (POSTED) = 480'

0 100

SCALE: 1" = 100'

NORTH ACCESS RIGHT TURN – CAR



NORTH ACCESS RIGHT TURN – CAR PROFILE

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NORTH ACCESS RT-CAR SIGHT DISTANCE

EXHIBIT

J - 5

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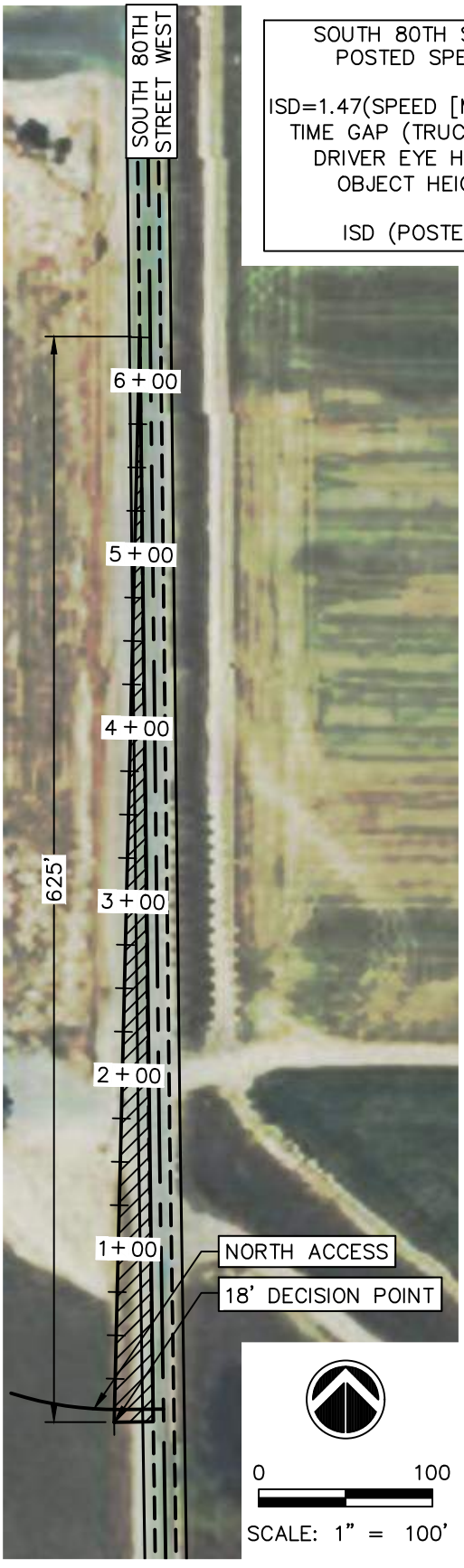
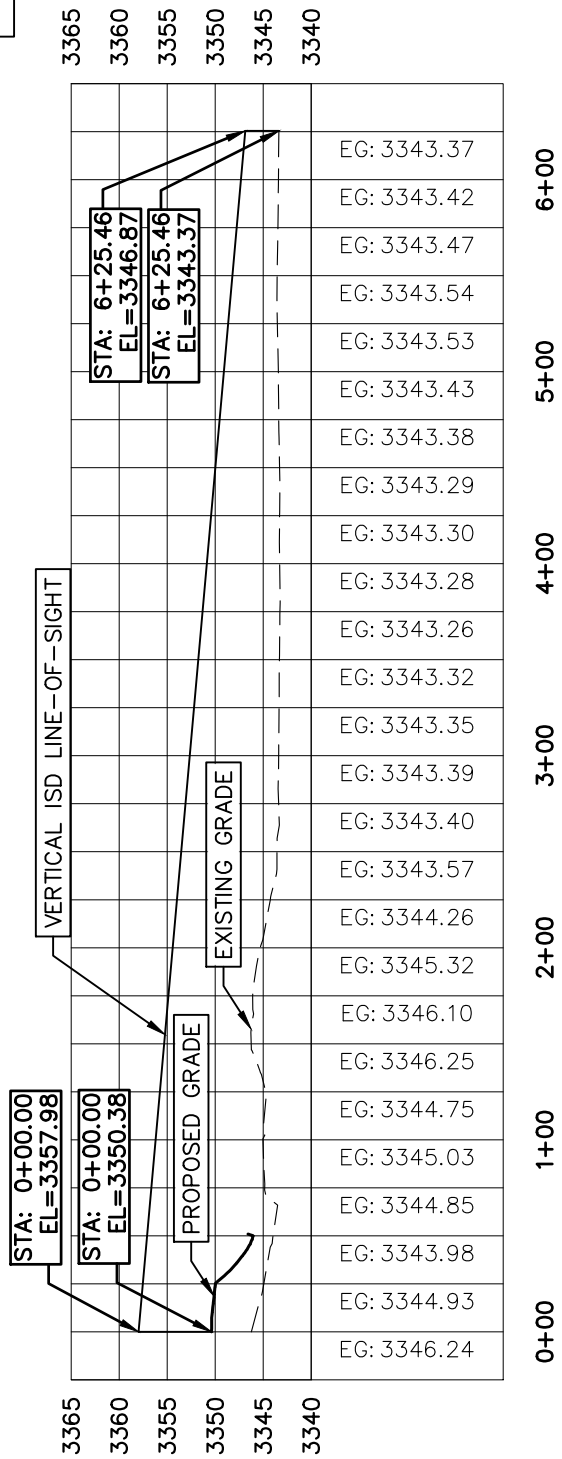


SOUTH 80TH STREET WEST
POSTED SPEED=50MPH

ISD=1.47(SPEED [MPH]])(TIME GAP)
TIME GAP (TRUCK)[SEC.] = 8.5
DRIVER EYE HEIGHT = 7.6'
OBJECT HEIGHT = 3.5'

ISD (POSTED) = 625'

NORTH ACCESS RIGHT TURN – TRUCK



NORTH ACCESS RIGHT TURN – TRUCK PROFILE

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NORTH ACCESS RT-TRUCK SIGHT DISTANCE

EXHIBIT
J - 6

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0 100

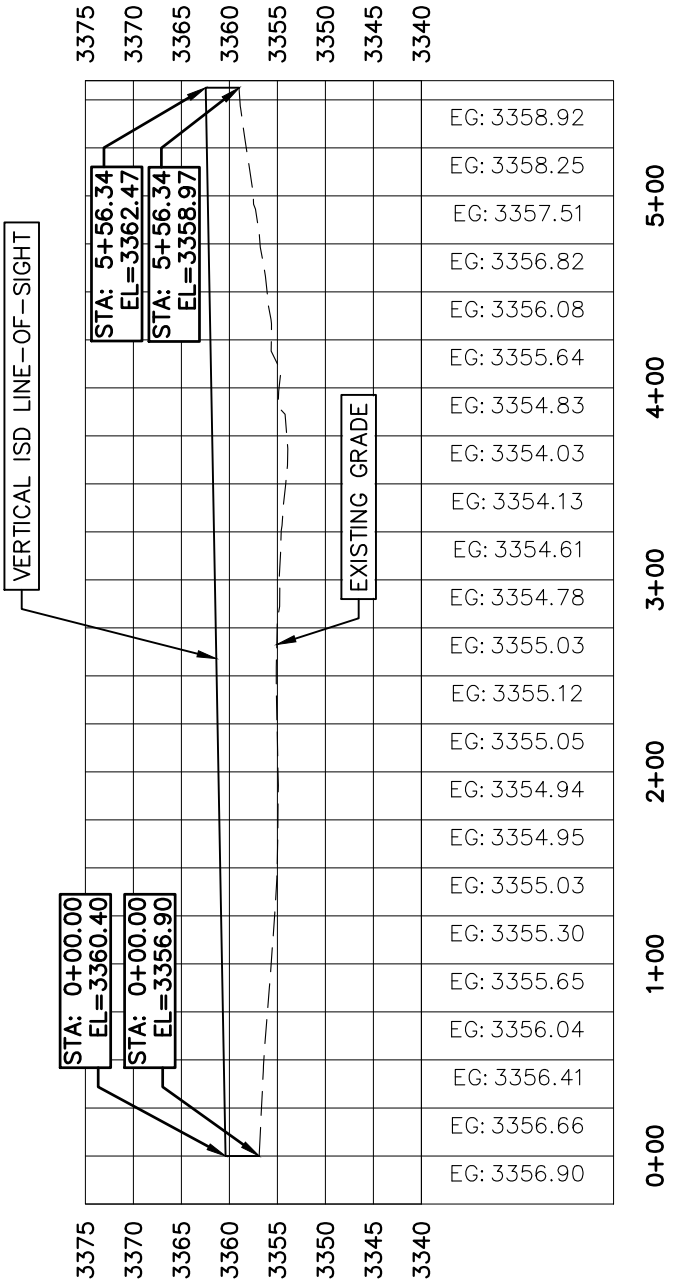
SCALE: 1" = 100'

SOUTH 80TH STREET WEST
POSTED SPEED=50MPH

ISD=1.47(SPEED [MPH]])(TIME GAP)
TIME GAP (CAR)[SEC.] = 7.5
DRIVER EYE HEIGHT = 3.5'
OBJECT HEIGHT = 3.5'

ISD (POSTED) = 550'

SOUTH ACCESS LEFT TURN – CAR



SOUTH ACCESS LEFT TURN – CAR PROFILE

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SOUTH ACCESS LT-CAR SIGHT DISTANCE

EXHIBIT

J - 7

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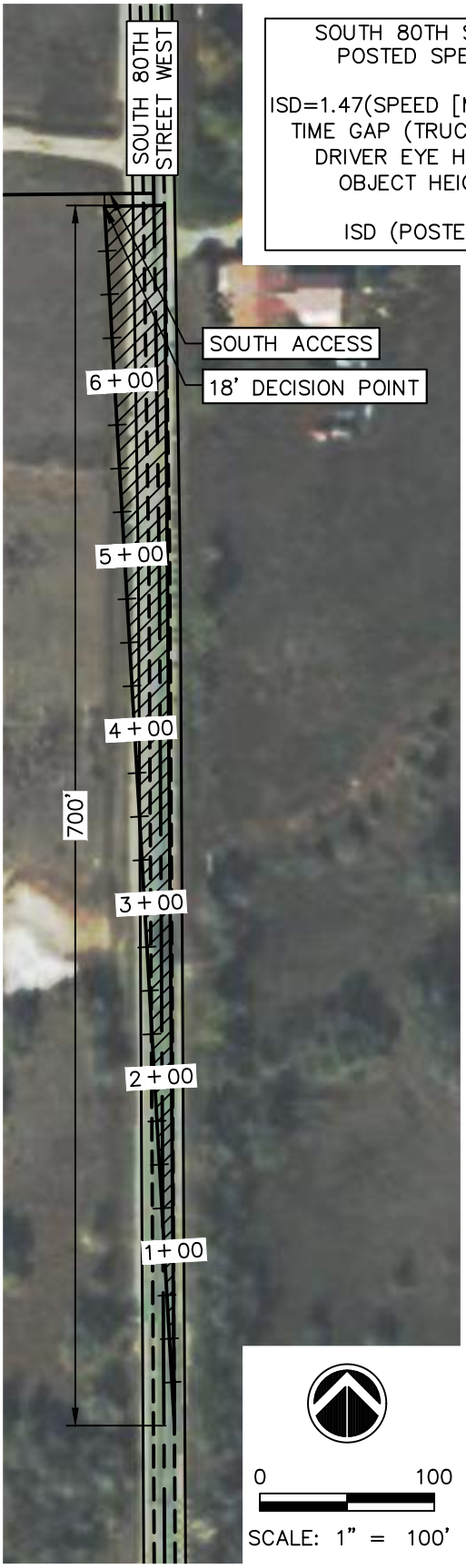
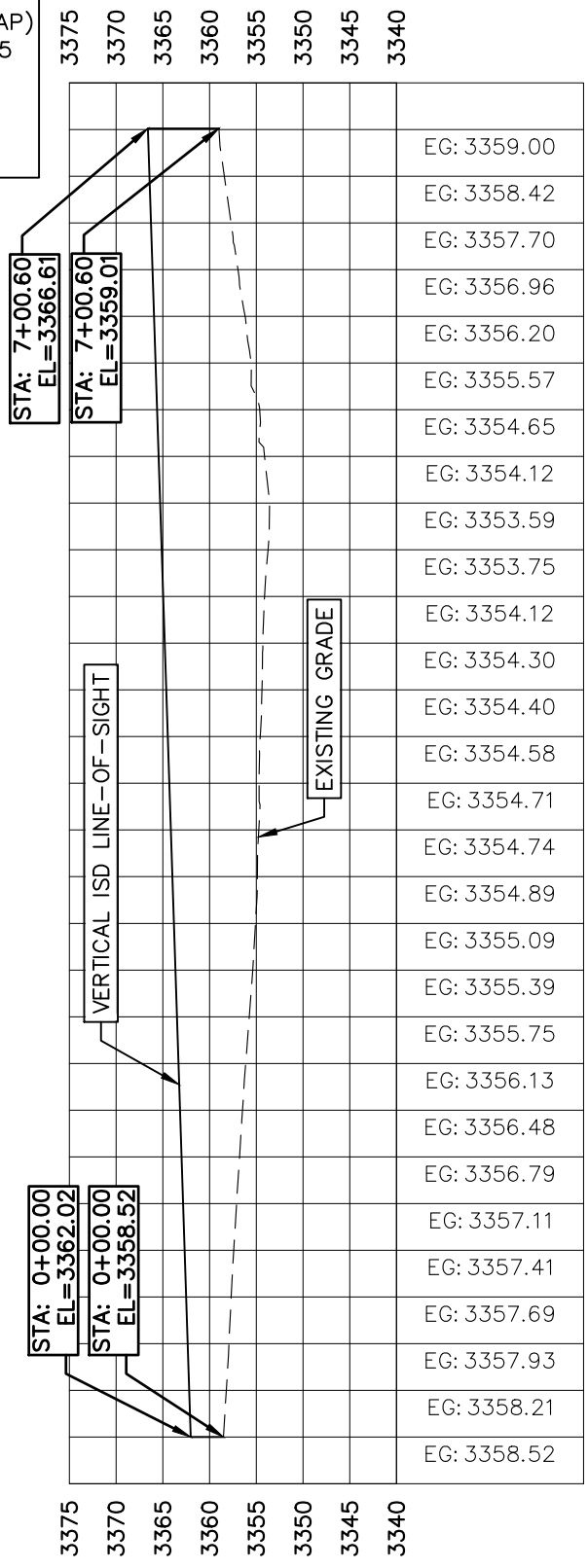


SOUTH 80TH STREET WEST
POSTED SPEED=50MPH

ISD=1.47(SPEED [MPH]])(TIME GAP)
TIME GAP (TRUCK)[SEC.] = 9.5
DRIVER EYE HEIGHT = 7.6'
OBJECT HEIGHT = 3.5'

ISD (POSTED) = 700'

SOUTH ACCESS LEFT TURN – TRUCK



SOUTH ACCESS LEFT TURN – TRUCK PROFILE

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SOUTH ACCESS LT-TRUCK SIGHT DISTANCE

EXHIBIT
J - 8

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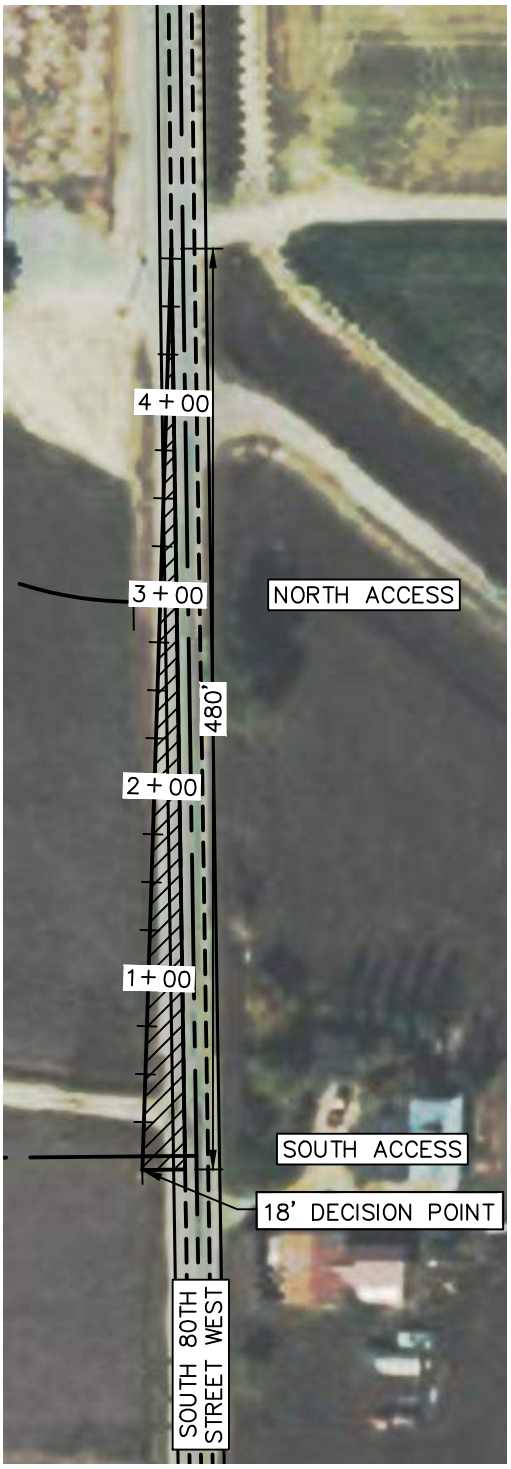
SOUTH 80TH STREET WEST
POSTED SPEED=50MPH

ISD=1.47(SPEED [MPH]])(TIME GAP)
TIME GAP (CAR)[SEC.] = 6.5
DRIVER EYE HEIGHT = 3.5'
OBJECT HEIGHT = 3.5'

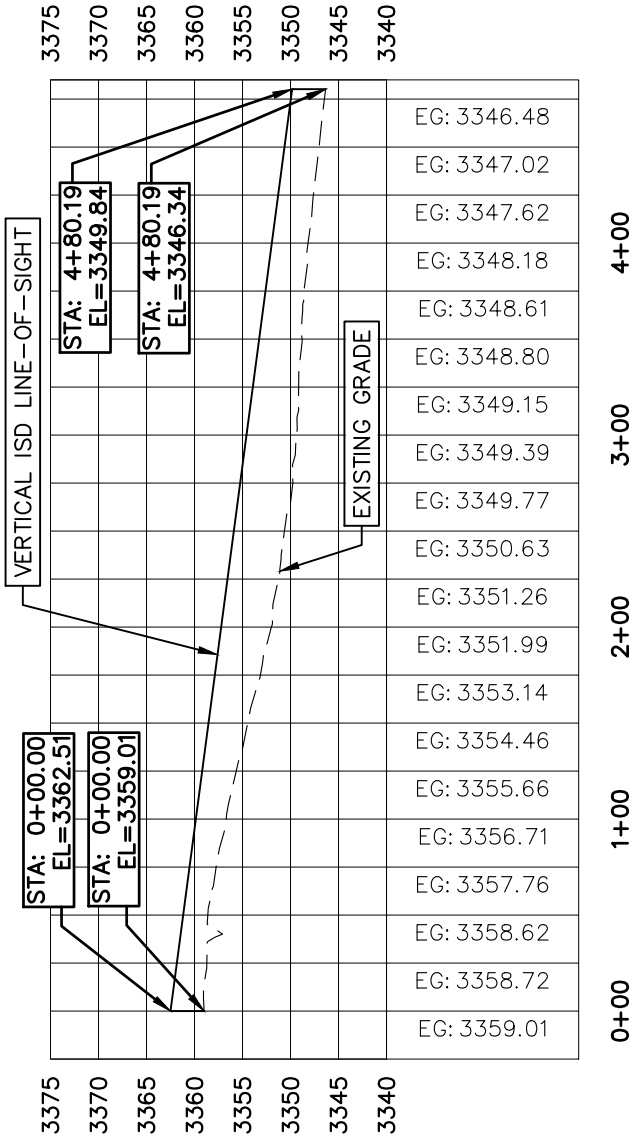
ISD (POSTED) = 480'

0 100

SCALE: 1" = 100'



SOUTH ACCESS RIGHT TURN – CAR



SOUTH ACCESS RIGHT TURN – CAR PROFILE

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SOUTH ACCESS RT-CAR SIGHT DISTANCE

EXHIBIT

J - 9

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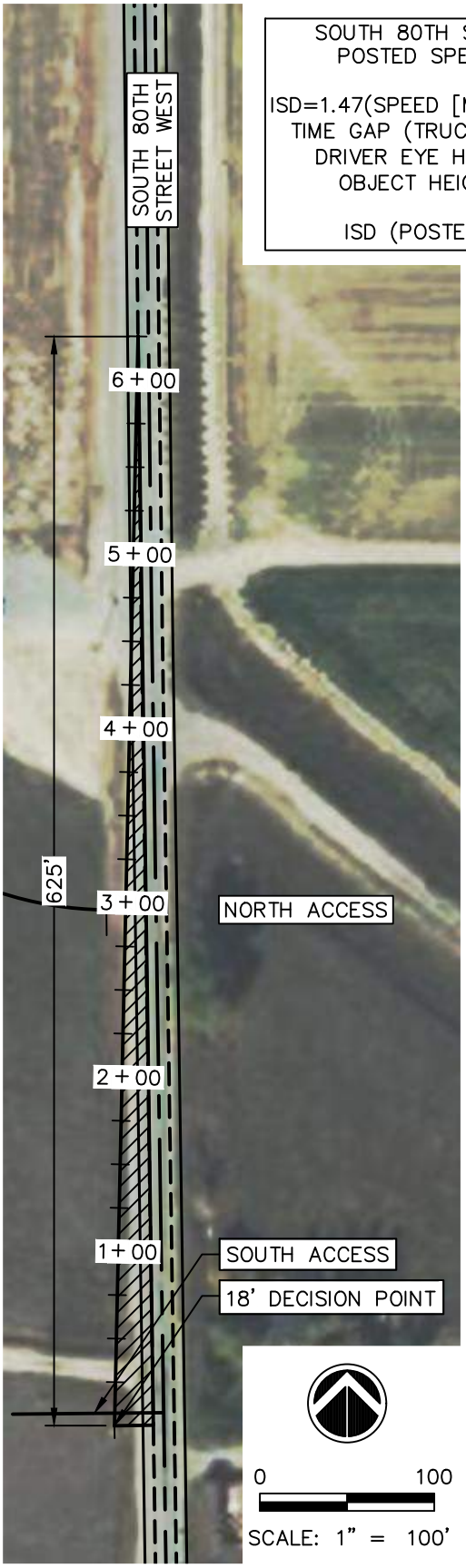
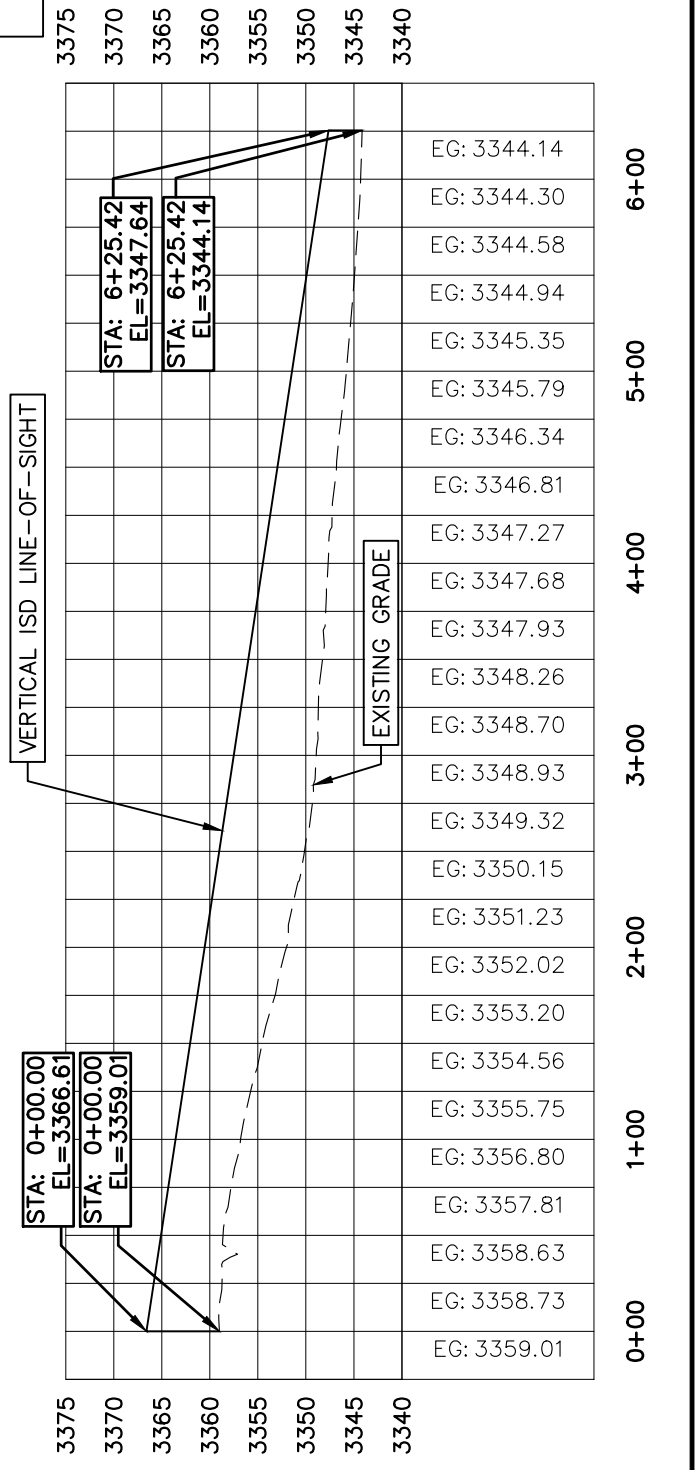


SOUTH 80TH STREET WEST
POSTED SPEED=50MPH

ISD=1.47(SPEED [MPH]])(TIME GAP)
TIME GAP (TRUCK)[SEC.] = 8.5
DRIVER EYE HEIGHT = 7.6'
OBJECT HEIGHT = 3.5'

ISD (POSTED) = 625'

SOUTH ACCESS LEFT TURN – TRUCK



SOUTH ACCESS LEFT TURN – TRUCK PROFILE

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SOUTH ACCESS LT-TRUCK SIGHT DISTANCE

EXHIBIT
J - 10

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SOUTH 80TH ST. WEST NB–RIGHT TURN

SOUTH 80TH ST. WEST NB–LEFT TURN

0 100

SCALE: 1" = 100'

3/6/26 G:\2025\25006765.00\DESIGN\CIVIL_CALCSSTUDYS\TRAFFIC STUDY\010 - APPENDICES (LWNG)\APPENDIX J_SIGHT DISTANCE FIGURES\25006765.00_SHOP HOUSE ACRES_SIGHT DISTANCE.DWG

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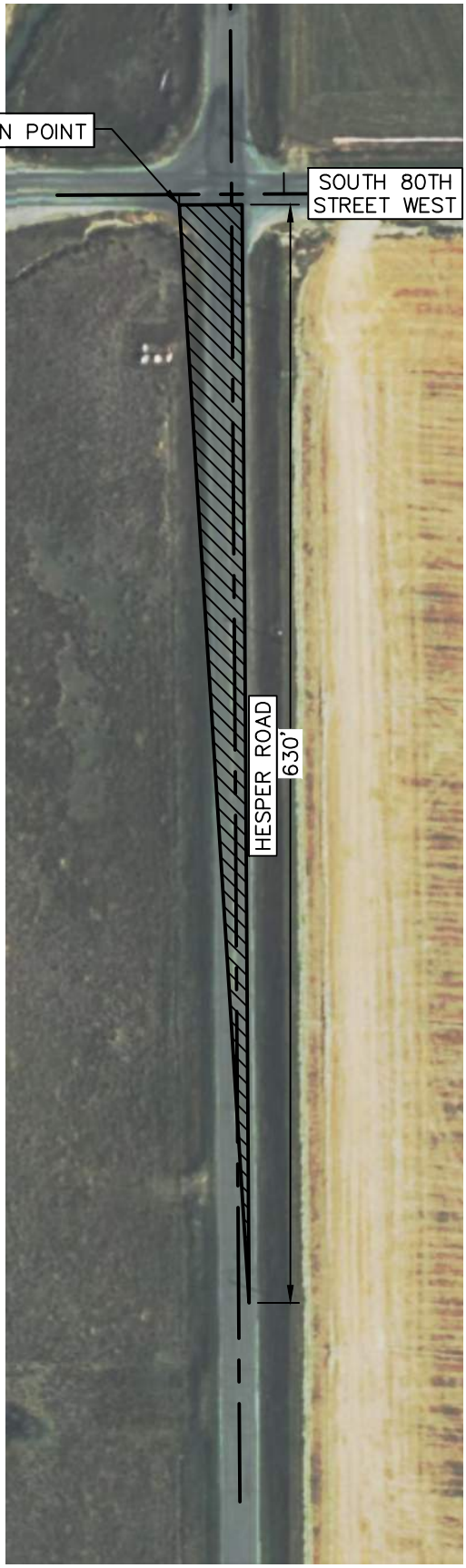
INTERSECTION #2 NB SIGHT DISTANCE

EXHIBIT

J - 7

SOUTH 80TH ST. WEST SB–RIGHT TURN



SOUTH 80TH ST. WEST SB–LEFT TURN

0 100

SCALE: 1" = 100'

3/6/26 G:\2025\25006765.00\DESIGN\CIVIL_CALCSSTUDYS\TRAFFIC STUDY\010 - APPENDICES (LWING)\APPENDIX J_SIGHT DISTANCE FIGURES\25006765.00_SHOP HOUSE ACRES_SIGHT DISTANCE.DWG

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INTERSECTION #2 SB SIGHT DISTANCE

EXHIBIT

J - 8

Shop House Acres Major Subdivision

Traffic Impact Study

APPENDIX K

Cost Participation

Intersection Cost Contribution
Project: Shop House Acres Major Subdivision
Prepared by: IMEG Corp.
Revised: 02/16/2026

Full Build Year: 2031

Intersection	Percent	Cost of Intersection	Contribution by Intersection
#1) King Ave. West & South 80th St. West	1.58%	$ 500,000	N/A
#2) Hesper Road & South 80th St West	1.17%	$ 500,000	N/A
		Total	**$ -**

Intersection:		**King Ave. West & South 80th St. West**				
Conditions:		**Existing 4-leg rual intersection with "STOP" signs controlling both the north and south legs of the intersection (South 80th St. West)**				
Approach		**AM Peak**		**PM Peak**		
		Mvmt Vol.	**Lane Vol.**	**Mvmt Vol.**	**Lane Vol.**	**Number of Lanes**
NB	**T**	4	4	3	3	1
	L	1	1	1	1	1
SB	**T**	2	2	5	5	1
	L	0	0	0	0	1
EB	**T**	0	0	0	0	1
	L	0	0	0	0	1
WB	**T**	0	0	0	0	1
	L	1	1	13	13	1
Critical Lane Sum Increase:			**5**		**19**	
Critical Lane Sum:			**1200**		**1200**	<--- 1200 for 4-leg intersection
Peak Hour %:			**0.4%**		**1.6%**	1140 for 3-leg intersection
Highest %:				**1.58%**		

Intersection:		**Hesper Road & South 80th St West**				
Conditions:		**Existing 4-leg rual intersection with "STOP" signs controlling both the north and south legs of the intersection (South 80th St. West)**				
Approach		**AM Peak**		**PM Peak**		
		Mvmt Vol.	**Lane Vol.**	**Mvmt Vol.**	**Lane Vol.**	**Number of Lanes**
NB	**T**	1	1	8	8	1
	L	0	0	0	0	1
SB	**T**	5	5	6	6	1
	L	3	3	1	1	1
EB	**T**	0	0	0	0	1
	L	3	3	5	5	1
WB	**T**	0	0	0	0	1
	L	0	0	0	0	1
Critical Lane Sum Increase:			**8**		**14**	
Critical Lane Sum:			**1200**		**1200**	<--- 1200 for 4-leg intersection
Peak Hour %:			**0.7%**		**1.2%**	1140 for 3-leg intersection
Highest %:				**1.17%**		