YELLOWSTONE COUNTY BOARD OF PLANNING

City of Billings and
Yellowstone County, Montana

AGENDA

APRIL 14, 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: https://ci.billings.mt.us/117/Agendas-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). 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 Brenda Berns, Planning Clerk at bernsb@billingsmt.gov or call 406-247-8610.

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. **MEETING MINUTES:**

   a. Minutes of March 24, 2026

   Attachments
   Minutes of March 24, 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).

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

   a. Plat Review. Board Discussion. Central Avenue Major Subdivision - Hunter Kelly, Planner I

   Attachments
   Preliminary Plat
   Draft Subdivision Improvement Agreement
   Findings of Fact
   Variance Request Letter
   Traffic Study

9. **OTHER BUSINESS:**

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

10. **FUTURE AGENDA ITEMS**

   a. TIP Amendment

11. **ADJOURNMENT**

Date:	04/14/2026
Title:	
Presented by:	
Department:	Planning & Community Services
Presentation:	

Information

RECOMMENDATION
Meeting Minutes of March 24, 2026

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

ALTERNATIVES
City Council may:

- Approve; or,
- Not Approve

FISCAL EFFECTS

Attachments

Minutes of March 24, 2026

CITY/COUNTY PLANNING BOARD

TUESDAY, MARCH 24, 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	05/26/2026	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																		
Roger Gravgaard	Billings Ward II	1	C	C	C	1	1																		
Dennie Stephenson	Billings Ward III	1	C	C	C	1	1																		
John Staley **PRESIDENT**	Billings Ward IV	1	C	C	C	1	1																		
David Nordel	Billings Ward V	V	C	C	C	A	A																		
Troy Boucher	YC District 1	1	C	C	C	A	V																		
Dennis Cook, **VICE PRESIDENT**	YC District 2	1	C	C	C	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																		
Vacant	YC District 7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scott Reiter Megan Trevino	Ex-Officio SD2	1 A	C C	C C	C C	1 A	1 A																		

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 4:30 PM

Introduction of Planning Board Members and Planning Department Staff
President Staley called for introductions of the members of the Planning Board and staff.

Attending Staff: Anna Vickers, Planning Division Manager; Brenda Berns, Planning Clerk

2. Approval of Agenda

Motion
Motion by Board member Dennie Stephenson to approve the agenda as submitted, second by Board member Cook. Motion passed unanimously.

3. Approval of Minutes: March 10, 2026

Motion
Motion by Board member Ronquillo to approve the March 10, 2026 meeting minutes, second by Board Member Stephenson. Motion passed unanimously.

4. Public Comment: None were received

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

6. Disclosure of Conflicts of Interest – None disclosed

7. Old Business – None

8**. New Business**

a. **Trailhead City Major Subdivision – Preliminary Plat. Public Hearing and Action**
Anna Vickers, Planning Division Manager

Ms. Vickers provided an overview of the proposed Trailhead City Major Subdivision and its general location, noting that the site is the former Holiday Inn property. The subdivision is proposed to consist of seven lots at .85 acres min to 3.32 acres max. Parkland dedication not required.
The site is currently served by existing infrastructure, with water and sewer lines available along Midland Road, as well as two established access points. Shared access splits lot 4 & 5
A traffic impact study was conducted evaluating four major roadways. Based on the findings, financial contributions for roadway improvements are not required, as the development does not meet the threshold of at least a 2% impact on critical traffic volumes. There were two intersections identified that this development would cause an additional impact of over 2%.

It was noted that only one of the evaluated intersections—South Billings Boulevard and Midland Road—falls under the jurisdiction of the City of Billings. The developer must coordinate with MDT.

Recommendation

- Staff recommend conditional approval subject to 4 conditions of approval.
- City Council is scheduled to review and act on the preliminary plat on April 27, 2026.

Conditions of Approval

1. To meet requirements of intersection contributions and for traffic safety, prior to final plat approval, the applicant will have MDT determination based on the TIS the agent provides to MDT, on any contributions required for the intersection of Midland Rd. and Mullowney Lane.
2. To provide locations and safe delivery and retrieval of individual mail, prior to final plat approval, the applicant will coordinate with the USPS to determine location of Central Box Units and provide the correct amount of space for safely delivering the mail to the businesses.
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
4. The final plat shall comply with all requirements of the City of Billings Subdivision regulations, rules, policies, and resolutions of the City of Billings, and the laws and Administrative Rules of the State of Montana.

Board Questions

The Board discussed the status of the existing building (former convention center), including whether it will remain and its relationship to the proposed subdivision. The applicant's representative clarified that their current involvement is limited to the subdivision process, with a future master site plan to address access, internal circulation, and parking, including parking in front of the existing building.

The Board noted that fire department connections (FDCs) and fire hydrant accessibility will be important considerations. Staff advised that fire department approval will be required as part of the master site plan review.

Questions were raised regarding potential future uses of the existing building. The applicant indicated that ownership representatives were available for questions.

Applicant: Tanner Gummersall

Mr. Gummersall stated that the property is being marketed as flexible space, with specific end users not yet determined.

Applicant's Agent: Craig Dalton, Performance Engineering

Mr. Dalton explained that the CMU2 zoning district allows for a broad range of commercial uses, including larger-scale commercial businesses such as grocery stores or big-box retail.

Public Hearing

President Staley opened the public hearing. No public comment was received.

The public hearing was closed.

Motion
Motion by Board Member Ronquillo to recommend approval of the subdivision, subject to the four (4) conditions of approval as outlined in the Staff Report. Seconded by Board Member Cook.
Vote: 6–0 – Motion carried; recommendation for approval.

Other Business
Ms. Vickers announced that the Billings2045 Plan will be presented during Billings Planning Week, April 6–8.
She noted that an Interim Planning Commission meeting originally scheduled for April 2 may be rescheduled due to multiple meetings that week, with a new date to be determined.
Discussion will include next steps in the planning process. Additional information and opportunities for public involvement are available at Billings2045.com.

Board Discussion
The Board discussed the status and availability of the Heights Plan. Staff indicated the plan will be made public prior to the April meeting and noted an upcoming public meeting scheduled for April 9. It was also noted that the Billings2045 Plan incorporates the Heights Plan, West End Plan, and annexation considerations.
Discussion included questions regarding potential development near MetraPark involving both City and County land. Staff clarified that the City is not proposing changes to County land uses or requiring annexation, and that future decisions by County Commissioners cannot be speculated upon.
The Board also discussed long-term connectivity opportunities, including potential connections along the 4th Avenue corridor. Staff noted that connectivity will be an important consideration in future transportation planning efforts.

The next Planning Board meeting will be Tuesday, April 14, 2026

Adjournment 4:50 PM

Brenda J Berns, Planning Clerk

Planning Board

Date:	04/14/2026
Title:	Central Avenue Subdivision, Major Preliminary Plat Review
Presented by:	Hunter Kelly, Planner 1
Department:	Planning & Community Services
Presentation:	Yes

Information

RECOMMENDATION

Staff recommends the Planning Board recommend to City Council that the preliminary plat of Central Avenue 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 November 3, 2025, Performance Engineering, on behalf of Kari Ellen, Donna Marie, and Diana Lynne Barber, applied for preliminary plat approval for Central Avenue Subdivision. The proposed subdivision creates nine (9) lots for development. The subject property is generally located north of Central Avenue, south of Broadwater Avenue, and west 44th Street West. The property is currently zoned in the county as A-Agriculture. There is a concurrent zone application for annexation with a proposed Planned Neighborhood Development that includes the zonings of Corridor Mixed Use 1 (CMU1), Mixed Residential 1 (NX1), Mid-Century Neighborhood Residential (N2), Suburban Neighborhood Residential (N3), and Parks and Open space (P1).

VARIANCES

Two variances are requested:

1. Variance from Section 23-406-A.1: Streets and Roads, A, 1. Said section requires developments to provide connections from the subdivision to undeveloped land. This subdivision is providing a connection to four (4) of the five (5) adjacent undeveloped lots. Said undeveloped lots have been previously divided, and are of a particular parcel size that they may, or may not, be further subdivided upon development thus not necessitating or continuing a connection.
2. Variance from Section 23-405: Blocks, A. Said section requires block dimensional standard to be met, including block perimeter, section, and length. Said requirements are planned to be met at final development of the created parcels, however as large lots are being proposed it causes the need for variance from said block dimensional standards.

Staff is recommending approval of the variance requests. Further explanation and analysis can be found in the Variance Request Letter.

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 deliver system is preferred and to locate and provide the correct amount of space for safely delivering the mail to businesses and residents.
2. To provide correct documentation and timelines for the propose phasing of the subdivision, prior to final plat, the applicant will include proposed opening dates for the phases and the correct documentation for future phases, certificates and release form.
3. Block dimension standards shall be met during the master site plan for the proposed development.
4. 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.
5. 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: July 14, 2025
Preliminary Plat application submitted to Planning Division: November 3, 2025
Departmental Review Meeting: November 13, 2025
Preliminary Plat Resubmittal: November 20, 2025
Planning Board Plat Review: December 9, 2025
Planning Board Public Hearing: December 23, 2025
Preliminary Plat to City Council: January 26, 2026
60 Working-Day Preliminary Plat Review period ends: February 4, 2026

- Note: Applicant requested a hold of the application and requested an extension to May 26, 2026 in order to accommodate alterations to their proposed zone change prior to being brought to the Planning Board. Therefore, the following dates apply:
    - Planning Board Plat Review: April 14, 2026
    - Planning Board Public Hearing: April 28, 2026
    - Preliminary Plat to City Council: May 26, 2026

PLAT INFORMATION
General Location: North of Central Avenue, south of Broadwater Avenue
Legal Description: Lot 3 & Lot 4 of Barber Farm Subdivision
Owner/Subdivider: Kari Ellen, Donna Marie, and Diana Lynne Barber
Engineer/Surveyor: Performance Engineering
Existing Zoning: A-Agriculture
Existing Land Use: agricultural land
Proposed Zoning: PND - CMU1, NX1, N2, N3 and P1 (Zone Change 1078)
Proposed Land Use: Residential & Commercial
Gross Area: ± 55.46 Acres
Lot Size:
Minimum: ± 0.63 Acres
Maximum: ± 11.83 Acres
Parkland Requirements: Subdivision regulations require a dedication of .22 acres. However, zoning regulations require 2% of the area included within a planned neighborhood development to be open space. This would require 1.11 acres. The applicant has provided 2 acres of open space through the PND.

PHASING
The subdivision will be constructed in two phases. Public improvements associated with these phases shall be constructed or monetarily guaranteed prior to opening the phase.

- **Phase I**: Lot 1, Block 2 and Lot 1, Block 3.
    - Double Haul Lane, Road B, and Road C constructed entirely from Central Avenue to the northern property line of Lot 1, Block 2 and Lot 1, Block 3.
    - West curb and gutter and 35 feet of asphalt will be constructed for Road A from Central Avenue to Road B.
    - Sanitary sewer will be constructed up to the northern property line of Lot 1, Block 2 and Lot 1, Block 3
    - Water main will be constructed up to the northern property line of Lot 1, Block 2 and Lot 1, Block 3
    - Stormwater detention facility, and associated storm drain and inlets, serving Phase 1 and incorporating management plan for Phase 2 will be constructed.
- **Phase II**: Lots 1-4, Block 1; Lot 2, Block 2; and Lots 2-3, Block 3.
    - Road C will be constructed from the terminus of Phase I to the intersection with Broadwater Avenue.
    - Broadwater Avenue will be constructed along the northern boundary of the subdivision.

Traffic Impact Study (TIS) CONCLUSIONS
Analysis of trip generation estimates, traffic operations, and considerations for alternative modes of transportation reveal that the proposed Central Avenue Subdivision project will have minimal impact on area traffic operations. Based on the additional lots created with the Central Avenue Subdivision, the percentage of traffic contributions and associated cost to these intersections based on a pro-rata share, as negotiated with City Engineering, are as follows:

- **Phase I**
    - Broadwater Avenue and Shiloh Road -- 1.0%
    - Central Avenue and 48th Street West -- 0.4%
    - Central Avenue and Shiloh Road -- 3.5%
    - Central Avenue and South 44th Street West -- 5.3%
- **Phase II**
    - Broadwater Avenue and Shiloh Road -- 1.5%
    - Central Avenue and 48th Street West -- 1.6%
    - Central Avenue and Shiloh Road -- 7.3%
    - Central Avenue and South 44th Street West -- 8.9%

STAKEHOLDERS
There are no stakeholder responses at this time. Stakeholder input will be received at a public hearing scheduled for this subdivision on April 28, 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 May 26, 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

Note: The original 60-day working period ended on February 4, 2026. The applicant requested a hold of the application and requested an extension to May 26, 2026 in order to accommodate alterations to their proposed zone change.

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

Preliminary Plat
Draft Subdivision Improvement Agreement
Findings of Fact
Variance Request Letter
Traffic Study

PE STANDARD.CTB

11/19/2025 12:04:48 PM

LEGEND

- FOUND PROPERTY CORNER, AS DESCRIBED
- SET PROPERTY CORNER, 5/8" REBAR W/ PEC CAP
- CALCULATED CORNER, NOT FOUND NOT SET
- SURVEY BOUNDARY
- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- RIGHT-OF-WAY LINE
- EASEMENT LINE
- SECTION LINE

PRELIMINARY PLAT OF

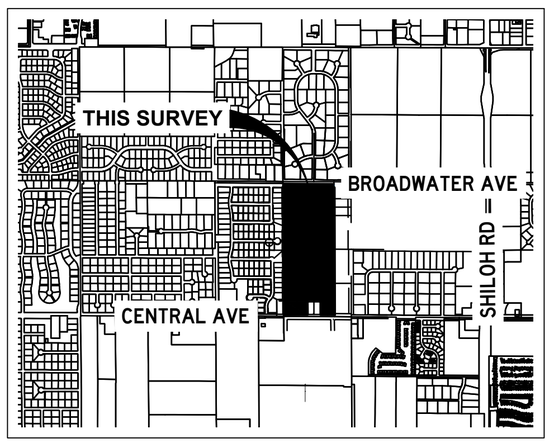
CENTRAL AVE SUBDIVISION

BEING TRACT 3 OF BARBER FARMS SUBDIVISION
LOCATED IN THE SW 1/4 OF SECTION 3, TOWNSHIP 01 SOUTH, RANGE 25 EAST, P.M.M.,
YELLOWSTONE COUNTY, MONTANA

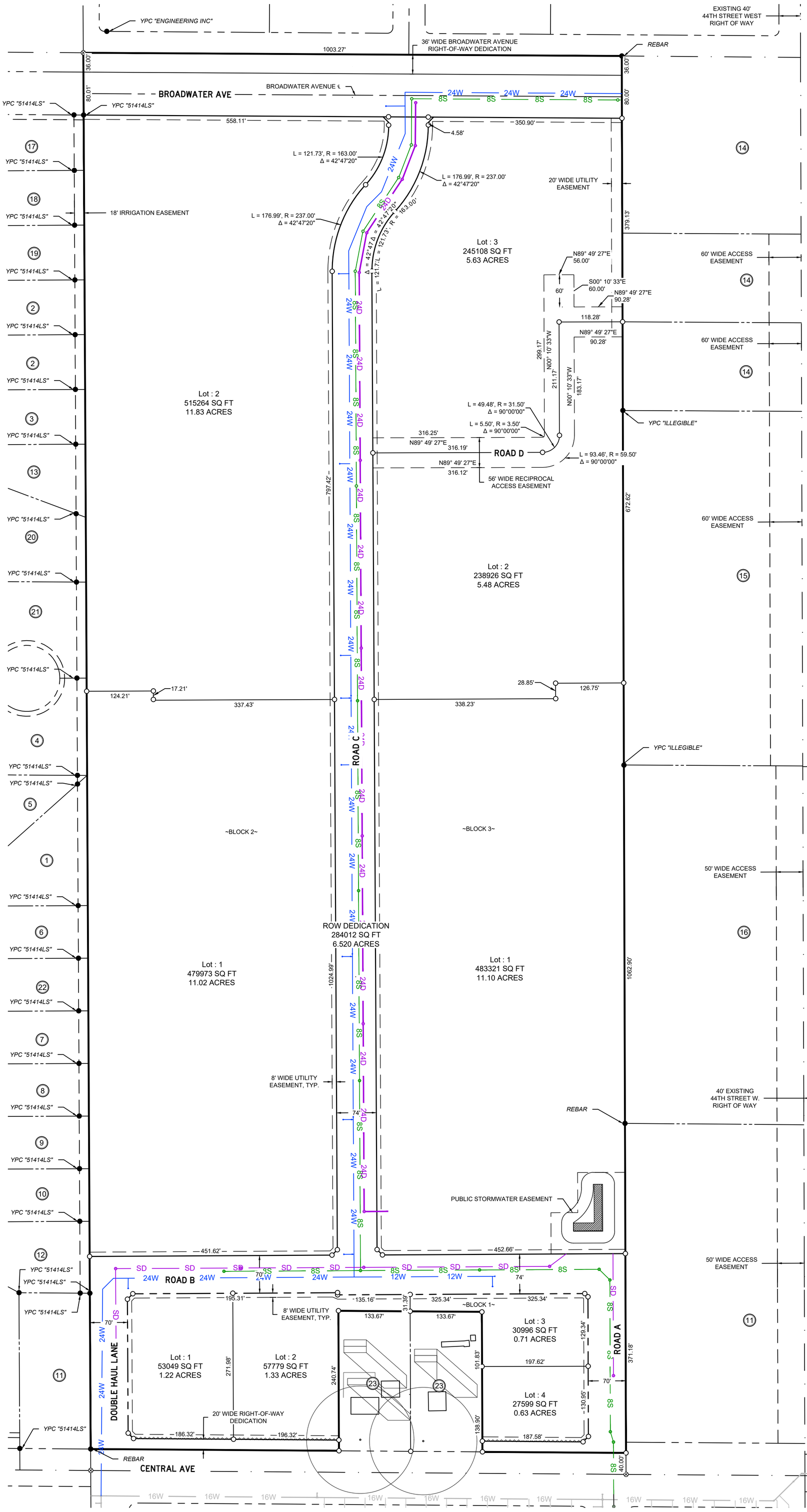
PREPARED FOR : KARIN ELLEN, DONNA MARIE, AND DIANA LYNNE BARBER

PREPARED BY : PERFORMANCE ENGINEERING, LLC

TOTAL GROSS AREA OF SUBDIVISION : ± 55.465
TOTAL NET AREA OF SUBDIVISION : ± 48.992
SEPTEMBER 2025



VICINITY MAP
NOT TO SCALE



SITE DATA	
NO. OF LOTS	8
MAXIMUM LOT AREA	± 515,319 SF
MINIMUM LOT AREA	± 27,649 SF
PARKLAND AREA REQUIRED	48,317 SF
PARKLAND AREA PROVIDED	67,954 SF
GROSS ACREAGE	± 55.46 AC
EXISTING ZONING	A
EXISTING LAND USE	AGRICULTURAL
PROPOSED LAND USE	CMU/NX1/N2/P1
SANITARY SEWER	CITY OF BILLINGS
WATER	CITY OF BILLINGS
FIRE SERVICE AREA	BILLINGS FIRE DEPT.

PROPERTY OWNER INFORMATION

1. REGAL LAND SUNDANCE, LLC
PO BOX 80445
BILLINGS, MT 59108

2. LC CUSTOM HOMES, INC.
2044 BROADWATER AVE, SUITE A
BILLINGS, MT 59102

3. MATTHEW W & CHELSEA THOMPSON
5234 BLACK STONE CIR
BILLINGS, MT 59106

4. TONY & JOY GAFFKE
4602 LIAHONA LN
BILLINGS, MT 59106

5. WILLARD HENRY BARRY & MELINDA SUE TRUSTEE
4607 SUN BASIN RD
BILLINGS, MT 59106

6. MARSICH INVESTMENTS, INC.
4804 VERDE LN
BILLINGS, MT 59106

7. JAMES & CATHERINE MCDONALD
205 SUNDANCE RIDGE RD
BILLINGS, MT 59106

8. PATRICK PETER MCDONALD & MARGARET ANN CARROLL
189 SUNDANCE RIDGE RD
BILLINGS, MT 59106

9. JOHN & LISA RITTENHOUSE
165 SUNDANCE RIDGE RD
BILLINGS, MT 59106

10. JAMILYN WELLS & CURTIS HARRIS
139 SUNDANCE RIDGE RD
BILLINGS, MT 59106

11. BRADLEY W HARDT
4620 CENTRAL AVE
BILLINGS, MT 59106

12. KENNETH AUGUST SCHAEFBAUER
117 SUNDANCE RIDGE RD
BILLINGS, MT 59106

13. ALAN MOOER
507 CANDLE LIGHT LN
BILLINGS, MT 59106

14. BIEGEL PROPERTIES LLC
4221 WELLS PL
BILLINGS, MT 59106

15. STEVE & CANDACE WELLS
PO BOX 80445
BILLINGS, MT 59108

16. JOHN L THIEL REVOCABLE TRUST
C/O JOHN L THIEL, TRUSTEE
PO BOX 81530
BILLINGS, MT 59108

17. JARDEE RANCH INC
1441 MILL IRON CAMP CROOK RD
EKALAKA, 59324

18. RICHARD & SUSAN REPUCCI
643 CANDLE LIGHT LN
BILLINGS, MT 59106

19. ROBERT & STACEY LOUCKS
613 CANDLE LIGHT LN
BILLINGS, MT 59106

20. CODY KEGEL
501 CANDLE LIGHT LN
BILLINGS, MT 59106

21. FREDRICK & PEGGY SCHNEIDER
4231 JULAURA LN
BILLINGS, MT 59106

22. JAMES & CATHERINE MCDONALD
PO BOX 7454
FORT WORTH, TX 76111

23. DONNA MARIE, DIANA LYNNE, & KARIN ELLEN BARBER
PO BOX 121
HOGELAND, MT 59529

BASIS OF BEARINGS

Bearings shown on this survey are derived from a low distortion Lambert Conformal Conic single parallel projection with parameters as follows:

Latitude of Origin: 45° 47' 00" N
Longitude of Origin: 108° 25' 00" W
Mapping Scale Factor: 1.0001515
Datum : Nad83 (2011)
Distances are ground.

0 100 200
IN FEET

SHEET 1 OF 1

Z:\Kunkel\2025-027 Barber Development\CAD\DWG\Plats\Barber Minor\Preliminary\Barber Major Prelim Plat.dwg

SUBDIVISION IMPROVEMENTS AGREEMENT
& WAIVER OF RIGHT TO PROTEST FUTURE SPECIAL IMPROVEMENT DISTRICTS

Central Avenue Subdivision

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(City of Billings)

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SUBDIVISION IMPROVEMENTS AGREEMENT & WAIVER OF RIGHT TO PROTEST FUTURE SPECIAL IMPROVEMENT DISTRICTS

Central Avenue Subdivision

This agreement is made and entered into this ____ day of _____, 20__, by and between *CK Land, LLC*, whose address for the purpose of this agreement is **2729 Aspen Way, Billings, MT 59106,** hereinafter referred to collectively as "Subdivider," and the **CITY OF BILLINGS**, Billings, Montana, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the plat of *Central Avenue Subdivision*, 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 *Central Avenue Subdivision*; and

WHEREAS, at a regular meeting conducted on _____ day of _____, 20__, the City Council conditionally approved a preliminary plat of *Central Avenue Subdivision*; 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 *Central Avenue 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 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

Subdivider has requested, and the City hereby grants, the following variances by the City Council from the strict interpretation of the City's Subdivision Regulations (Section 23.1101, BMCC):

1. Variance from Section 23-406-A.1: Streets and Roads, A, 1. Said section requires developments to provide connections from the subdivision to undeveloped land.

This subdivision is providing a connection to four (4) of the five (5) adjacent undeveloped lots. Said undeveloped lots have been previously divided, and are of a particular parcel size that they may, or may not, be further subdivided upon development thus not necessitating or continuing a connection.

2. Variance from Section 23-405: Blocks, A. Said section requires block dimensional standard to be met, including block perimeter, section, and length. Said requirements are planned to met at final development of the created parcels, however as large lots are being proposed it causes the need for variance from said block dimensional standards.

II. PROPERTY CONDITIONS AND INFORMATION FOR LOT PURCHASERS

A. Lot owners will be required to construct sidewalk along the segment of the existing access road(s) 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

- Central Avenue currently exists in a 100-foot wide rights-of-way. As part of the development an additional 20-feet of rights-of-way will be dedicated extending north from the edge of existing Central Avenue rights-of-way. Additionally, a 70-foot wide rights-of-way for Double Haul Lane, Road A, and Road B, and a 74-foot wide rights-of-way for Road C will be dedicated for public roads and utilities within the development. Said rights-of-way widths are in conformance with the Subdivision Regulations for commercial and collector roadways, respectively. Broadwater Avenue currently exists as an 80' rights-of-way previously dedicated as part of Barber Farm Subdivision.

- A westbound right turn lane on Central Avenue at Road A will be constructed as part of Phase I of the Subdivision improvements.

- Eastbound left turn lanes on Central Avenue at Road A and Double Haul Lane will be constructed as part of Phase II of the Subdivision improvements.

- Double Haul Lane and Road B (west of Road C) will be constructed as commercial local access streets meeting City of Billings subdivision requirements, being constructed to commercial local street widths. Road B east of its intersection of Road C will be constructed as a collector roadway street meeting City of Billings subdivision requirements, being constructed to a collector road width. Improvements will be completed by private contract or SID.

- Road A will be constructed as a collector roadway street meeting City of Billings subdivision requirements, being constructed to a collector road width. At the time of development, Road A will include curb and gutter on

the west side of the street and 35 feet of asphalt paving. Curb and gutter on the east side of the street and the additional asphalt paving shall be constructed as Parcel 2A1 of COS 2007, Amended is annexed into the City of Billings and developed.

- Road C shall be constructed as a collector street meeting City of Billings subdivision requirements, being constructed to a collector road width. Improvements will be completed by private contract or SID. Road C will be constructed to the north edge of Phase 1 and incorporate a fire apparatus turnaround. Upon opening of Phase 2, the remaining length of Road C will be constructed to its intersection with Broadwater Avenue, which will also be constructed as a City of Billings collector roadway from the western edge of the development to the eastern edge of the development at that time.

- Broadwater Avenue shall be constructed as a collector street meeting City of Billings subdivision requirements. At the time of development, Broadwater Avenue will include curb and gutter on the south side of the street and 35 feet of asphalt paving. Improvements will be completed by private contract or SID. Final alignment of Broadwater Avenue to be determined by City Engineering.

- No connection to Bluegrass Drive West is proposed at this time, and the Subdivider waives the right to protest inclusion in a future SID should the connection be pursued by the City of Billings.

- A Traffic Impact Study has been completed for the *Central Avenue Subdivision*. All required intersection improvement contributions identified therein shall be completed by the Subdivider at the Subdivider's expense. Based on the additional lots created with the *Central Avenue Subdivision*, the percentage of traffic contributions and associated cost to these intersections based on a pro-rata share, as negotiated with City Engineering, are as follows:

    - Phase I -
        - Broadwater Avenue and Shiloh Road – 1.0%
        - Central Avenue and 48th Street West – 0.4%
        - Central Avenue and Shiloh Road – 3.5%
        - Central Avenue and South 44th Steet West – 5.3%
    - Phase II-
        - Broadwater Avenue and Shiloh Road – 1.5%
        - Central Avenue and 48th Street West – 1.6%
        - Central Avenue and Shiloh Road – 7.3%
        - Central Avenue and South 44th Steet West – 8.9%

The cash contributions shall be based on the percentage 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 improvements will be made prior to final plat approval. The percentage of contributions are as outlined within the Traffic Impact Study for *Central Avenue Subdivision* as submitted with the preliminary plat.

B. Sidewalks

- Individual lot owners will be responsible for the construction of the sidewalks adjacent to public rights-of-way fronting their lot at the time of lot construction and shall be included in each building permit.

- Sidewalks shall be 5-foot-wide boulevard style walks aside from the areas designated for an 8' wide asphalt trail, as indicated in "Section F".

- ADA ramps shall be installed by the Subdivider at the time of construction of public improvements.

C. Street Lighting

- Street lighting in the public rights-of-way 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.

D. 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 anticipated to be warranted within this subdivision. Stop signs shall be installed on the southbound lane of Double Haul Lane and Road A at their intersections with Central Avenue, as well as the southbound lane of Road C at its intersection with Road B and northbound lane at its intersection with Broadwater Avenue.

- 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.

- As detailed in the TIS prepared for the Subdivision and within the City of Billings Subdivision Regulations, traffic calming measures will be incorporated on roadways without traffic controls for distances greater than 500'.

E. Access

- The Subdivision will be accessed by way of Central Avenue through intersections at Double Haul Lane and Central Avenue and Road A and Central Avenue during Phase 1

- The Subdivision will have a third access point at the time Phase 2 is built out which will connect to the existing eastern edge of Broadwater Avenue north of Sundance Subdivision and progress west to Broadwater Avenue's intersection with 48th Street West.

- Double Haul Lane, Road A, Road B and Road C will be public rights-of-way providing access to the lots within the development.

F. Billings Area Bikeway and Trail Master Plan

As part of this project, an 8-foot wide asphalt trail will be constructed as adjacent lots are developed. This trail will be constructed at the time of lot development in the areas as follows:

- On the west side of Road A from Central Avenue to Road B.
- On the south side of Road B from Road A to Road C.
- On the east side of Road C from Road B to Broadwater Avenue.

G. Public Transit

- MET Transit provides service 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. A complete stormwater management plan shall be submitted to the Engineering Division for review and approval at the time of private contract permitting for public facilities and as part of individual lot development.

Stormwater drainage will be collected and conveyed to detention facilities located within areas that will serve as private parkland. These underground detention facilities will be sized to accept runoff generated from the public rights-of-way of Double Haul Lane, Road A, Road B, Road C and Broadwater Avenue. It is anticipated infiltration of captured stormwater will be utilized to evacuate the stored water, with connection to underlying gravels providing the capacity for this means. Stormwater treatment will comply with the City of Billings Stormwater Management Manual. The detention facilities will be within a "Stormwater Detention Easement" that will be determined by the final approved Comprehensive Drainage Report. The detention facility will be managed and maintained by the Subdivision Owner's Association.

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 will be extending a 24-inch water main north through the subdivision within Double Haul Lane, Road B (west of Road C), Road C, and continuing east through Broadwater Avenue from Road C. Said 24-inch water main will connect onto the existing 16-inch water main within Central Avenue prior to being extended.
- The Subdivision will extend a 12-inch water main east of Road C within Road B to a point along Lot 3, Block 1 to provide service to said lot.
- Lot 4, Block 1 will be serviced from the existing 16-in water main located south of Central Avenue. The Developer will reimburse for the constructed water main along the Subdivision's frontage in accordance with the City's Rules and Regulations Governing Water and Wastewater Service.

B. Sanitary Sewer

- The Subdivision will be extending an 8-inch sanitary sewer main from the existing 8-inch sewer south of Central Avenue. The Developer is responsible for extending the 8-inch main through Road A, Road C, and east through Broadwater Avenue. 8-inch sewer main will be constructed within Road B east of its intersection with Road C, and far enough west within Road B to provide service to Lots 1 and 2 of Block 1.

C. Power, Telephone, Gas, and Cable Television

All telephone, gas, electrical power, and cable television lines within the public rights-of-way shall be installed prior to surface improvements. Private utility easements are provided along the front lot lines of lots as shown on the plat.

VII. PARKS/OPEN SPACE

- Section 27-803 of the City Code of Billings, Montana covers the open space requirements for Planned Neighborhood Developments. Table 27-

800.1 calls for a minimum of 2 percent of the land proposed to be zoned for open space. The required open space for the subdivision is 1.11 acres.

- No parkland dedication is required outside that included in Section 27-803 as the subject lots are commercial or greater than 5 acres.

VIII. 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 unless authorization from current and downstream users is provided.

IX. SOILS/GEOTECHNICAL STUDY

A geotechnical investigation was performed for the area and can be obtained from the City Engineering Department office.

X. PHASING OF IMPROVEMENTS

The Subdivision will be constructed in phases as defined below. Public improvements associated with these phases shall be constructed or monetarily guaranteed prior to opening the phase.

- Phase I: Lot 1, Block 2 and Lot 1, Block 3.
    - Double Haul Lane, Road B and Road C constructed entirely from Central Avenue to the northern property line of Lot 1, Block 2 and Lot 1, Block 3.
    - West curb and gutter and 35 feet of asphalt will be constructed for Road A from Central Avenue to Road B.
    - Sanitary sewer will be constructed up to the northern property line of Lot 1, Block 2 and Lot 1, Block 3
    - Water main will be constructed up to the northern property line of Lot 1, Block 2 and Lot 1, Block 3
    - Stormwater detention facility, and associated storm drain and inlets, serving Phase 1 and incorporating management plan for Phase 2 will be constructed.
- Phase II: Lots 1-4, Block 1; Lot 2, Block 2; and Lots 2-3, Block 3.
    - Road C will be constructed from the terminus of Phase I to the intersection with Broadwater Avenue.
    - Broadwater Avenue will be constructed along the northern boundary of the subdivision.

XI. 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.

XII. LEGAL PROVISIONS APPLYING TO SUBDIVIDER

A. Subdivider agrees to guarantee all public improvements for a period of two year 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" *CK Land, 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 _____, personally appeared _____ _____, known to me to be the _____ of *CK Land, LLC,* who executed the foregoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of _____
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 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:

Central Avenue Subdivision

Signed and dated this _____ day of _____, 20___.

CK Land, LLC

By: _____

Title: _____

STATE OF)
: ss
County of)

On this _____ day of _____, 20__, before me, a Notary Public in and for the State of _____, personally appeared _____ _____, known to me to be the _____ of *CK Land, LLC,* who executed the foregoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of _____
Printed Name: _____
Residing at: _____
My commission expires: _____

FINDINGS OF FACT

The Planning staff has prepared the Findings of Fact for the preliminary plat of Central Avenue Subdivision. 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 Agricultural. 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 Central Avenue. 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 the heading VI Utilities, A, Water.

   Sanitary sewer service will be provided by connecting to the existing City of Billings' sewer mains. There is an existing main in Central Avenue. 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 the heading VI Utilities, 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.

a. **Streets** – The subdivision is adjacent to Central Avenue and Broadwater. Both of these streets are developed rights of way. A westbound right turn lane on Central Avenue at Road A will be constructed as part of Phase I of the Subdivision improvements. Eastbound left turn lanes will be constructed as part of Phase II of the Subdivision improvements. No other street improvements are anticipated at this time. Street improvements are included in the Waiver of Right to Protest Future Special Improvement Districts.

   The sidewalks will be installed by the respective lot owner 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. This information is all in the SIA under the heading Transportation.

b. **Emergency Services** – The Billings Police and Fire Departments will respond to emergencies within the proposed subdivision. The nearest fire station is Station #7 approximately 2.20 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).

c. **Schools** –School District #2 provides educational services to elementary through high school students. Meadowlark Elementary School will provide educational services for elementary students, with 644 enrolled students out of a capacity of 460 students. Ben Steele Middle School will provide educational services for middle school students, with 738 enrolled students out of a capacity of 750 students. West End high school will provide education services for high school students, with 2176 enrolled students out of a capacity of 1731 students.

d. **Parks and Recreation** – This subdivision is part of a planned neighborhood development. The parkland requirements have been met with the previous filing of the subdivision.

e. **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).**

f. **Phasing** – The subdivision is proposed to be constructed in phases as defined below. Public improvements associated with these phases shall be constructed or monetarily guaranteed prior to opening the phase **(Condition #2).**

   - Phase 1: Lot 1, Block 1 & Lot 1, Block 3
   - Phase 2: Lots 1-4, Block 1; Lot 2, Block 2; Lots 2-3, Block 3

3. Effect on the natural environment

The subject property is currently agricultural with the proposed use of commercial and residential development. 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.

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:

A. Essential Investments:

a. Infill development and development near existing City infrastructure may be the most cost-effective.

b. Neighborhoods that are safe and attractive and provide essential services are much desired.

c. Mobility and Access (transportation choices in places where goods and services are accessible to all).

B. Prosperity:

a. Community investments that attract and retain a strong, skilled, and diverse workforce also attracts businesses.

C. Strong Neighborhoods;

a. Walkable neighborhoods that permit convenient destinations such as neighborhood services, open space, parks, schools, and public gathering spaces foster health, goodwill and social interaction.

b. Neighborhoods that are safe and attractive and provide essential services are much desired. Implementation of the Infill Policy is important to encourage the development of underutilized properties.

2. West End Area Plan

The proposed subdivision is consistent with the following goals of the West End Area Plan.

- **Planned Growth**
  - Conserving land and natural resources by limiting sprawl (unplanned and unmanaged growth) through achieving more compact development.
  - Reserving key land parcels for parks and open space.
  - Having mixed land use to allow shorter automobile trips, more walking, and less automobile reliance.

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. An 8-foot wide asphalt trail will be constructed as adjacent lots are developed east of Road A and Road C and north of Road B east of the intersection of Road B and Road C.

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 to 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 a PND – Planned Neighborhood Development zoning. 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. Future development is intended to be developed within a

Master Site Plan, which would likewise conform to the zoning requirements. Development within the Master Site Plan process shall conform to block dimension standards **(Condition #3).**

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.]

Phase 1's legal and physical access is provided to the proposed will be from Central Avenue. Phase 2's legal and physical access is provided to the proposed will be from Central Avenue & Broadwater Avenue. New internal access will provide circulation to individual lots.

CONCLUSIONS OF FINDINGS OF FACT

- The preliminary plat of Central Avenue Subdivision 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 nor West End Area Plan 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

The Planning Board recommends to City Council that the preliminary plat of Central Avenue Subdivision be conditionally approved, the variances accepted and adopt the Findings of Fact as presented in the staff report.

Variance Request A
Central Avenue Subdivision

Central Avenue Subdivision is a proposed major subdivision in the City of Billings. The applicant is requesting a variance from Section 23-406 Street and Roads. A. 1

1. Relation to Undeveloped Areas: W h e n a proposed subdivision adjoins undeveloped land, streets within the proposed subdivision shall be arranged to allow access to the adjoining undeveloped land this may require multiple connections to multiple adjacent undeveloped parcels. The maximum distance between connections to undeveloped lands shall not exceed 600 feet.

The subdivision has undeveloped land to the east and providing a future connection to those parcels will give those parcels an opportunity to connect to a road system as well as the possibility to connect to City of Billings services that can be much closer to them. Because the lots within the Central Avenue Subdivision are being developed individually, using the master site plan review process, there is limited opportunity to know where roads will be laid out. The developer is providing connection to 3 lots to the east. Subdivision Regulations required connections every 600 feet. The 600-foot maximum is based on a subdivision being laid out using block lengths outlined in the City of Billings subdivision regulations.

1. The granting of the variance will not be detrimental to the public health, safety, or general welfare or injurious to other adjoining properties. Staff does not believe that granting the variance will be detrimental to the public health, safety, or general welfare of the public. With the connections being provided it will give future development to the east a second way in and out of the area.

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. There are no topographical conditions that would create a hardship to the developer. The land has been used as farm land with minimum grades across the land.

3. The variance will not result in an increase in taxpayer burden. The variance will not increase a tax burden on taxpayers.

4. The variance will not in any manner place the subdivision in nonconformance with any adopted zoning regulations or Growth Policy. Granting the variance would not place the subdivision in nonconformance with any adopted zoning regulations or the growth policy.

5. The subdivider must prove that the alternative design is equally effective, and the objectives of the improvements are satisfied. Because the lots to the east are smaller in general the need for a connection every 600 feet would provide many connections but no real need for them if someone were to only place a single home on a large lot. In this case fewer connections are the most logical option.

Variance Request B
Central Avenue Subdivision

Central Avenue Subdivision is a proposed major subdivision in the City of Billings. The applicant is requesting a variance from Section 23-405 Blocks

Block Length means the measurement along the property lines of all lots that share the same street frontage until another street intersects (see Figure 23-405.2.). A block length continues until the street frontage changes from one cardinal direction to another.

TABLE 23-405.1 REQUIRED BLOCK DESIGN; only the zoning for this subdivision is shown.

	Block Length		
	Max.	Min.	Preferred
NX1	780’	160’	600’
N2	950’	160’	720’
CMU1	700’	160’	500’
P1	N/A	N/A	N/A

The proposed subdivision is platting large lots with the intent to do master site plans on the large lots. Large lots have been platted before in the city with the intent of doing a master site plan layout on lots at a later time. Subdivision regulations still require streets to be laid out to meet the requirement of block as required by zoning. Because this subdivision is platting large lots it requires them to request a variance from block layout requirements of the subdivision regulations.

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 applicant will be laying out blocks with the development of each lot with the master site plan review. Staff does not believe that granting the variance will be detrimental to the public health, safety, or general welfare of the public.

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. There are no topographical conditions that would create a hardship to the developer. The land has been used as farm land with minimum grades across the land.

3. The variance will not result in an increase in taxpayer burden. The variance will not increase a tax burden on taxpayers.

4. The variance will not in any manner place the subdivision in nonconformance with any adopted zoning regulations or Growth Policy. Granting the variance would not place the subdivision in nonconformance with any adopted zoning regulations or the growth policy.

5. The subdivider must prove that the alternative design is equally effective, and the objectives of the improvements are satisfied. Because they are platting large lots, the alternative will be to layout the blocks at the time of master site plan review.

Traffic Impact Study

Prepared for submittal to:

CITY OF Billings

for the project:

Barber Farm Subdivision

on behalf of:

Performance Engineering
3412 Colton Blvd., Suite 202
Billings, MT 59102

by:

TRAFFIC & TRANSPORTATION CONSULTING

406 Traffic & Transportation Consulting
P.O. Box 249
Bozeman, MT 59771
406.922.7300

MONTANA
NATHAN M. LARSON
No. 72564 PE
LICENSED PROFESSIONAL ENGINEER

PTOE #1185, certified in 2003

October 2025

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1 INTRODUCTION

This report documents the Traffic Impact Study (TIS) conducted for the Barber Farm 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.

This TIS builds on findings from the recent TIS conducted for the similar subdivision located due south across Central Avenue, Clearwater/44 West (406 Traffic for Performance Engineering, August 2025) because the two subdivisions will share two new intersections to Central as their primary access points—Barber from the north and Clearwater/44 West from the south. The relationship and timing of these two subdivisions is important for traffic impact analysis and will be described in that context at various points in this report.

1.1 PROJECT SITE AND STUDY AREA

The overall Barber Farm subdivision site location is shown in **Exhibit 1** along with the intersections studied. The following study intersections were identified during preapplication review with City of Billings staff, along with the two access points the Clearwater/44 West subdivision proponent is in the process of constructing:

1. Broadwater Avenue at S. 48th Street West
2. Broadwater Avenue at Shiloh Road
3. Central Avenue at S. 48th Street West
4. Central Avenue at Sundance Ridge Road
5. Central Avenue at Double Haul Lane
6. Central Avenue at S. 44th Street West (called Road A in some application materials)
7. Central Avenue at Shiloh 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 subdivision’s two new access points on Central Avenue, Double Haul Lane and S. 44th Street West, have only been analyzed for future scenarios because they are not constructed yet. The site’s third access will be to a future extension of Broadwater Avenue, which is expected to be extended east into the site area to serve the second phase. The Broadwater extension will provide access to 48th Street West. Because Broadwater will not be connected to the north or east of the Barber site in the timeline of this project, its connection with the internal collector (Road C) will not function as an intersection and was therefore not analyzed in this study.

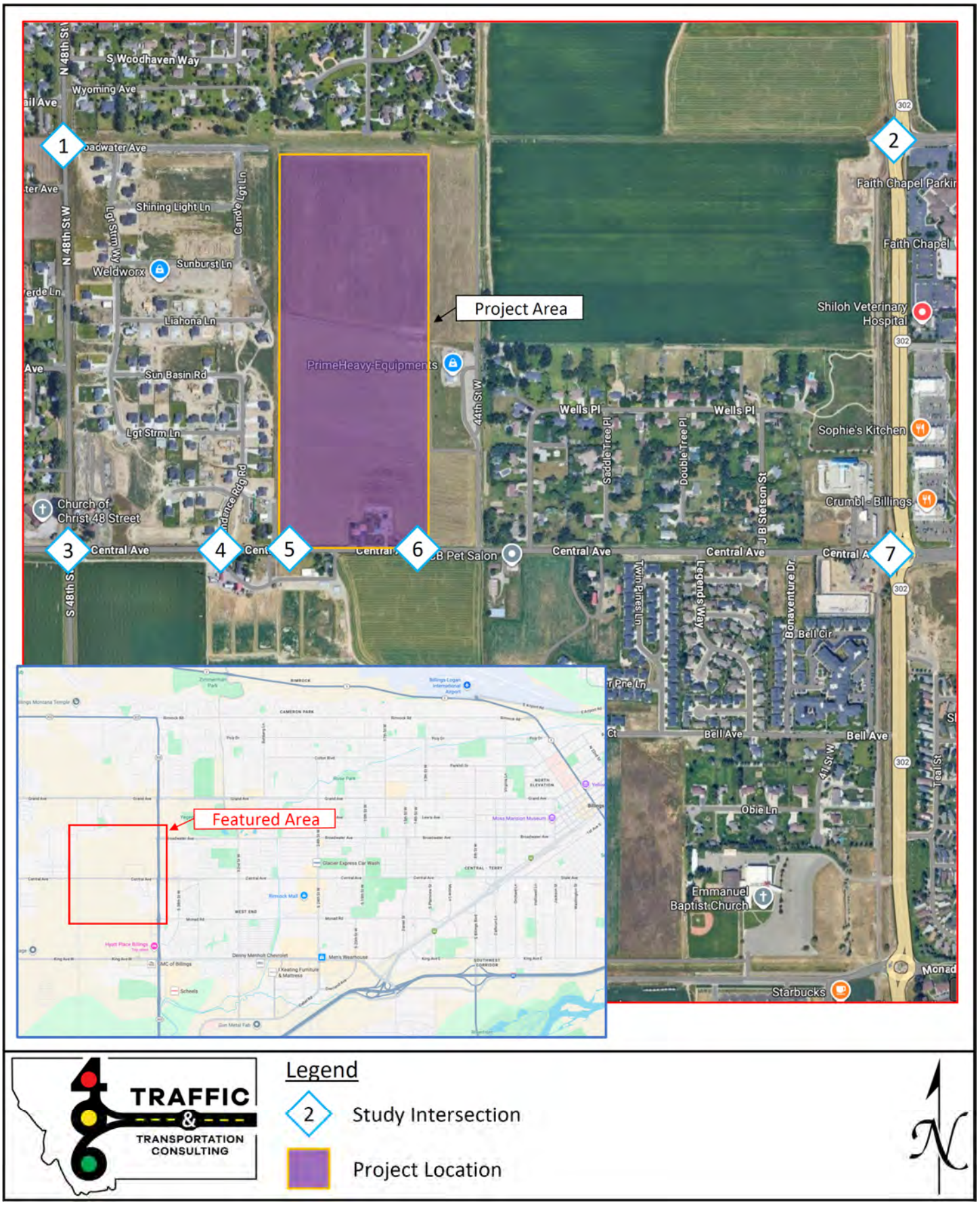
1.2 PROPOSED LAND USE AND PHASING

The site is currently agricultural land. The subdivision’s proposed land uses will be a combination of residential and commercial, with 370 single-family attached homes three commercial uses: a 35,000 square-foot (SF) recreational community center (or similar), an 8,500 SF restaurant, and an 8,500 SF building for small office use. These areas are for planning/estimating purposes and could vary slightly as project definition is finalized. The project is divided into two logical phases. Phase 1 contains only residential use—one half (185) of the single-family homes indicated. Broadwater Avenue access was only assumed to be available when Phase 2 opens. Phase 2 contains the remainder of the proposed land uses.

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 no local streets have long enough blocks uninterrupted by traffic control devices 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 Barber Farm site plan on which the analysis here is based. It indicates land uses and phasing (red = Phase 1), with Central Avenue at the bottom of the page. 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



For analysis purposes, both Double Haul Lane and S. 44th Street West were initially assumed to have one northbound lane and one southbound lane at their intersections with Central, such that vehicles leaving the site wait in a single shared lane regardless of their eventual turning movement.

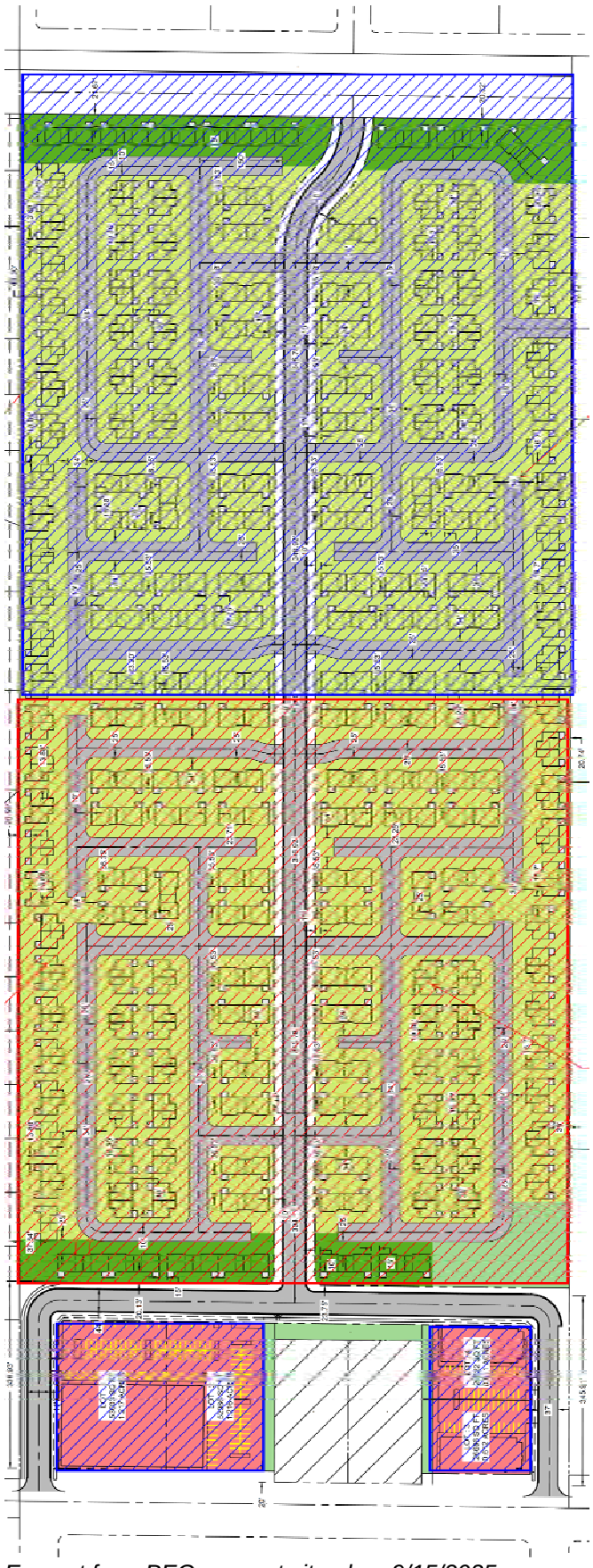
1.3 Analysis Methods and References

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, along with new intersection counts at Intersections 1 and 4. 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. While the 12th edition became available, the project team used the 11th edition in order to maintain consistency with the Clearwater/44 West TIS. 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.

Exhibit 2. Site Plan and Phasing



Excerpt from PEC concept site plan, 9/15/2025

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.

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.

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

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 Montana Department of Transportation (MDT), and a principal arterial according to the 2023 Billings Long Range Transportation Plan (LRTP). 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' 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. Exclusive left-turn lanes exist at some 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. 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 connecting 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 this segment of Central Avenue and the Clearwater/44 West project has completed construction on such a path on the south side of the road along its frontage. 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.

East of Shiloh Road, **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 future westward extension of the road. 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 Broadwater's south side extending east.

West of Shiloh Road, Broadwater is a local road segment is currently disconnected from the rest of the arterial network and only accessible via 48th Street W.

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 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 (2025) annualized volumes were estimated from raw field counts collected in 2024 and 2025 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 1 in 2029. The resulting volumes and operating conditions form the basis for evaluating marginal intersection delay effects of traffic generated by this first phase of the Barber Farm subdivision. Full buildout (Phase 2) is scheduled for completion and occupancy in 2031. 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**.

Exhibit 4. Existing Road and Intersection Basics

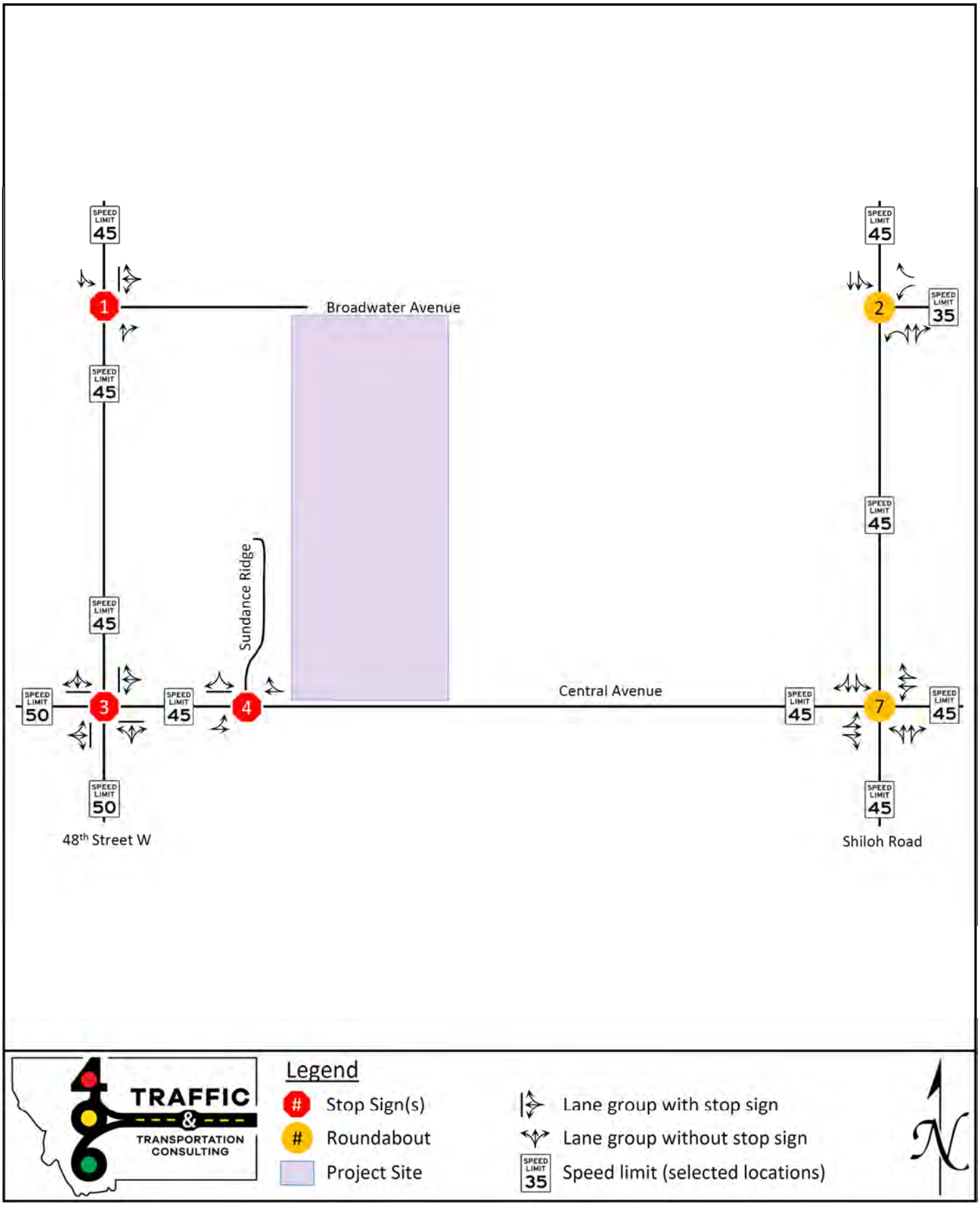


Exhibit 5. Existing Traffic Volumes

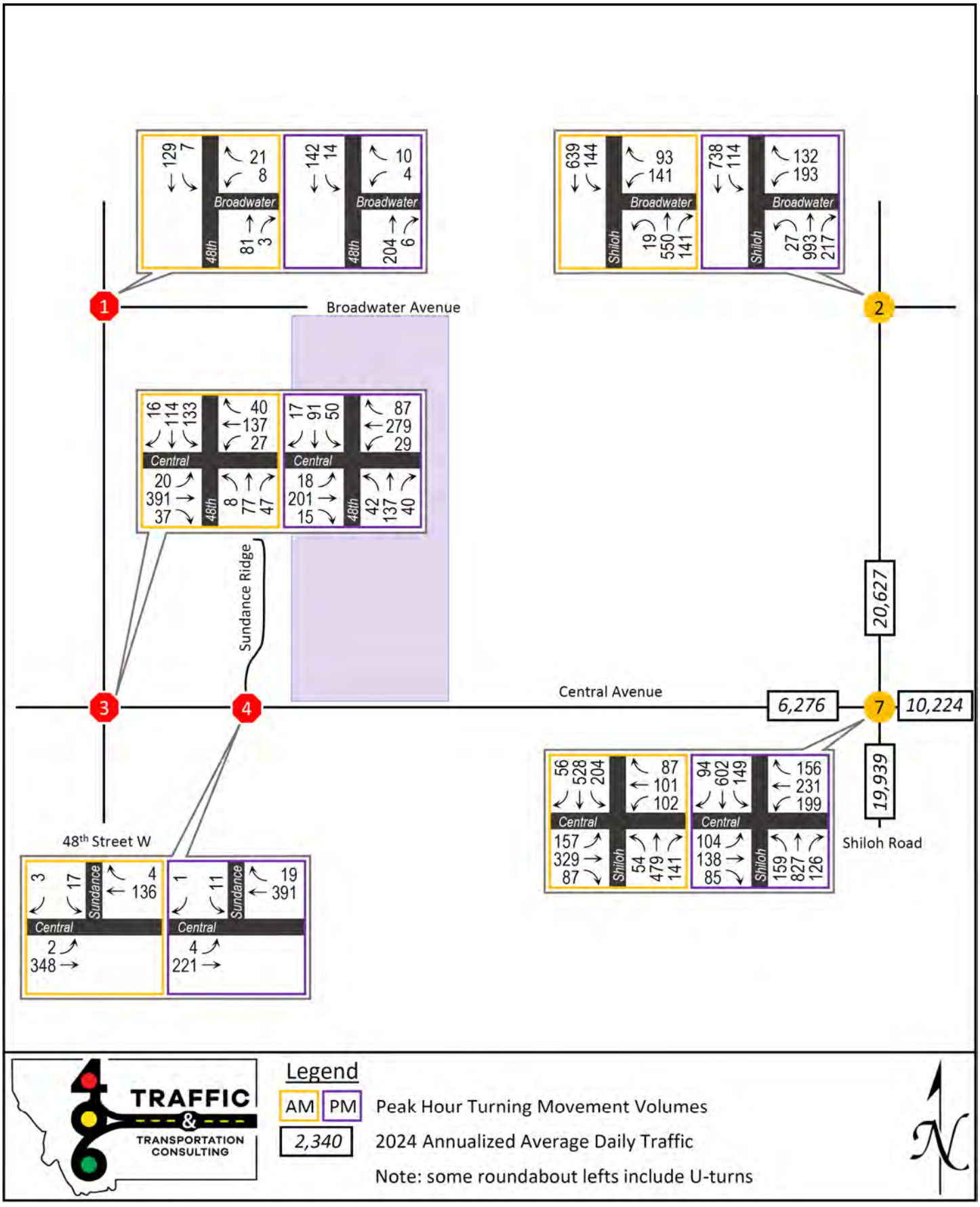
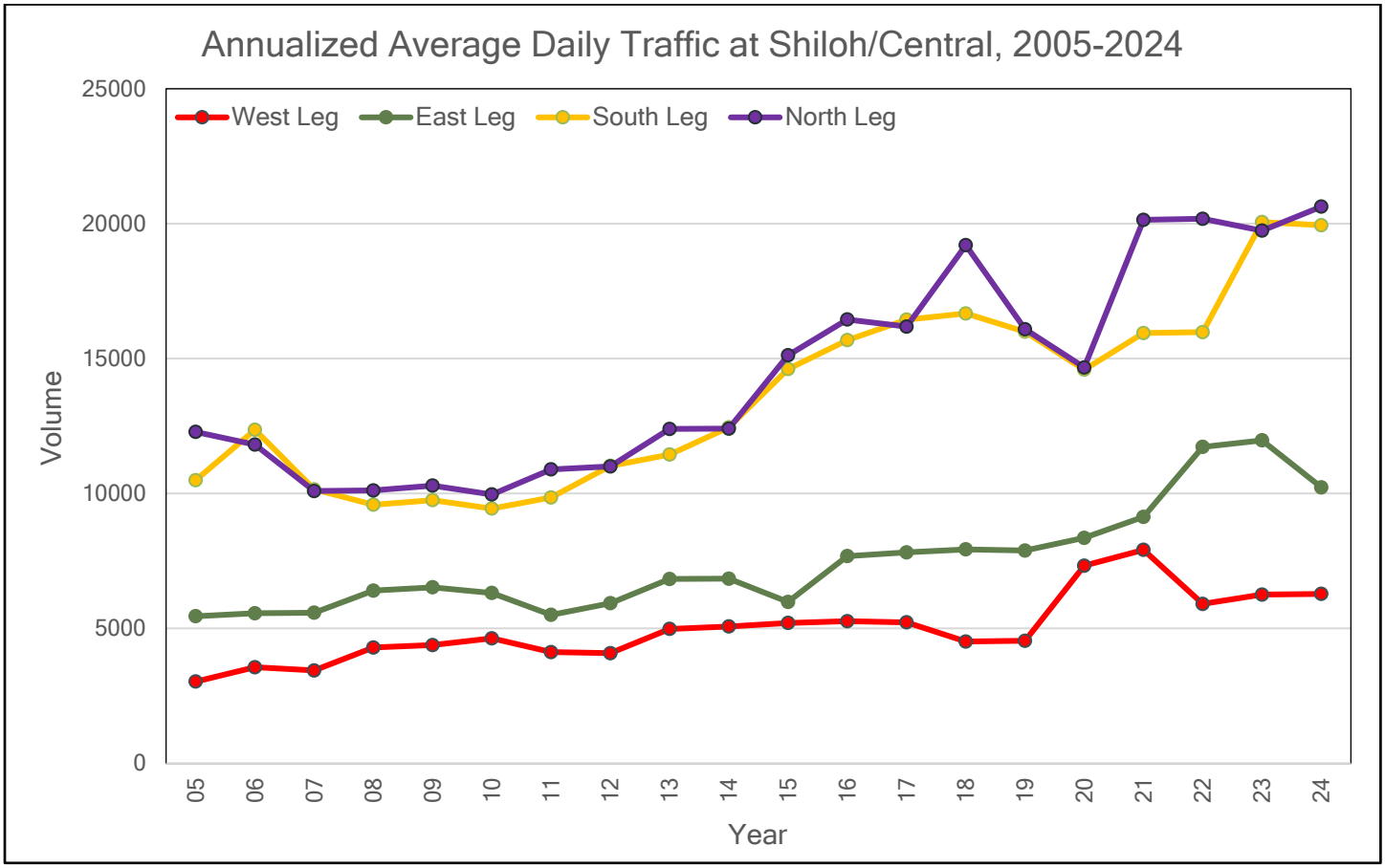
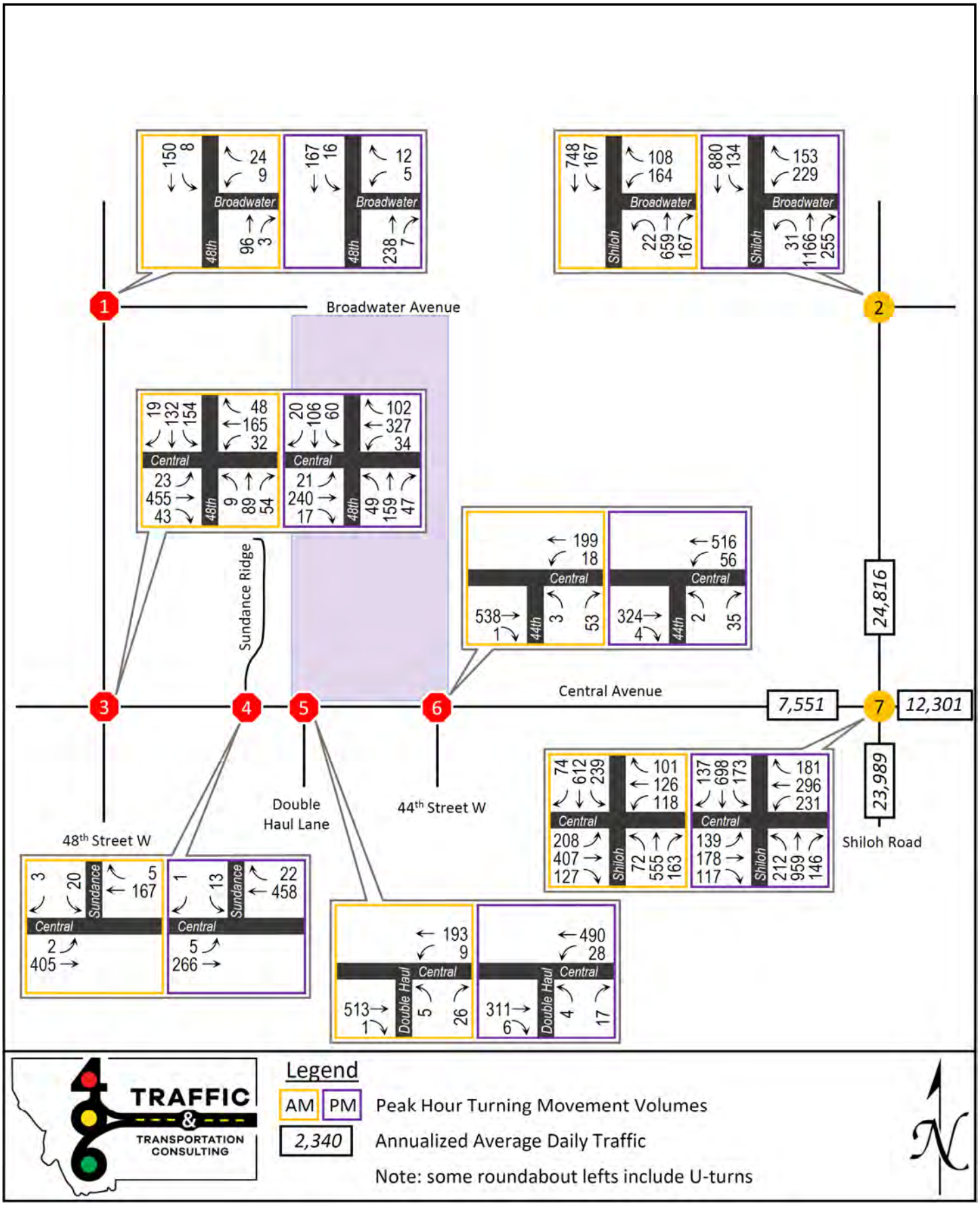


Exhibit 6. Historical Daily Traffic Volumes



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 two phases of this project will be constructed sequentially and were not considered independent 'all-or-nothing' conditions at each two-year interval, the second phase's traffic builds on that generated by Phase 1 and each phase's traffic impacts were analyzed incrementally. 2029 Background traffic is shown in **Exhibit 7**.

Exhibit 7. 2029 Background Traffic Volumes



2.4 INTERSECTION TRAFFIC OPERATIONS WITHOUT THE PROJECT

The existing and 2029 background peak hour intersection Level of Service (LOS) and delay results are shown in **Exhibit 8**. Analysis software results are provided in Appendix B, and as described earlier, no separate 2031 background scenario was examined.

Exhibit 8. Existing and 2029 Background Intersection LOS and Delay

			Peak Hour LOS (delay, in seconds/vehicle)	
	Intersection	Traffic Control	Existing	2029 Background
AM Peak Hour	1. Broadwater at 48th	TWSC*	A (9.2)	A (9.4)
	2. Broadwater at Shiloh	Roundabout	A (6.1)	A (7.1)
	3. Central at 48th	AWSC, then Signal	C (25.0)	A (9.9)
	4. Central at Sundance Ridge	TWSC*	B (12.4)	B (13.7)
	5. Central at Double Haul	TWSC*	-	B (13.0)
	6. Central at 44th	TWSC*	-	B (13.4)
	7. Central at Shiloh	Roundabout	B (12.1)	C (22.3)
PM Peak Hour	1. Broadwater at 48th	TWSC*	B (10.1)	B (10.5)
	2. Broadwater at Shiloh	Roundabout	A (9.3)	B (12.5)
	3. Central at 48th	AWSC, then Signal	C (18.9)	A (8.5)
	4. Central at Sundance Ridge	TWSC*	B (14.0)	C (15.9)
	5. Central at Double Haul	TWSC*	-	B (11.9)
	6. Central at 44th	TWSC*	-	B (11.2)
	7. Central at Shiloh	Roundabout	B (14.9)	D (33.7)

* *Intersections 1 and 4 – 6 are all T intersections, so the worst lane group that determines LOS is the minor approach.*

The results in the table indicate that with 2025 annualized average traffic volume, all intersections operate at LOS B or better except the AWSC at Central/48th. For the 2029 scenario without Barber traffic, signalization of the intersection by Yellowstone County would result in LOS A there in both peaks. For the busiest intersection in the study area, Central at Shiloh, addition of early-phase Clearwater/44 West trips and four years of background growth would result in LOS D in the PM peak hour.

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.

Barber Farm will consist of mostly 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 commercial space in Phase 2 has had fairly certain sub-types of commercial use identified, and 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 commercial element is the only part of the site considered for these discounts. Due to the retail site's location, small size, and expected general 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) 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 (370 attached-home lots) were first estimated, then the resulting trip totals were proportioned according to the amount of each home type in each phase. **Exhibit 9** shows the subdivision's trip generation details by phase and land use. Commercial trips are listed first in Phase 2 for clearer accounting of the internal capture effect.

Exhibit 9. Trip Generation

		Daily	AM Peak Hour	PM Peak Hour
Phase 1	ITE Land Use 215 – Single Family Attached Housing: X = 185 dwelling units			
	Equation/Rate	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	1,384	93 (23 in / 70 out)	109 (64 in / 45 out)
Phase 2	ITE Land Use 495 – Recreational Community Center: X = 35 ksf (thousands of square feet)			
	Equation/Rate	T = 28.82(X)	T = 1.91(X)	T = 2.50(X)
	Peak hour in/out split	-	*66% / 34%*	*47% / 53%*
	Trips	1,009	67 (44 / 23)	88 (41 / 46)
	ITE Land Use 712 – Small Office Building: X = 8.5 ksf			
	Equation/Rate	T = 14.39(X)	T = 1.67(X)	T = 2.16(X)
	Peak hour in/out split	-	*82% / 18%*	*34% / 66%*
	Trips	122	14 (12 in / 3 out)	18 (6 in / 12 out)
	ITE Land Use 931 – Fine Dining Restaurant: X = 8.5 ksf			
	Equation/Rate	T = 83.84(X)	T = 0.73(X)	T = 7.80(X)
	Peak hour in/out split	-	*50% / 50%*	*67% / 33%*
	Trips	713	6 (3 in / 3 out)	66 (44 in / 22 out)
	Full gross Phase 2 Commercial trips, all uses	1,844	87 (59 in / 28 out)	172 (92 in / 80 out)
	Less 10% internal and walk/bike	-184	- 9 (-6 in / -3 out)	- 17 (-9 in / -8 out)
	Net Phase 2 Commercial Trips	1,659	79 (53 in / 26 out)	155 (83 in / 72 out)
	ITE Land Use 215 – Single Family Attached Housing: X = 185 dwelling units			
	Phase 2 Residential Trips	1,384	93 (23 in / 70 out)	109 (64 in / 45 out)
	Phase 2 Total Net Trips	3,044	172 (76 in / 96 out)	264 (147 in, 117 out)
Combined net trips, both phases:		**4,428**	**265 (100 in / 166 out)**	**373 (211 in / 162 out)**

Source: Equations/rates from ITE Trip Generation, 11th Edition.
Note: Some totals may be reported +/- one vehicle due to rounding.

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 Broadwater Avenue and/or the similar connection in Phase 2 to the east, no Barber Farm traffic was assumed to use such a connection. Trip distribution and large-scale assignment percentages are shown in **Exhibit 10**. Phase 1 Project Trips are shown in **Exhibit 11**. Future traffic volumes for the 2029 Total Traffic scenario and 2031 scenario without Phase 2 are shown in **Exhibits 12** and **13**, respectively. Phase 2 Project Trips are shown in **Exhibit 14** and 2031 Total Traffic volumes are shown in **Exhibit 15**.

Exhibit 10. Trip Distribution Percentages

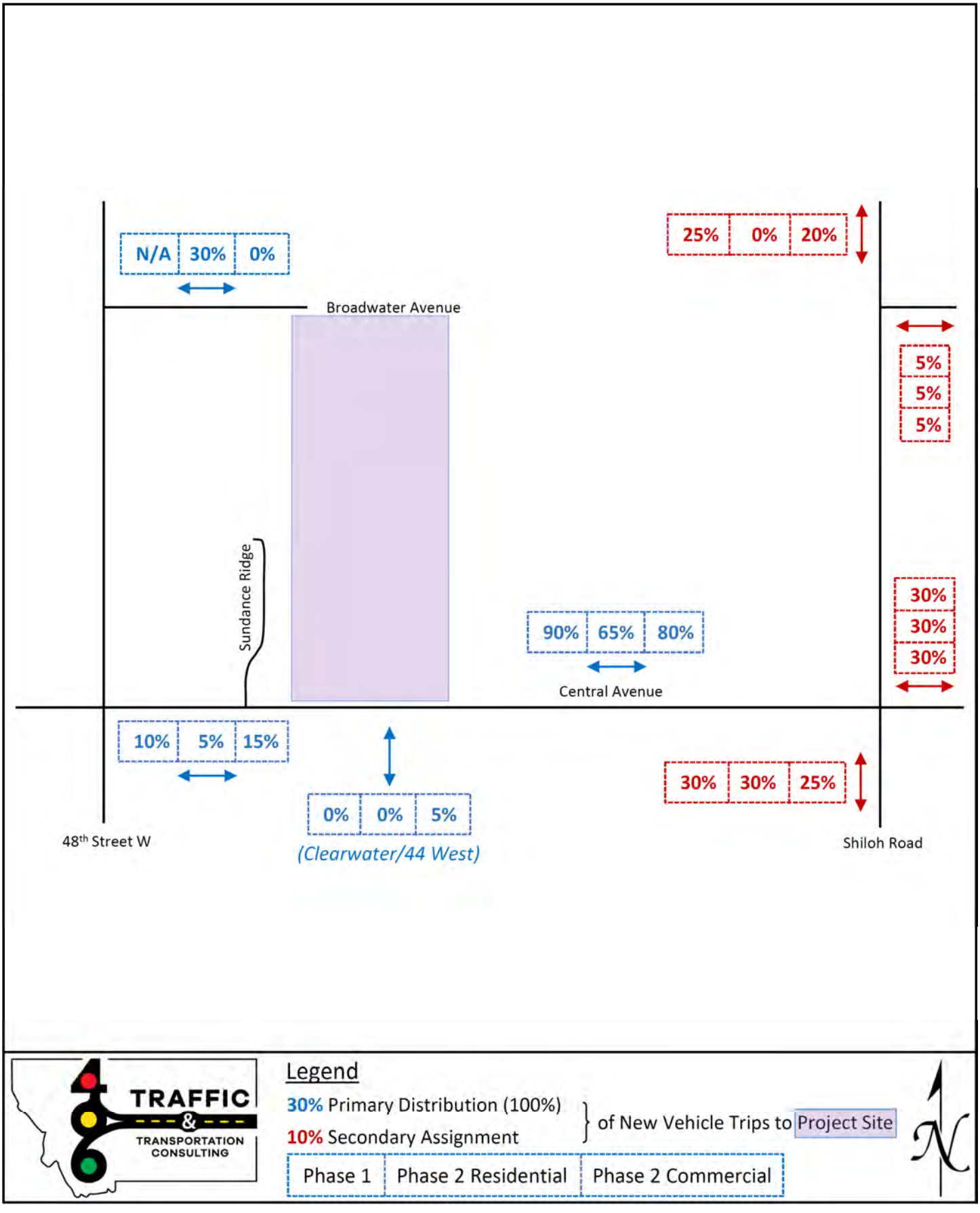


Exhibit 11. Phase 1 Project Trips

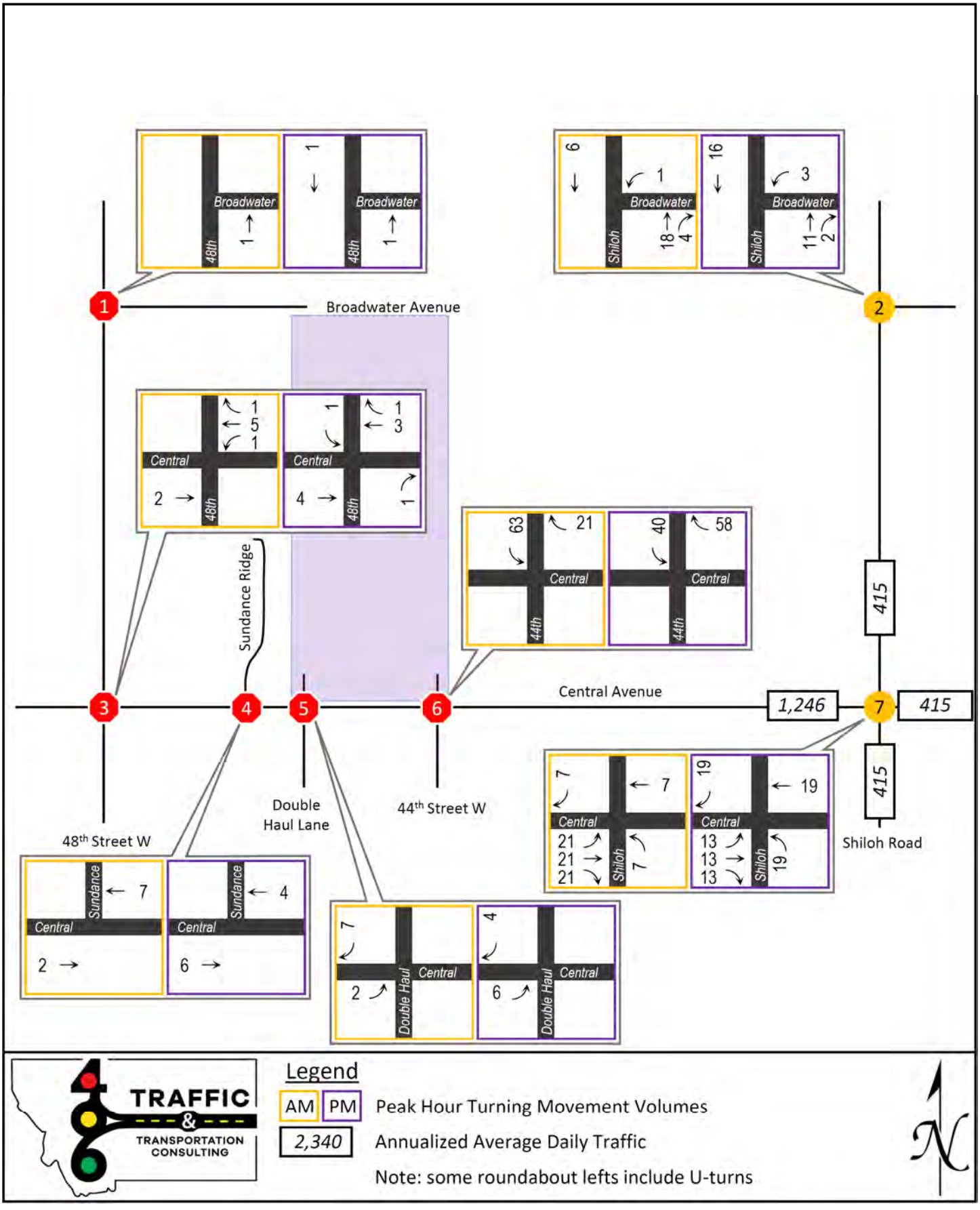


Exhibit 12. 2029 Total Traffic

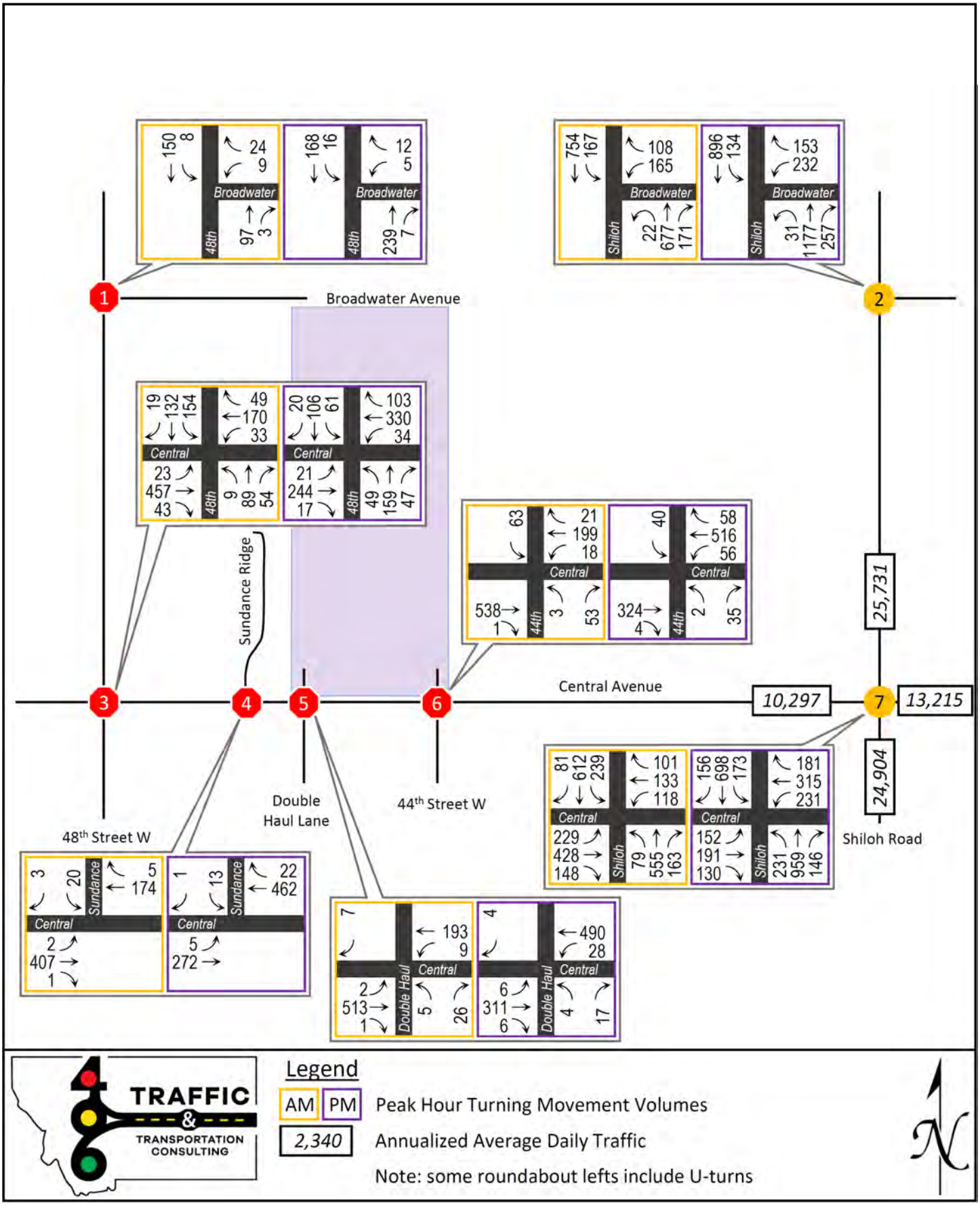


Exhibit 13. 2031 Traffic without Phase 2

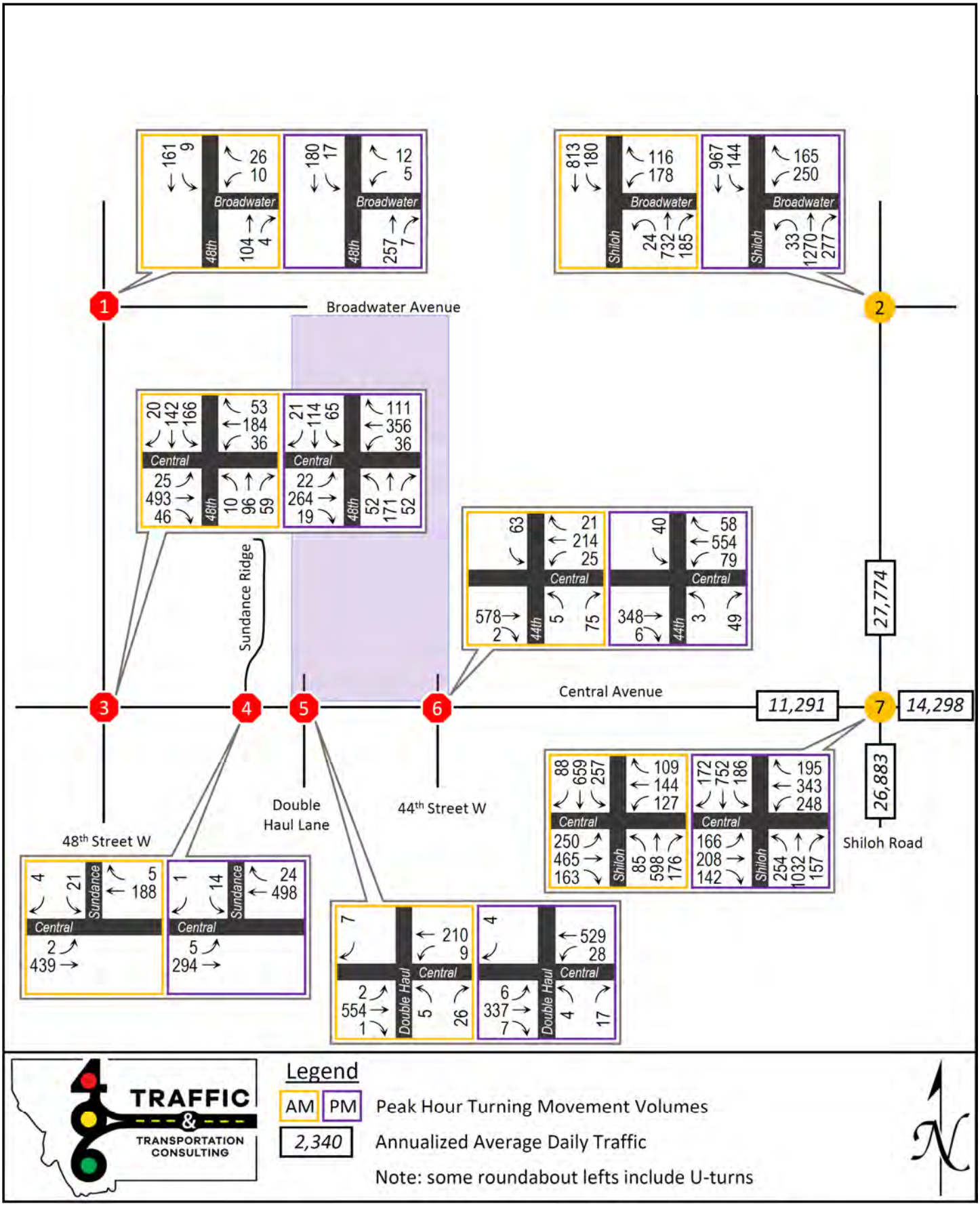


Exhibit 14. Phase 2 Project Trips

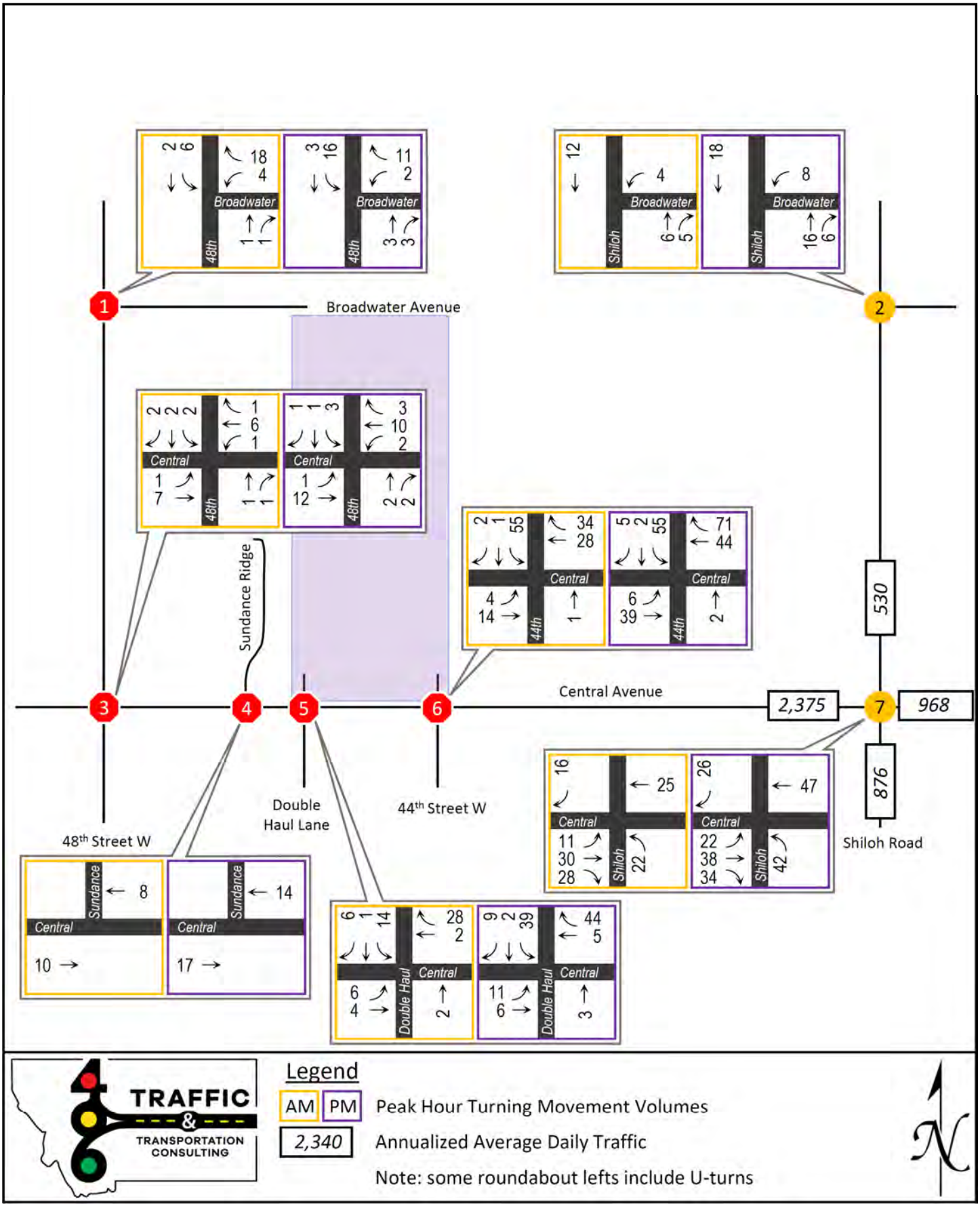
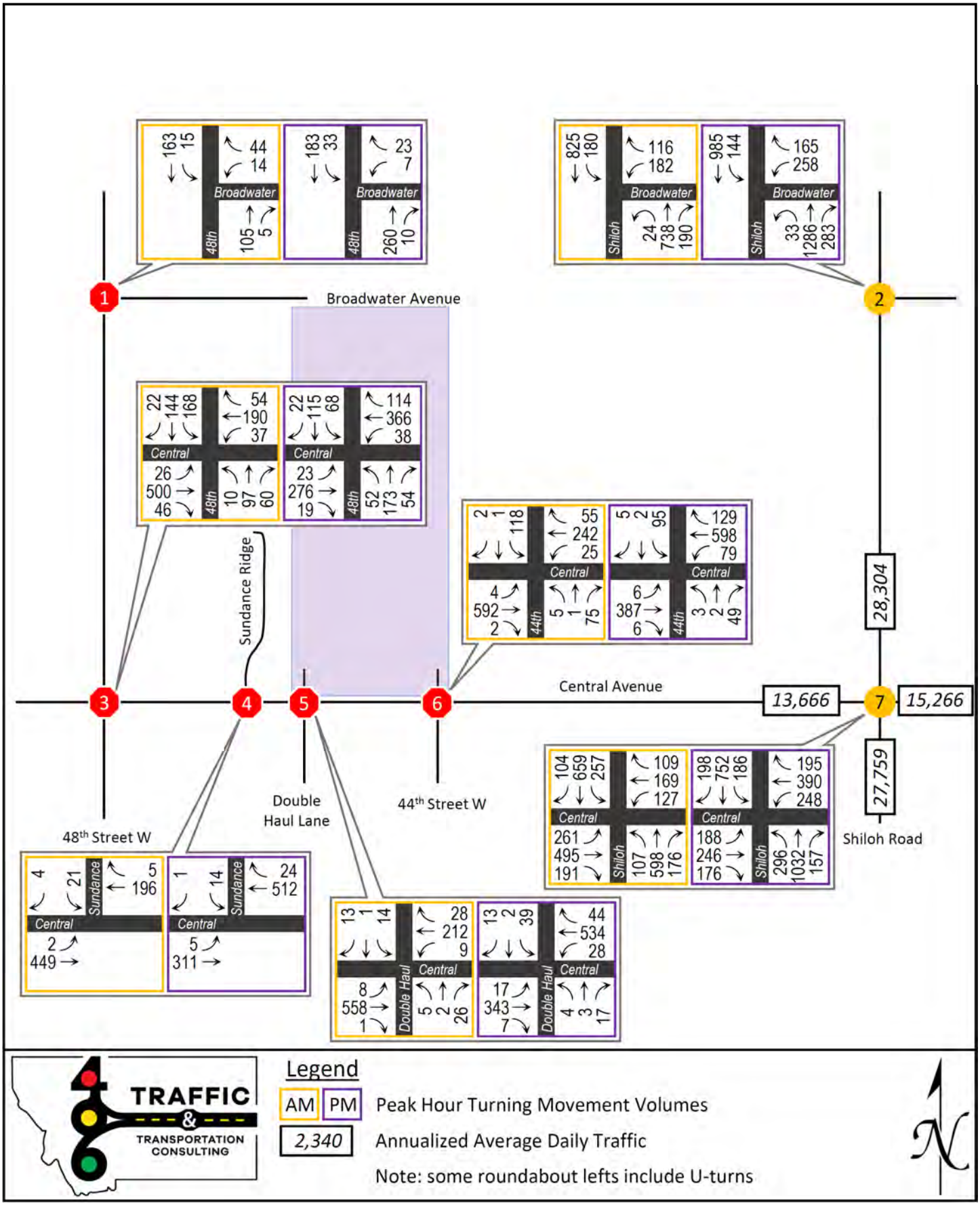


Exhibit 15. 2031 Total Traffic



4 CAPACITY ANALYSIS

The analysis results described in this section are organized by project phase order. Project traffic by phase is additive such that the Phase 2 scenario includes Phase 1 traffic. 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 C and summaries of MUTCD signal warrant analysis for Intersection 6 (44th Avenue W) are provided by phase in Appendix D.

4.1 INTERSECTION DELAY

The peak hour intersection Level of Service (LOS) and delay results with and without Clearwater/ 44 West subdivision Phase 1 traffic are shown in **Exhibit 16**. Bold results indicate LOS cases that are projected to be worse than the LOS C standard.

Exhibit 16. Future Intersection LOS and Delay

	Intersection	Traffic Control	LOS (delay, in seconds/vehicle) 2029 Background	2029 Total	2031, No Phase 2	2031 Total
AM Peak Hour	1. Broadwater at 48th	TWSC*	A (9.4)	A (9.4)	A (9.5)	A (9.7)
	2. Broadwater at Shiloh	Roundabout	A (7.1)	A (7.2)	A (7.8)	A (7.9)
	3. Central at 48th	Signal	A (9.9)	A (10.0)	B (11.4)	B (11.7)
	4. Central at Sundance Ridge	TWSC*	B (13.7)	B (13.8)	B (14.4)	B (14.5)
	5. Central at Double Haul	TWSC*	B (13.0)	B (13.3)	B (14.0)	C (16.2)
	6. Central at 44th	TWSC*	B (13.4)	**D (26.5)**	**D (33.8)**	**F (75.9)**
	7. Central at Shiloh	Roundabout	C (22.3)	**D (26.7)**	**E (44.4)**	**F (57.8)**
PM Peak Hour	1. Broadwater at 48th	TWSC*	B (10.5)	B (10.6)	B (10.8)	B (10.9)
	2. Broadwater at Shiloh	Roundabout	B (12.5)	B (12.8)	C (15.5)	C (16.3)
	3. Central at 48th	Signal	A (8.5)	A (8.5)	A (9.2)	A (9.4)
	4. Central at Sundance Ridge	TWSC*	C (15.9)	C (16.0)	C (17.2)	C (17.8)
	5. Central at Double Haul	TWSC*	B (11.9)	B (12.6)	B (13.2)	**D (29.9)**
	6. Central at 44th	TWSC*	B (11.2)	**D (33.9)**	**E (47.2)**	**F (204.1)**
	7. Central at Shiloh	Roundabout	**D (33.7)**	**E (40.2)**	**F (69.9)**	**F (102.6)**

* *Intersections 1 and 4 – 6 are all TWSC intersections; worst lane group that determines LOS is a minor approach.*

Intersections 1 through 4 would all operate at LOS C or better in all scenarios, and Intersection 5, Central Avenue at Double Haul Lane, would only exceed the LOS C standard in the 2031 PM peak hour. Signalization of Intersection 3, Central at 48th, is indicated here to provide clear benefits to peak hour traffic operations. The east site access to Central Avenue would operate beyond the LOS C standard in both phases, including LOS F conditions in the 2031 PM peak hour under standard two-way stop control. The need for evaluation of additional capacity and control is clearly indicated for this location. Initial testing of signalization with PM peak hour traffic assumptions here shows that LOS could be expected to be well within acceptable limits (LOS A). While this also means that AM peak LOS would also be expected to improve and be within the LOS C standard, additional engineering study is recommended before a signal is formally considered.

The Central/Shiloh roundabout would operate beyond the LOS C standard in at least one peak hour in all scenarios, as has been demonstrated in multiple recent traffic impact analyses. Mitigation of future delay problems at the Central/Shiloh roundabout is recommended with or without the Barber Farm subdivision, in the form of the eventual addition of a westbound right turn bypass lane, subject to additional evaluation by City staff. Preliminary testing with 2031 Phase 2 PM peak hour volumes indicates that addition of a westbound bypass lane would reduce overall intersection delay considerably, while it would still be in the LOS F range. Synchro's estimate of the 95th percentile westbound queue would be reduced by about 46%, from 24 vehicles per lane to 13.

4.2 TURN LANE WARRANTS

Auxiliary turn lanes were evaluated using the methods and tools in MDT Traffic Engineering Manual, Chapter 28 for the three locations where project-generated traffic accesses the surrounding highway network at qualifying locations: Intersections 1, 5, and 6. Both AM and PM conditions were evaluated for both right-turn and left-turn lanes, and condition could provide justification for considering a turn lane. Intersection 1 was only evaluated for 2031 conditions because Broadwater is not projected to be extended east from 48th to serve the project site before that time. This analysis indicates that three such lanes could be justified by the MDT method: westbound right on Central at 44th in 2029, and eastbound left on Central at both Double Haul Lane and 44th in 2031. Despite the low eastbound turning volume (single-digits in both 2031 peaks), the MDT methodology still considers a lane justified due to the very heavy east-west through volumes projected on Central. Note that the LOS results shown in Exhibit 16 above do not reflect the addition of any auxiliary lanes.

Growth in background traffic on Central is a strong part of the future need for left turn lanes. The project team believes strongly that, especially in concert with other side-street turning activity in the corridor, proportionate share cost contributions (discussed in the next chapter) for the Double Haul and 44th intersections from both subdivisions should be used to help the City and County construct the LRTP project that would create a 3-lane section on Central between Shiloh and 48th.

4.3 SIGNAL WARRANTS AT 44TH AVENUE W

At Intersection 6, only the volume warrants are meaningful and relevant. With 2029 Phase 1 conditions none of them would be met, although the intersection is projected to operate at LOS D in both peaks with projected stop control, in which the highest-delay movement's (southbound left turn) delay is the basis for LOS reporting. In contrast, when Phase 2 and two years of additional background traffic growth are added, 2031 full-project traffic there results in all three signal warrants being met. With respect to the Clearwater/44 West subdivision under the City's consideration across Central Avenue to the south, the 2031 Barber horizon year corresponds to the completion of all residential units in the northern half of the project, but no commercial development activity. A traffic signal is expected to be warranted by 2031 based on the analysis indicated in this study.

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 are below 2%, but project trips from all phases are considered together when evaluating such a possibility. Phase-specific project trips used in this calculation were shown previously in Exhibits 11 and 14.

Exhibit 17 shows the incremental intersection cost participation for the new trips associated with each project phase. Exempted shares for Phase 1 traffic would be deferred until the cost participation contribution is due for the second phase. These are shown in brackets and excluded from the Phase 1 total.

Exhibit 17. Intersection Cost Participation by Phase

Intersection	Phase 1	Phase 2	Project Total
1. Broadwater at 48th	[0.1%]	[1.8%]	1.9%-exempt
2. Broadwater at Shiloh	[1.0%]	[1.5%]	2.5%
3. Central at 48th	[0.4%]	2.0%	2.4%
4. Central at Sundance Ridge	[0.6%]	[1.5%]	2.1%
7. Central at Shiloh	4.0%	9.8%	13.8%
Arterial Intersection Subtotal:	**4.0%**		**20.8%**
5. Central at Double Haul (Local)	[0.5%]	4.8%	5.3%
6. Central at 44th (Local)	5.3%	8.9%	14.2%
Total Participation:	**9.3%**		**40.3%**

Note: each % represents the highest project critical-volume share of the two peak hours (AM or PM) for that location.

As shown in the table, only Intersection 1 qualifies for the “sub-2%” exemption when both phases are considered. A total of 9.3% is due with Phase 1 and the remaining 31.0% is due with Phase 2. The details of these cost participation calculations are provided in Appendix E.

This concludes the Barber Farm Subdivision TIS.

Appendix A: Original Raw Traffic Count Data for Intersections

Note: Intersections 5 and 6 were not yet built at the time of this study.

Intersection 1. Broadwater Ave & 48th St. W.
Start Date Wednesday, August 20, 2025
Start Time 7:00 AM, 4:00 PM

	48th Street West Southbound				Broadwater Avenue Westbound				48th Street West Northbound				n/a Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM		23	2	0	2		1	0	1	8		0				
7:15 AM		29	3	0	2		1	0	0	17		0				
7:30 AM		35	1	0	8		2	0	0	28		0				
7:45 AM		43	2	0	5		3	0	0	21		0				
8:00 AM		29	0	0	5		0	0	0	20		0				
8:15 AM		26	4	0	4		3	0	3	14		0				
8:30 AM		36	0	0	4		0	0	1	25		0				
8:45 AM		30	1	0	3		1	0	0	24		0				
4:00 PM		27	4	0	4		0	0	5	45		0				
4:15 PM		37	5	0	6		1	0	2	27		0				
4:30 PM		34	1	0	4		0	0	2	52		0				
4:45 PM		33	2	0	5		2	0	0	50		0				
5:00 PM		30	2	0	0		0	0	2	54		0				
5:15 PM		39	6	0	4		1	0	4	59		0				
5:30 PM		44	4	0	1		1	0	0	47		0				
5:45 PM		35	7	0	3		0	0	1	31		0				

Intersection 2. Shiloh & Broadwater
Start Date Thursday, March 7th, 2024
Start Time 7:00 AM, 4:00 PM

	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

Intersection 3. 48th & Central
Start Date Tuesday, September 10, 2024
Start Time 12:00 AM

	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	3	19	14	0	8	11	3	0	5	10	1	0	6	48	3	0
7:15 AM	4	13	33	0	7	31	1	0	11	23	1	0	8	94	4	0
7:30 AM	3	35	34	0	11	35	7	0	19	17	4	0	8	104	5	0
7:45 AM	6	41	35	0	15	42	11	0	14	19	1	0	15	103	3	0
8:00 AM	3	26	31	0	8	29	8	0	3	18	2	0	6	92	8	0
8:15 AM	2	20	22	0	5	49	7	0	12	18	2	0	6	61	5	0
8:30 AM	6	10	20	0	11	29	4	0	20	12	3	0	5	54	5	0
8:45 AM	1	16	16	0	7	19	4	0	8	17	1	0	6	34	1	0
4:00 PM	4	17	10	0	14	46	10	0	11	31	12	0	2	37	6	0
4:15 PM	2	23	10	0	15	68	9	0	7	29	8	0	4	35	7	0
4:30 PM	8	17	17	0	25	53	9	0	10	37	7	0	13	43	4	0
4:45 PM	3	17	11	0	15	56	8	0	10	32	10	0	3	40	3	0
5:00 PM	2	15	15	0	19	71	10	0	7	35	14	0	4	55	7	0
5:15 PM	8	29	10	0	26	95	4	0	14	43	9	0	3	55	2	0
5:30 PM	4	31	14	0	27	58	7	0	10	28	9	0	5	52	6	0
5:45 PM	4	18	19	0	18	46	9	0	5	26	10	0	8	39	4	0

Intersection 4. Central Ave & Sundance Ridge Rd
Start Date Wednesday, August 20, 2025
Start Time 7:00 AM, 4:00 PM

	Sundance Ridge Road Southbound				Central Avenue Westbound				Northbound Approach 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	1	0	1	0	0	22	0	0	0	0	0	0	0	57	1	0
7:15 AM	0	0	7	0	1	32	0	0	0	0	0	0	0	79	1	0
7:30 AM	2	0	3	0	1	39	0	0	0	0	0	0	0	76	0	0
7:45 AM	1	0	6	0	1	37	0	0	1	0	0	0	1	111	0	0
8:00 AM	1	0	4	0	1	33	0	0	0	0	0	0	0	85	0	0
8:15 AM	1	0	3	0	0	30	0	0	0	0	0	0	0	76	2	0
8:30 AM	0	0	5	0	2	40	0	0	0	0	0	0	0	87	0	0
8:45 AM	2	0	4	0	2	42	0	0	0	0	0	0	0	67	0	0
4:00 PM	1	0	4	0	4	75	0	0	0	0	0	0	0	58	1	0
4:15 PM	0	0	2	0	2	72	0	0	0	0	0	0	0	45	1	0
4:30 PM	0	0	2	0	3	81	0	0	0	0	0	0	0	55	3	0
4:45 PM	0	0	2	0	2	93	0	0	0	0	0	0	0	62	0	0
5:00 PM	1	0	3	0	2	99	0	0	0	0	0	0	0	58	2	0
5:15 PM	0	0	3	0	9	114	0	0	0	0	0	0	0	61	1	0
5:30 PM	0	0	3	0	7	97	0	0	0	0	0	0	0	47	1	0
5:45 PM	0	0	5	0	2	71	1	0	0	0	1	0	0	36	0	0

Intersection 7. Shiloh & Central
Start Date Thursday, March 21st, 2024
Start Time 7:00 AM

	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

Appendix B: Intersection Analysis Software Output

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	21	81	3	7	129
Future Vol, veh/h	8	21	81	3	7	129
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	9	24	94	3	8	150

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	262	96	0	0	98	0
Stage 1	96	-	-	-	-	-
Stage 2	166	-	-	-	-	-
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	731	966	-	-	1508	-
Stage 1	933	-	-	-	-	-
Stage 2	868	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	727	966	-	-	1508	-
Mov Cap-2 Maneuver	727	-	-	-	-	-
Stage 1	933	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	9.23	0	0.38
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	886	93	-
HCM Lane V/C Ratio	-	-	0.038	0.005	-
HCM Ctrl Dly (s/v)	-	-	9.2	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	6.1
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	249	756	833
Demand Flow Rate, veh/h	252	771	842
Vehicles Circulating, veh/h	618	155	173
Vehicles Exiting, veh/h	308	860	597
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	5.9	5.9	6.3
Approach LOS	A	A	A

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	152	100	362	409	396	446
Cap Entry Lane, veh/h	840	855	1233	1233	1213	1213
Entry HV Adj Factor	0.987	0.990	0.981	0.980	0.989	0.990
Flow Entry, veh/h	150	99	355	401	392	442
Cap Entry, veh/h	829	847	1210	1208	1200	1201
V/C Ratio	0.181	0.117	0.294	0.332	0.326	0.368
Control Delay, s/veh	6.2	5.4	5.7	6.1	6.1	6.6
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	1	1	1	2

Intersection	
Intersection Delay, s/veh	25
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	391	37	27	137	40	8	77	47	133	114	16
Future Vol, veh/h	20	391	37	27	137	40	8	77	47	133	114	16
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	5	5	5	5	5	5	2	2	2
Mvmt Flow	23	455	43	31	159	47	9	90	55	155	133	19
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	37	14.7	13.1	18.6
HCM LOS	E	B	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	6%	4%	13%	51%
Vol Thru, %	58%	87%	67%	43%
Vol Right, %	36%	8%	20%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	132	448	204	263
LT Vol	8	20	27	133
Through Vol	77	391	137	114
RT Vol	47	37	40	16
Lane Flow Rate	153	521	237	306
Geometry Grp	1	1	1	1
Degree of Util (X)	0.299	0.872	0.435	0.574
Departure Headway (Hd)	7.004	6.023	6.606	6.756
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	510	599	541	532
Service Time	5.094	4.085	4.688	4.829
HCM Lane V/C Ratio	0.3	0.87	0.438	0.575
HCM Control Delay, s/veh	13.1	37	14.7	18.6
HCM Lane LOS	B	E	B	C
HCM 95th-tile Q	1.2	10	2.2	3.6

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	348	136	4	17	3
Future Vol, veh/h	2	348	136	4	17	3
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	84	84	84	84
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	2	414	162	5	20	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	167	0	-	0	583	164
Stage 1	-	-	-	-	164	-
Stage 2	-	-	-	-	419	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1417	-	-	-	478	886
Stage 1	-	-	-	-	870	-
Stage 2	-	-	-	-	668	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1417	-	-	-	477	886
Mov Cap-2 Maneuver	-	-	-	-	477	-
Stage 1	-	-	-	-	868	-
Stage 2	-	-	-	-	668	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.04	0	12.37
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	10	-	-	-	512
HCM Lane V/C Ratio	0.002	-	-	-	0.046
HCM Ctrl Dly (s/v)	7.5	0	-	-	12.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Intersection Delay, s/veh	12.1
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	644	326	757	887
Demand Flow Rate, veh/h	657	335	780	896
Vehicles Circulating, veh/h	950	797	790	297
Vehicles Exiting, veh/h	243	773	817	835
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	8.4	15.0	8.0
Approach LOS	C	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	0.471	0.529	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	309	348	157	178	367	413	421	475
Cap Entry Lane, veh/h	563	633	648	721	653	726	1027	1103
Entry HV Adj Factor	0.979	0.980	0.975	0.970	0.969	0.971	0.990	0.990
Flow Entry, veh/h	302	341	153	173	356	401	417	470
Cap Entry, veh/h	551	621	632	699	633	705	1017	1092
V/C Ratio	0.549	0.550	0.242	0.247	0.562	0.569	0.410	0.431
Control Delay, s/veh	16.9	15.4	8.7	8.1	15.6	14.5	8.0	7.9
LOS	C	C	A	A	C	B	A	A
95th %tile Queue, veh	3	3	1	1	4	4	2	2

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	10	204	6	14	142
Future Vol, veh/h	4	10	204	6	14	142
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	5	12	237	7	16	165

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	438	241	0	0	244	0
Stage 1	241	-	-	-	-	-
Stage 2	198	-	-	-	-	-
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	579	803	-	-	1334	-
Stage 1	804	-	-	-	-	-
Stage 2	840	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	572	803	-	-	1334	-
Mov Cap-2 Maneuver	572	-	-	-	-	-
Stage 1	804	-	-	-	-	-
Stage 2	829	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.12	0	0.69
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	720	162	-
HCM Lane V/C Ratio	-	-	0.023	0.012	-
HCM Ctrl Dly (s/v)	-	-	10.1	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	374	1420	981
Demand Flow Rate, veh/h	374	1420	990
Vehicles Circulating, veh/h	1171	134	252
Vehicles Exiting, veh/h	383	1108	1141
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	12.6	9.4	7.9
Approach LOS	B	A	A

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	222	152	667	753	465	525
Cap Entry Lane, veh/h	525	539	1257	1257	1129	1129
Entry HV Adj Factor	1.000	1.000	1.001	0.999	0.991	0.990
Flow Entry, veh/h	222	152	667	753	461	520
Cap Entry, veh/h	525	539	1258	1256	1119	1118
V/C Ratio	0.423	0.282	0.531	0.599	0.412	0.465
Control Delay, s/veh	13.9	10.7	8.7	10.0	7.5	8.3
LOS	B	B	A	B	A	A
95th %tile Queue, veh	2	1	3	4	2	3

Intersection	
Intersection Delay, s/veh	18.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	201	15	29	279	87	42	137	40	50	91	17
Future Vol, veh/h	18	201	15	29	279	87	42	137	40	50	91	17
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	21	236	18	34	328	102	49	161	47	59	107	20
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	15.2	25.1	15.3	13.6
HCM LOS	C	D	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	19%	8%	7%	32%
Vol Thru, %	63%	86%	71%	58%
Vol Right, %	18%	6%	22%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	219	234	395	158
LT Vol	42	18	29	50
Through Vol	137	201	279	91
RT Vol	40	15	87	17
Lane Flow Rate	258	275	465	186
Geometry Grp	1	1	1	1
Degree of Util (X)	0.469	0.484	0.758	0.352
Departure Headway (Hd)	6.547	6.327	5.871	6.814
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	549	567	613	526
Service Time	4.616	4.394	3.928	4.889
HCM Lane V/C Ratio	0.47	0.485	0.759	0.354
HCM Control Delay, s/veh	15.3	15.2	25.1	13.6
HCM Lane LOS	C	C	D	B
HCM 95th-tile Q	2.5	2.6	6.8	1.6

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	221	391	19	11	1
Future Vol, veh/h	4	221	391	19	11	1
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, %	1	1	0	0	0	0
Mvmt Flow	4	248	439	21	12	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	461	0	-	0	707	450
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	257	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1106	-	-	-	405	613
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	790	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1106	-	-	-	403	613
Mov Cap-2 Maneuver	-	-	-	-	403	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	790	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.15	0	13.98
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	32	-	-	-	414
HCM Lane V/C Ratio	0.004	-	-	-	0.033
HCM Ctrl Dly (s/v)	8.3	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Intersection Delay, s/veh	14.9
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	351	630	1195	908
Demand Flow Rate, veh/h	351	630	1195	917
Vehicles Circulating, veh/h	1029	1172	422	633
Vehicles Exiting, veh/h	521	445	958	1169
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.0	22.7	13.0	13.6
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	0.470	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	165	186	296	334	562	633	431	486
Cap Entry Lane, veh/h	524	592	459	524	916	992	754	829
Entry HV Adj Factor	1.000	1.000	1.000	1.000	0.999	1.001	0.990	0.990
Flow Entry, veh/h	165	186	296	334	562	633	427	481
Cap Entry, veh/h	524	592	459	524	915	993	746	821
V/C Ratio	0.315	0.314	0.644	0.637	0.614	0.638	0.572	0.586
Control Delay, s/veh	11.6	10.4	24.2	21.3	13.0	13.0	13.9	13.3
LOS	B	B	C	C	B	B	B	B
95th %tile Queue, veh	1	1	4	4	4	5	4	4

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	24	96	3	8	150
Future Vol, veh/h	9	24	96	3	8	150
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	10	28	112	3	9	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	306	113	0	0	115	0
Stage 1	113	-	-	-	-	-
Stage 2	193	-	-	-	-	-
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	690	945	-	-	1486	-
Stage 1	916	-	-	-	-	-
Stage 2	845	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	685	945	-	-	1486	-
Mov Cap-2 Maneuver	685	-	-	-	-	-
Stage 1	916	-	-	-	-	-
Stage 2	839	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	9.4	0	0.38
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	856	91	-
HCM Lane V/C Ratio	-	-	0.045	0.006	-
HCM Ctrl Dly (s/v)	-	-	9.4	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	289	904	974
Demand Flow Rate, veh/h	292	923	984
Vehicles Circulating, veh/h	741	180	202
Vehicles Exiting, veh/h	362	1006	715
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	7.0	6.9	7.4
Approach LOS	A	A	A

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	176	116	434	489	462	522
Cap Entry Lane, veh/h	756	773	1206	1206	1182	1182
Entry HV Adj Factor	0.989	0.990	0.979	0.980	0.991	0.989
Flow Entry, veh/h	174	115	425	479	458	516
Cap Entry, veh/h	748	766	1181	1182	1171	1169
V/C Ratio	0.233	0.150	0.360	0.406	0.391	0.442
Control Delay, s/veh	7.4	6.3	6.6	7.1	7.0	7.7
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	1	2	2	2	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	455	43	32	165	48	9	89	54	154	132	19
Future Volume (veh/h)	23	455	43	32	165	48	9	89	54	154	132	19
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	1723	1723	1723
Adj Flow Rate, veh/h	27	529	50	37	192	56	10	103	63	179	153	22
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	5	5	5	5	5	5	2	2	2
Cap, veh/h	117	669	61	154	518	137	114	304	175	353	230	29
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	33	1509	139	98	1169	310	32	977	562	658	738	93
Grp Volume(v), veh/h	606	0	0	285	0	0	176	0	0	354	0	0
Grp Sat Flow(s),veh/h/ln	1681	0	0	1577	0	0	1571	0	0	1489	0	0
Q Serve(g_s), s	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0
Cycle Q Clear(g_c), s	11.4	0.0	0.0	4.3	0.0	0.0	3.2	0.0	0.0	7.6	0.0	0.0
Prop In Lane	0.04		0.08	0.13		0.20	0.06		0.36	0.51		0.06
Lane Grp Cap(c), veh/h	847	0	0	810	0	0	593	0	0	612	0	0
V/C Ratio(X)	0.72	0.00	0.00	0.35	0.00	0.00	0.30	0.00	0.00	0.58	0.00	0.00
Avail Cap(c_a), veh/h	1266	0	0	1171	0	0	1186	0	0	1154	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	8.8	0.0	0.0	6.9	0.0	0.0	9.8	0.0	0.0	11.2	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.9	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	2.1	0.0	0.0	0.8	0.0	0.0	0.7	0.0	0.0	1.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	10.0	0.0	0.0	7.2	0.0	0.0	10.1	0.0	0.0	12.0	0.0	0.0
LnGrp LOS	A			A			B			B		
Approach Vol, veh/h		606			285			176			354	
Approach Delay, s/veh		10.0			7.2			10.1			12.0	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	15.9	20.8	15.9	20.8
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	5.2	13.4	9.6	6.3
Green Ext Time (p_c), s	0.8	2.8	1.8	1.5

Intersection Summary	
HCM 7th Control Delay, s/veh	9.9
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	405	167	5	20	3
Future Vol, veh/h	2	405	167	5	20	3
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	84	84	84	84
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	2	482	199	6	24	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	205	0	-	0	689	202
Stage 1	-	-	-	-	202	-
Stage 2	-	-	-	-	487	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1373	-	-	-	415	844
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	622	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1373	-	-	-	414	844
Mov Cap-2 Maneuver	-	-	-	-	414	-
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	622	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.04	0	13.66
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	9	-	-	-	443
HCM Lane V/C Ratio	0.002	-	-	-	0.062
HCM Ctrl Dly (s/v)	7.6	0	-	-	13.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

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	90	90	90	90	90	90
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	571	1	10	214	6	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	572	0	806	572
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	234	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1001	-	354	524
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	809	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1001	-	350	524
Mov Cap-2 Maneuver	-	-	-	-	350	-
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	800	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.38	12.99
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	485	-	-	80	-
HCM Lane V/C Ratio	0.071	-	-	0.01	-
HCM Ctrl Dly (s/v)	13	-	-	8.6	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	90	90	90	90	90	90
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	599	1	20	221	3	59

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	600	0	861	599
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	261	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	977	-	329	505
Stage 1	-	-	-	-	552	-
Stage 2	-	-	-	-	787	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	977	-	321	505
Mov Cap-2 Maneuver	-	-	-	-	321	-
Stage 1	-	-	-	-	552	-
Stage 2	-	-	-	-	769	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.73	13.41
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	490	-	-	149	-
HCM Lane V/C Ratio	0.127	-	-	0.02	-
HCM Ctrl Dly (s/v)	13.4	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

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	2	2
Adj Approach Flow, veh/h	834	388	889	1040
Demand Flow Rate, veh/h	851	399	915	1051
Vehicles Circulating, veh/h	1104	966	977	366
Vehicles Exiting, veh/h	313	926	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	29.4	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	430	485	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	0.972	0.972	0.990	0.990
Flow Entry, veh/h	392	442	182	206	418	471	489	551
Cap Entry, veh/h	479	544	538	608	534	601	954	1030
V/C Ratio	0.818	0.812	0.339	0.338	0.783	0.784	0.512	0.535
Control Delay, s/veh	37.3	33.2	11.8	10.6	30.8	28.2	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	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	12	238	7	16	167
Future Vol, veh/h	5	12	238	7	16	167
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	6	14	277	8	19	194

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	512	281	0	0	285	0
Stage 1	281	-	-	-	-	-
Stage 2	231	-	-	-	-	-
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	525	763	-	-	1289	-
Stage 1	771	-	-	-	-	-
Stage 2	812	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	517	763	-	-	1289	-
Mov Cap-2 Maneuver	517	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	799	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.54	0	0.68
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	669	157	-
HCM Lane V/C Ratio	-	-	0.03	0.014	-
HCM Ctrl Dly (s/v)	-	-	10.5	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	439	1668	1165
Demand Flow Rate, veh/h	439	1668	1177
Vehicles Circulating, veh/h	1375	156	298
Vehicles Exiting, veh/h	449	1319	1340
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	19.4	12.4	10.1
Approach LOS	C	B	B

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	263	176	784	884	553	624
Cap Entry Lane, veh/h	441	455	1232	1232	1083	1083
Entry HV Adj Factor	1.000	1.000	1.000	1.000	0.990	0.989
Flow Entry, veh/h	263	176	784	884	547	617
Cap Entry, veh/h	441	455	1232	1232	1072	1071
V/C Ratio	0.596	0.387	0.636	0.717	0.511	0.576
Control Delay, s/veh	22.5	14.8	11.1	13.5	9.4	10.7
LOS	C	B	B	B	A	B
95th %tile Queue, veh	4	2	5	7	3	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	240	17	34	327	102	49	159	47	60	106	20
Future Volume (veh/h)	21	240	17	34	327	102	49	159	47	60	106	20
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	1750	1750	1750	1750
Adj Flow Rate, veh/h	25	282	20	40	385	120	58	187	55	71	125	24
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	149	666	45	152	533	158	195	307	81	253	296	48
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	53	1533	103	60	1226	363	204	1124	298	359	1084	177
Grp Volume(v), veh/h	327	0	0	545	0	0	300	0	0	220	0	0
Grp Sat Flow(s),veh/h/ln	1690	0	0	1649	0	0	1626	0	0	1619	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.8	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.0	0.0	0.0	8.4	0.0	0.0	4.9	0.0	0.0	3.3	0.0	0.0
Prop In Lane	0.08		0.06	0.07		0.22	0.19		0.18	0.32		0.11
Lane Grp Cap(c), veh/h	860	0	0	842	0	0	583	0	0	597	0	0
V/C Ratio(X)	0.38	0.00	0.00	0.65	0.00	0.00	0.51	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	1499	0	0	1480	0	0	1462	0	0	1419	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	7.3	0.0	0.0	9.9	0.0	0.0	9.3	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.8	0.0	0.0	0.7	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	0.5	0.0	0.0	1.2	0.0	0.0	1.0	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.3	0.0	0.0	8.1	0.0	0.0	10.6	0.0	0.0	9.7	0.0	0.0
LnGrp LOS	A			A			B			A		
Approach Vol, veh/h		327			545			300			220	
Approach Delay, s/veh		6.3			8.1			10.6			9.7	
Approach LOS		A			A			B			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	12.9	17.9	12.9	17.9
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	6.9	6.0	5.3	10.4
Green Ext Time (p_c), s	1.5	1.6	1.1	2.9

Intersection Summary	
HCM 7th Control Delay, s/veh	8.5
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	266	458	22	13	1
Future Vol, veh/h	5	266	458	22	13	1
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, %	1	1	0	0	0	0
Mvmt Flow	6	299	515	25	15	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	539	0	-	0	837	527
Stage 1	-	-	-	-	527	-
Stage 2	-	-	-	-	310	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1034	-	-	-	339	555
Stage 1	-	-	-	-	596	-
Stage 2	-	-	-	-	748	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1034	-	-	-	337	555
Mov Cap-2 Maneuver	-	-	-	-	337	-
Stage 1	-	-	-	-	592	-
Stage 2	-	-	-	-	748	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.16	0	15.87
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	33	-	-	-	347
HCM Lane V/C Ratio	0.005	-	-	-	0.045
HCM Ctrl Dly (s/v)	8.5	0	-	-	15.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1

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	90	90	90	90	90	90
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	346	7	31	544	4	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	352	0	956	349
Stage 1	-	-	-	-	349	-
Stage 2	-	-	-	-	607	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1212	-	289	699
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	548	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1212	-	278	699
Mov Cap-2 Maneuver	-	-	-	-	278	-
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	528	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.44	11.93
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	543	-	-	97	-
HCM Lane V/C Ratio	0.043	-	-	0.026	-
HCM Ctrl Dly (s/v)	11.9	-	-	8	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	90	90	90	90	90	90
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	360	4	62	573	2	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	364	0	1060	362
Stage 1	-	-	-	-	362	-
Stage 2	-	-	-	-	698	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1200	-	250	687
Stage 1	-	-	-	-	709	-
Stage 2	-	-	-	-	497	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1200	-	231	687
Mov Cap-2 Maneuver	-	-	-	-	231	-
Stage 1	-	-	-	-	709	-
Stage 2	-	-	-	-	460	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.8	11.21
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	621	-	-	176	-
HCM Lane V/C Ratio	0.066	-	-	0.052	-
HCM Ctrl Dly (s/v)	11.2	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-

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	776	1416	1084
Demand Flow Rate, veh/h	465	776	1416	1095
Vehicles Circulating, veh/h	1195	1407	527	809
Vehicles Exiting, veh/h	709	536	1133	1374
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	70.5	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	365	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	0.999	1.001	0.999	1.001	0.990	0.991
Flow Entry, veh/h	219	246	365	411	666	750	510	575
Cap Entry, veh/h	449	515	370	430	831	908	635	707
V/C Ratio	0.487	0.478	0.986	0.957	0.801	0.827	0.803	0.812
Control Delay, s/veh	17.8	15.6	77.4	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	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	24	97	3	8	150
Future Vol, veh/h	9	24	97	3	8	150
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	10	28	113	3	9	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	308	115	0	0	116	0
Stage 1	115	-	-	-	-	-
Stage 2	193	-	-	-	-	-
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	689	943	-	-	1485	-
Stage 1	915	-	-	-	-	-
Stage 2	845	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	684	943	-	-	1485	-
Mov Cap-2 Maneuver	684	-	-	-	-	-
Stage 1	915	-	-	-	-	-
Stage 2	839	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	9.41	0	0.38
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	855	91	-
HCM Lane V/C Ratio	-	-	0.045	0.006	-
HCM Ctrl Dly (s/v)	-	-	9.4	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	291	927	980
Demand Flow Rate, veh/h	294	946	990
Vehicles Circulating, veh/h	760	180	204
Vehicles Exiting, veh/h	366	1014	734
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	7.1	7.0	7.4
Approach LOS	A	A	A

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	178	116	445	501	465	525
Cap Entry Lane, veh/h	744	761	1206	1206	1179	1179
Entry HV Adj Factor	0.989	0.990	0.979	0.981	0.991	0.989
Flow Entry, veh/h	176	115	436	491	461	519
Cap Entry, veh/h	736	754	1180	1182	1168	1167
V/C Ratio	0.239	0.153	0.369	0.416	0.394	0.445
Control Delay, s/veh	7.6	6.4	6.7	7.3	7.0	7.8
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	1	2	2	2	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	457	43	33	170	49	9	89	54	154	132	19
Future Volume (veh/h)	23	457	43	33	170	49	9	89	54	154	132	19
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	1723	1723	1723
Adj Flow Rate, veh/h	27	531	50	38	198	57	10	103	63	179	153	22
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	5	5	5	5	5	5	2	2	2
Cap, veh/h	117	671	61	155	520	136	113	304	175	352	230	29
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	32	1510	138	99	1171	307	32	977	562	658	738	93
Grp Volume(v), veh/h	608	0	0	293	0	0	176	0	0	354	0	0
Grp Sat Flow(s),veh/h/ln	1681	0	0	1577	0	0	1571	0	0	1489	0	0
Q Serve(g_s), s	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0
Cycle Q Clear(g_c), s	11.5	0.0	0.0	4.5	0.0	0.0	3.2	0.0	0.0	7.6	0.0	0.0
Prop In Lane	0.04		0.08	0.13		0.19	0.06		0.36	0.51		0.06
Lane Grp Cap(c), veh/h	849	0	0	811	0	0	592	0	0	611	0	0
V/C Ratio(X)	0.72	0.00	0.00	0.36	0.00	0.00	0.30	0.00	0.00	0.58	0.00	0.00
Avail Cap(c_a), veh/h	1262	0	0	1168	0	0	1183	0	0	1150	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	8.9	0.0	0.0	6.9	0.0	0.0	9.8	0.0	0.0	11.2	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.9	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	2.1	0.0	0.0	0.8	0.0	0.0	0.7	0.0	0.0	1.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	10.0	0.0	0.0	7.2	0.0	0.0	10.1	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B			A			B			B		
Approach Vol, veh/h		608			293			176			354	
Approach Delay, s/veh		10.0			7.2			10.1			12.1	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	15.9	20.8	15.9	20.8
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	5.2	13.5	9.6	6.5
Green Ext Time (p_c), s	0.8	2.8	1.8	1.6

Intersection Summary	
HCM 7th Control Delay, s/veh	10.0
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	407	174	5	20	3
Future Vol, veh/h	2	407	174	5	20	3
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	84	84	84	84
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	2	485	207	6	24	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	213	0	-	0	699	210
Stage 1	-	-	-	-	210	-
Stage 2	-	-	-	-	489	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1363	-	-	-	409	835
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	620	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1363	-	-	-	408	835
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	828	-
Stage 2	-	-	-	-	620	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.04	0	13.79
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	9	-	-	-	437
HCM Lane V/C Ratio	0.002	-	-	-	0.063
HCM Ctrl Dly (s/v)	7.6	0	-	-	13.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	513	1	9	193	0	5	0	26	0	0	7
Future Vol, veh/h	2	513	1	9	193	0	5	0	26	0	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	0	0	0
Mvmt Flow	2	570	1	10	214	0	6	0	29	0	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	214	0	0	571	0	0	809	809	571	809	810	214
Stage 1	-	-	-	-	-	-	575	575	-	234	234	-
Stage 2	-	-	-	-	-	-	234	234	-	574	576	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1362	-	-	1002	-	-	301	316	524	301	316	831
Stage 1	-	-	-	-	-	-	507	506	-	773	715	-
Stage 2	-	-	-	-	-	-	773	715	-	507	506	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1362	-	-	1002	-	-	294	312	524	281	312	831
Mov Cap-2 Maneuver	-	-	-	-	-	-	294	312	-	281	312	-
Stage 1	-	-	-	-	-	-	506	505	-	764	706	-
Stage 2	-	-	-	-	-	-	757	706	-	478	504	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.03	0.38	13.35	9.38
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	466	7	-	-	80	-	-	831
HCM Lane V/C Ratio	0.074	0.002	-	-	0.01	-	-	0.009
HCM Ctrl Dly (s/v)	13.3	7.6	0	-	8.6	0	-	9.4
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	538	1	18	199	21	3	0	53	63	0	0
Future Vol, veh/h	0	538	1	18	199	21	3	0	53	63	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	0	0	0
Mvmt Flow	0	598	1	20	221	23	3	0	59	70	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	244	0	0	599	0	0	859	883	598	871	872	233
Stage 1	-	-	-	-	-	-	598	598	-	273	273	-
Stage 2	-	-	-	-	-	-	261	284	-	598	599	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1328	-	-	978	-	-	279	287	506	274	291	811
Stage 1	-	-	-	-	-	-	492	494	-	738	688	-
Stage 2	-	-	-	-	-	-	748	680	-	493	494	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1328	-	-	978	-	-	272	280	506	236	284	811
Mov Cap-2 Maneuver	-	-	-	-	-	-	272	280	-	236	284	-
Stage 1	-	-	-	-	-	-	492	494	-	720	671	-
Stage 2	-	-	-	-	-	-	730	664	-	435	494	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.66	13.54	26.54
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	483	1328	-	-	134	-	-	236
HCM Lane V/C Ratio	0.129	-	-	-	0.02	-	-	0.296
HCM Ctrl Dly (s/v)	13.5	0	-	-	8.8	0	-	26.5
HCM Lane LOS	B	A	-	-	A	A	-	D
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	1.2

Intersection	
Intersection Delay, s/veh	26.7
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	904	395	896	1048
Demand Flow Rate, veh/h	922	406	923	1059
Vehicles Circulating, veh/h	1104	997	1025	382
Vehicles Exiting, veh/h	337	951	1001	1021
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	44.1	11.7	34.6	10.5
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	0.470	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	433	489	191	215	434	489	498	561
Cap Entry Lane, veh/h	489	556	539	608	526	594	950	1026
Entry HV Adj Factor	0.982	0.980	0.971	0.973	0.971	0.971	0.989	0.990
Flow Entry, veh/h	425	479	185	209	421	475	493	556
Cap Entry, veh/h	480	545	524	592	510	577	940	1016
V/C Ratio	0.886	0.880	0.354	0.353	0.825	0.823	0.524	0.547
Control Delay, s/veh	46.6	41.9	12.4	11.1	36.4	33.0	10.6	10.5
LOS	E	E	B	B	E	D	B	B
95th %tile Queue, veh	10	10	2	2	8	8	3	3

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	12	239	7	16	168
Future Vol, veh/h	5	12	239	7	16	168
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	6	14	278	8	19	195

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	515	282	0	0	286	0
Stage 1	282	-	-	-	-	-
Stage 2	233	-	-	-	-	-
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	524	762	-	-	1288	-
Stage 1	770	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	515	762	-	-	1288	-
Mov Cap-2 Maneuver	515	-	-	-	-	-
Stage 1	770	-	-	-	-	-
Stage 2	798	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.56	0	0.68
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	668	157	-
HCM Lane V/C Ratio	-	-	0.03	0.014	-
HCM Ctrl Dly (s/v)	-	-	10.6	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	12.8
Intersection LOS	B

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	443	1683	1184
Demand Flow Rate, veh/h	443	1683	1196
Vehicles Circulating, veh/h	1388	156	302
Vehicles Exiting, veh/h	451	1342	1353
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	20.1	12.6	10.3
Approach LOS	C	B	B

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	267	176	791	892	562	634
Cap Entry Lane, veh/h	436	450	1232	1232	1079	1079
Entry HV Adj Factor	1.000	1.000	1.000	1.000	0.990	0.990
Flow Entry, veh/h	267	176	791	892	556	627
Cap Entry, veh/h	436	450	1232	1232	1068	1068
V/C Ratio	0.612	0.391	0.642	0.724	0.521	0.588
Control Delay, s/veh	23.5	15.0	11.2	13.8	9.6	11.0
LOS	C	C	B	B	A	B
95th %tile Queue, veh	4	2	5	7	3	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	244	17	34	330	103	49	159	48	61	106	20
Future Volume (veh/h)	21	244	17	34	330	103	49	159	48	61	106	20
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	1750	1750	1750	1750
Adj Flow Rate, veh/h	25	287	20	40	388	121	58	187	56	72	125	24
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	148	670	44	151	535	158	194	306	83	254	295	48
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	53	1536	102	59	1226	363	203	1120	302	364	1079	176
Grp Volume(v), veh/h	332	0	0	549	0	0	301	0	0	221	0	0
Grp Sat Flow(s),veh/h/ln	1691	0	0	1649	0	0	1626	0	0	1619	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.9	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.1	0.0	0.0	8.6	0.0	0.0	5.0	0.0	0.0	3.3	0.0	0.0
Prop In Lane	0.08		0.06	0.07		0.22	0.19		0.19	0.33		0.11
Lane Grp Cap(c), veh/h	863	0	0	844	0	0	583	0	0	596	0	0
V/C Ratio(X)	0.38	0.00	0.00	0.65	0.00	0.00	0.52	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	1491	0	0	1470	0	0	1453	0	0	1409	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	7.3	0.0	0.0	10.0	0.0	0.0	9.4	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.9	0.0	0.0	0.7	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	0.5	0.0	0.0	1.2	0.0	0.0	1.0	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.4	0.0	0.0	8.2	0.0	0.0	10.7	0.0	0.0	9.8	0.0	0.0
LnGrp LOS	A			A			B			A		
Approach Vol, veh/h		332			549			301			221	
Approach Delay, s/veh		6.4			8.2			10.7			9.8	
Approach LOS		A			A			B			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	12.9	18.0	12.9	18.0
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	7.0	6.1	5.3	10.6
Green Ext Time (p_c), s	1.5	1.7	1.1	2.9

Intersection Summary	
HCM 7th Control Delay, s/veh	8.5
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	272	462	22	13	1
Future Vol, veh/h	5	272	462	22	13	1
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, %	1	1	0	0	0	0
Mvmt Flow	6	306	519	25	15	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	544	0	-	0	848	531
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	317	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1030	-	-	-	334	552
Stage 1	-	-	-	-	593	-
Stage 2	-	-	-	-	743	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1030	-	-	-	332	552
Mov Cap-2 Maneuver	-	-	-	-	332	-
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	743	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.15	0	16.04
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	32	-	-	-	342
HCM Lane V/C Ratio	0.005	-	-	-	0.046
HCM Ctrl Dly (s/v)	8.5	0	-	-	16
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	6	311	6	28	490	0	4	0	17	0	0	4
Future Vol, veh/h	6	311	6	28	490	0	4	0	17	0	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	7	346	7	31	544	0	4	0	19	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	544	0	0	352	0	0	969	969	349	966	972	544
Stage 1	-	-	-	-	-	-	362	362	-	607	607	-
Stage 2	-	-	-	-	-	-	607	607	-	359	366	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1025	-	-	1212	-	-	235	256	699	236	254	543
Stage 1	-	-	-	-	-	-	661	629	-	487	490	-
Stage 2	-	-	-	-	-	-	487	490	-	663	626	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1025	-	-	1212	-	-	223	244	699	220	243	543
Mov Cap-2 Maneuver	-	-	-	-	-	-	223	244	-	220	243	-
Stage 1	-	-	-	-	-	-	655	624	-	469	472	-
Stage 2	-	-	-	-	-	-	465	472	-	640	621	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.16	0.44	12.61	11.69
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	497	33	-	-	97	-	-	543
HCM Lane V/C Ratio	0.047	0.007	-	-	0.026	-	-	0.008
HCM Ctrl Dly (s/v)	12.6	8.5	0	-	8	0	-	11.7
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	324	4	56	516	58	2	0	35	40	0	0
Future Vol, veh/h	0	324	4	56	516	58	2	0	35	40	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	0	360	4	62	573	64	2	0	39	44	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	638	0	0	364	0	0	1060	1124	362	1090	1094	606
Stage 1	-	-	-	-	-	-	362	362	-	730	730	-
Stage 2	-	-	-	-	-	-	698	762	-	360	364	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	946	-	-	1200	-	-	204	207	687	194	216	501
Stage 1	-	-	-	-	-	-	661	629	-	417	431	-
Stage 2	-	-	-	-	-	-	434	416	-	662	627	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	946	-	-	1200	-	-	187	190	687	168	198	501
Mov Cap-2 Maneuver	-	-	-	-	-	-	187	190	-	168	198	-
Stage 1	-	-	-	-	-	-	661	629	-	383	396	-
Stage 2	-	-	-	-	-	-	399	383	-	625	627	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.73	11.44	33.86
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	600	946	-	-	157	-	-	168
HCM Lane V/C Ratio	0.068	-	-	-	0.052	-	-	0.264
HCM Ctrl Dly (s/v)	11.4	0	-	-	8.2	0	-	33.9
HCM Lane LOS	B	A	-	-	A	A	-	D
HCM 95th %tile Q(veh)	0.2	0	-	-	0.2	-	-	1

Intersection	
Intersection Delay, s/veh	40.2
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	508	797	1436	1105
Demand Flow Rate, veh/h	508	797	1436	1117
Vehicles Circulating, veh/h	1195	1442	556	850
Vehicles Exiting, veh/h	772	550	1147	1389
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	18.1	86.7	27.1	33.8
Approach LOS	C	F	D	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	0.470	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	239	269	375	422	675	761	525	592
Cap Entry Lane, veh/h	450	514	358	417	809	885	618	689
Entry HV Adj Factor	0.999	1.001	0.999	1.001	1.000	1.000	0.990	0.990
Flow Entry, veh/h	239	269	375	422	675	761	520	586
Cap Entry, veh/h	449	515	358	417	809	885	611	682
V/C Ratio	0.532	0.523	1.047	1.012	0.834	0.860	0.850	0.859
Control Delay, s/veh	19.4	17.0	95.2	79.2	26.6	27.5	34.6	33.0
LOS	C	C	F	F	D	D	D	D
95th %tile Queue, veh	3	3	13	13	10	11	9	10

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	26	104	4	9	161
Future Vol, veh/h	10	26	104	4	9	161
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	12	30	121	5	10	187

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	331	123	0	0	126	0
Stage 1	123	-	-	-	-	-
Stage 2	208	-	-	-	-	-
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	668	933	-	-	1473	-
Stage 1	907	-	-	-	-	-
Stage 2	831	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	662	933	-	-	1473	-
Mov Cap-2 Maneuver	662	-	-	-	-	-
Stage 1	907	-	-	-	-	-
Stage 2	825	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	9.52	0	0.39
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	838	95	-
HCM Lane V/C Ratio	-	-	0.05	0.007	-
HCM Ctrl Dly (s/v)	-	-	9.5	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	312	1003	1056
Demand Flow Rate, veh/h	315	1024	1067
Vehicles Circulating, veh/h	823	193	219
Vehicles Exiting, veh/h	394	1093	795
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	7.8	7.6	8.1
Approach LOS	A	A	A

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	191	124	481	543	501	566
Cap Entry Lane, veh/h	705	723	1191	1191	1163	1163
Entry HV Adj Factor	0.990	0.990	0.981	0.980	0.991	0.989
Flow Entry, veh/h	189	123	472	532	496	560
Cap Entry, veh/h	698	715	1169	1167	1153	1151
V/C Ratio	0.271	0.172	0.404	0.456	0.431	0.486
Control Delay, s/veh	8.4	6.9	7.2	7.9	7.6	8.5
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	1	2	2	2	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	493	46	36	184	53	10	96	59	166	142	20
Future Volume (veh/h)	25	493	46	36	184	53	10	96	59	166	142	20
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	1723	1723	1723
Adj Flow Rate, veh/h	29	573	53	42	214	62	12	112	69	193	165	23
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	5	5	5	5	5	5	2	2	2
Cap, veh/h	107	693	62	147	530	140	105	314	181	349	233	29
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	33	1510	136	104	1155	305	36	976	563	673	723	90
Grp Volume(v), veh/h	655	0	0	318	0	0	193	0	0	381	0	0
Grp Sat Flow(s),veh/h/ln	1679	0	0	1564	0	0	1576	0	0	1485	0	0
Q Serve(g_s), s	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0
Cycle Q Clear(g_c), s	14.1	0.0	0.0	5.4	0.0	0.0	3.9	0.0	0.0	9.3	0.0	0.0
Prop In Lane	0.04		0.08	0.13		0.19	0.06		0.36	0.51		0.06
Lane Grp Cap(c), veh/h	862	0	0	817	0	0	600	0	0	610	0	0
V/C Ratio(X)	0.76	0.00	0.00	0.39	0.00	0.00	0.32	0.00	0.00	0.62	0.00	0.00
Avail Cap(c_a), veh/h	1132	0	0	1048	0	0	1062	0	0	1030	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	9.8	0.0	0.0	7.5	0.0	0.0	10.7	0.0	0.0	12.4	0.0	0.0
Incr Delay (d2), s/veh	2.2	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	1.1	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	8.1	0.0	0.0	1.1	0.0	0.0	0.9	0.0	0.0	2.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	12.0	0.0	0.0	7.8	0.0	0.0	11.1	0.0	0.0	13.4	0.0	0.0
LnGrp LOS	B			A			B			B		
Approach Vol, veh/h		655			318			193			381	
Approach Delay, s/veh		12.0			7.8			11.1			13.4	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	17.7	23.3	17.7	23.3
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	5.9	16.1	11.3	7.4
Green Ext Time (p_c), s	0.9	2.7	1.9	1.7

Intersection Summary	
HCM 7th Control Delay, s/veh	11.4
HCM 7th LOS	B

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	439	188	5	21	4
Future Vol, veh/h	2	439	188	5	21	4
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	84	84	84	84
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	2	523	224	6	25	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	230	0	-	0	754	227
Stage 1	-	-	-	-	227	-
Stage 2	-	-	-	-	527	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1344	-	-	-	380	818
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	596	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1344	-	-	-	379	818
Mov Cap-2 Maneuver	-	-	-	-	379	-
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	596	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.03	0	14.36
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	8	-	-	-	414
HCM Lane V/C Ratio	0.002	-	-	-	0.072
HCM Ctrl Dly (s/v)	7.7	0	-	-	14.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	2	554	1	9	210	0	5	0	26	0	0	7
Future Vol, veh/h	2	554	1	9	210	0	5	0	26	0	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	0	0	0
Mvmt Flow	2	616	1	10	233	0	6	0	29	0	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	233	0	0	617	0	0	874	874	616	873	874	233
Stage 1	-	-	-	-	-	-	621	621	-	253	253	-
Stage 2	-	-	-	-	-	-	253	253	-	620	621	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1340	-	-	963	-	-	272	290	494	273	290	811
Stage 1	-	-	-	-	-	-	479	483	-	755	701	-
Stage 2	-	-	-	-	-	-	755	701	-	479	482	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1340	-	-	963	-	-	266	286	494	253	286	811
Mov Cap-2 Maneuver	-	-	-	-	-	-	266	286	-	253	286	-
Stage 1	-	-	-	-	-	-	477	481	-	746	693	-
Stage 2	-	-	-	-	-	-	739	693	-	450	481	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.03	0.36	14.01	9.48
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	434	6	-	-	74	-	-	811
HCM Lane V/C Ratio	0.079	0.002	-	-	0.01	-	-	0.01
HCM Ctrl Dly (s/v)	14	7.7	0	-	8.8	0	-	9.5
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	578	2	25	214	21	5	0	75	63	0	0
Future Vol, veh/h	0	578	2	25	214	21	5	0	75	63	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	0	0	0
Mvmt Flow	0	642	2	28	238	23	6	0	83	70	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	261	0	0	644	0	0	937	960	643	947	949	249
Stage 1	-	-	-	-	-	-	643	643	-	305	305	-
Stage 2	-	-	-	-	-	-	293	317	-	642	644	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1309	-	-	941	-	-	247	259	477	243	262	794
Stage 1	-	-	-	-	-	-	465	471	-	709	666	-
Stage 2	-	-	-	-	-	-	719	658	-	466	471	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1309	-	-	941	-	-	238	250	477	194	253	794
Mov Cap-2 Maneuver	-	-	-	-	-	-	238	250	-	194	253	-
Stage 1	-	-	-	-	-	-	465	471	-	684	643	-
Stage 2	-	-	-	-	-	-	694	635	-	384	471	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.86	14.99	33.76
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	449	1309	-	-	170	-	-	194
HCM Lane V/C Ratio	0.198	-	-	-	0.03	-	-	0.362
HCM Ctrl Dly (s/v)	15	0	-	-	8.9	0	-	33.8
HCM Lane LOS	B	A	-	-	A	A	-	D
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	1.5

Intersection	
Intersection Delay, s/veh	44.4
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	986	427	966	1128
Demand Flow Rate, veh/h	1006	440	995	1139
Vehicles Circulating, veh/h	1186	1078	1111	413
Vehicles Exiting, veh/h	366	1028	1081	1105
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	80.5	13.8	58.9	12.1
Approach LOS	F	B	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	0.470	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	473	533	207	233	468	527	535	604
Cap Entry Lane, veh/h	453	518	501	568	486	552	923	1000
Entry HV Adj Factor	0.979	0.980	0.970	0.972	0.970	0.971	0.991	0.989
Flow Entry, veh/h	463	522	201	226	454	512	530	598
Cap Entry, veh/h	444	508	486	552	471	536	915	989
V/C Ratio	1.043	1.029	0.413	0.410	0.963	0.954	0.580	0.604
Control Delay, s/veh	85.3	76.2	14.6	13.0	62.4	55.9	12.1	12.1
LOS	F	F	B	B	F	F	B	B
95th %tile Queue, veh	14	15	2	2	12	12	4	4

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	12	257	7	17	180
Future Vol, veh/h	5	12	257	7	17	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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	6	14	299	8	20	209

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	552	303	0	0	307	0
Stage 1	303	-	-	-	-	-
Stage 2	249	-	-	-	-	-
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	498	742	-	-	1265	-
Stage 1	754	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	490	742	-	-	1265	-
Mov Cap-2 Maneuver	490	-	-	-	-	-
Stage 1	754	-	-	-	-	-
Stage 2	783	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.77	0	0.68
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	644	155	-
HCM Lane V/C Ratio	-	-	0.031	0.016	-
HCM Ctrl Dly (s/v)	-	-	10.8	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	477	1815	1277
Demand Flow Rate, veh/h	477	1815	1290
Vehicles Circulating, veh/h	1497	168	324
Vehicles Exiting, veh/h	486	1446	1460
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	27.1	15.1	11.8
Approach LOS	D	C	B

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	287	190	853	962	606	684
Cap Entry Lane, veh/h	398	411	1219	1219	1057	1057
Entry HV Adj Factor	1.000	1.000	1.000	1.000	0.990	0.989
Flow Entry, veh/h	287	190	853	962	600	677
Cap Entry, veh/h	398	411	1219	1219	1047	1046
V/C Ratio	0.722	0.463	0.700	0.789	0.573	0.647
Control Delay, s/veh	32.9	18.4	13.0	16.9	10.8	12.7
LOS	D	C	B	C	B	B
95th %tile Queue, veh	6	2	6	9	4	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	264	19	36	356	111	52	171	52	65	114	21
Future Volume (veh/h)	22	264	19	36	356	111	52	171	52	65	114	21
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	1750	1750	1750	1750
Adj Flow Rate, veh/h	26	311	22	42	419	131	61	201	61	76	134	25
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	138	697	47	141	554	165	183	313	86	244	304	48
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	51	1539	104	58	1224	364	200	1119	307	365	1086	173
Grp Volume(v), veh/h	359	0	0	592	0	0	323	0	0	235	0	0
Grp Sat Flow(s),veh/h/ln	1693	0	0	1647	0	0	1627	0	0	1624	0	0
Q Serve(g_s), s	0.0	0.0	0.0	2.7	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.8	0.0	0.0	10.2	0.0	0.0	5.9	0.0	0.0	3.8	0.0	0.0
Prop In Lane	0.07		0.06	0.07		0.22	0.19		0.19	0.32		0.11
Lane Grp Cap(c), veh/h	881	0	0	860	0	0	583	0	0	596	0	0
V/C Ratio(X)	0.41	0.00	0.00	0.69	0.00	0.00	0.55	0.00	0.00	0.39	0.00	0.00
Avail Cap(c_a), veh/h	1372	0	0	1350	0	0	1334	0	0	1295	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	7.8	0.0	0.0	10.8	0.0	0.0	10.1	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.0	1.0	0.0	0.0	0.8	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	0.7	0.0	0.0	1.7	0.0	0.0	1.3	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.7	0.0	0.0	8.8	0.0	0.0	11.6	0.0	0.0	10.5	0.0	0.0
LnGrp LOS	A			A			B			B		
Approach Vol, veh/h		359			592			323			235	
Approach Delay, s/veh		6.7			8.8			11.6			10.5	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	13.9	19.8	13.9	19.8
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	7.9	6.8	5.8	12.2
Green Ext Time (p_c), s	1.6	1.8	1.2	3.1

Intersection Summary	
HCM 7th Control Delay, s/veh	9.2
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	294	498	24	14	1
Future Vol, veh/h	5	294	498	24	14	1
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, %	1	1	0	0	0	0
Mvmt Flow	6	330	560	27	16	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	587	0	-	0	915	573
Stage 1	-	-	-	-	573	-
Stage 2	-	-	-	-	342	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	993	-	-	-	305	523
Stage 1	-	-	-	-	568	-
Stage 2	-	-	-	-	724	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	993	-	-	-	303	523
Mov Cap-2 Maneuver	-	-	-	-	303	-
Stage 1	-	-	-	-	564	-
Stage 2	-	-	-	-	724	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.14	0	17.19
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	30	-	-	-	312
HCM Lane V/C Ratio	0.006	-	-	-	0.054
HCM Ctrl Dly (s/v)	8.6	0	-	-	17.2
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	6	337	7	28	529	0	4	0	17	0	0	4
Future Vol, veh/h	6	337	7	28	529	0	4	0	17	0	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	7	374	8	31	588	0	4	0	19	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	588	0	0	382	0	0	1042	1042	378	1038	1046	588
Stage 1	-	-	-	-	-	-	392	392	-	650	650	-
Stage 2	-	-	-	-	-	-	650	650	-	388	396	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	987	-	-	1182	-	-	210	232	673	211	230	513
Stage 1	-	-	-	-	-	-	637	610	-	461	468	-
Stage 2	-	-	-	-	-	-	461	468	-	640	608	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	987	-	-	1182	-	-	198	221	673	195	219	513
Mov Cap-2 Maneuver	-	-	-	-	-	-	198	221	-	195	219	-
Stage 1	-	-	-	-	-	-	631	605	-	443	450	-
Stage 2	-	-	-	-	-	-	439	450	-	617	603	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.15	0.41	13.21	12.08
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	462	31	-	-	90	-	-	513
HCM Lane V/C Ratio	0.051	0.007	-	-	0.026	-	-	0.009
HCM Ctrl Dly (s/v)	13.2	8.7	0	-	8.1	0	-	12.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	348	6	79	554	58	3	0	49	40	0	0
Future Vol, veh/h	0	348	6	79	554	58	3	0	49	40	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	1	1	2	0	2	0	2	2	2
Mvmt Flow	0	387	7	88	616	64	3	0	54	44	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	680	0	0	393	0	0	1181	1246	390	1210	1217	648
Stage 1	-	-	-	-	-	-	390	390	-	823	823	-
Stage 2	-	-	-	-	-	-	791	856	-	387	393	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.52	6.2	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4.018	3.3	3.518	4.018	3.318
Pot Cap-1 Maneuver	912	-	-	1171	-	-	168	174	663	159	181	471
Stage 1	-	-	-	-	-	-	638	608	-	367	388	-
Stage 2	-	-	-	-	-	-	386	375	-	637	606	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	912	-	-	1171	-	-	148	153	663	128	159	471
Mov Cap-2 Maneuver	-	-	-	-	-	-	148	153	-	128	159	-
Stage 1	-	-	-	-	-	-	638	608	-	323	340	-
Stage 2	-	-	-	-	-	-	339	329	-	584	606	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.95	12.28	47.17
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	552	912	-	-	202	-	-	128
HCM Lane V/C Ratio	0.105	-	-	-	0.075	-	-	0.346
HCM Ctrl Dly (s/v)	12.3	0	-	-	8.3	0	-	47.2
HCM Lane LOS	B	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	1.4

Intersection	
Intersection Delay, s/veh	69.9
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	555	862	1552	1194
Demand Flow Rate, veh/h	555	862	1552	1206
Vehicles Circulating, veh/h	1286	1561	604	925
Vehicles Exiting, veh/h	845	595	1237	1498
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	23.8	160.9	44.1	59.1
Approach LOS	C	F	E	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	261	294	405	457	729	823	567	639
Cap Entry Lane, veh/h	414	476	321	377	774	850	576	647
Entry HV Adj Factor	0.999	1.001	1.000	1.000	1.001	0.999	0.990	0.990
Flow Entry, veh/h	261	294	405	457	729	823	561	633
Cap Entry, veh/h	413	476	321	377	775	849	570	641
V/C Ratio	0.631	0.618	1.261	1.213	0.941	0.968	0.984	0.988
Control Delay, s/veh	25.6	22.1	174.0	149.2	42.4	45.5	60.5	57.9
LOS	D	C	F	F	E	E	F	F
95th %tile Queue, veh	4	4	19	19	14	16	14	15

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	44	105	5	15	163
Future Vol, veh/h	14	44	105	5	15	163
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	16	51	122	6	17	190

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	349	125	0	0	128	0
Stage 1	125	-	-	-	-	-
Stage 2	224	-	-	-	-	-
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	652	931	-	-	1471	-
Stage 1	906	-	-	-	-	-
Stage 2	818	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	643	931	-	-	1471	-
Mov Cap-2 Maneuver	643	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	807	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	9.66	0	0.63
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	840	152	-
HCM Lane V/C Ratio	-	-	0.08	0.012	-
HCM Ctrl Dly (s/v)	-	-	9.7	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	317	1014	1069
Demand Flow Rate, veh/h	320	1035	1080
Vehicles Circulating, veh/h	829	193	224
Vehicles Exiting, veh/h	399	1111	801
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	8.0	7.6	8.2
Approach LOS	A	A	A

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	196	124	486	549	508	572
Cap Entry Lane, veh/h	702	719	1191	1191	1158	1158
Entry HV Adj Factor	0.990	0.990	0.981	0.980	0.989	0.991
Flow Entry, veh/h	194	123	477	538	503	567
Cap Entry, veh/h	695	712	1169	1167	1146	1147
V/C Ratio	0.279	0.173	0.408	0.461	0.439	0.494
Control Delay, s/veh	8.6	7.0	7.2	8.0	7.8	8.6
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	1	2	2	2	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	500	46	37	190	54	10	97	60	168	144	22
Future Volume (veh/h)	26	500	46	37	190	54	10	97	60	168	144	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	1723	1723	1723	1682	1682	1682	1682	1682	1682	1723	1723	1723
Adj Flow Rate, veh/h	30	581	53	43	221	63	12	113	70	195	167	26
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	5	5	5	5	5	5	2	2	2
Cap, veh/h	105	696	62	145	532	138	102	317	184	346	232	32
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	35	1510	134	105	1154	300	36	975	566	669	716	99
Grp Volume(v), veh/h	664	0	0	327	0	0	195	0	0	388	0	0
Grp Sat Flow(s),veh/h/ln	1679	0	0	1559	0	0	1576	0	0	1484	0	0
Q Serve(g_s), s	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0
Cycle Q Clear(g_c), s	14.7	0.0	0.0	5.7	0.0	0.0	4.0	0.0	0.0	9.7	0.0	0.0
Prop In Lane	0.05		0.08	0.13		0.19	0.06		0.36	0.50		0.07
Lane Grp Cap(c), veh/h	863	0	0	815	0	0	603	0	0	611	0	0
V/C Ratio(X)	0.77	0.00	0.00	0.40	0.00	0.00	0.32	0.00	0.00	0.64	0.00	0.00
Avail Cap(c_a), veh/h	1105	0	0	1021	0	0	1037	0	0	1005	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	10.0	0.0	0.0	7.6	0.0	0.0	10.9	0.0	0.0	12.7	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	1.1	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	8.3	0.0	0.0	1.2	0.0	0.0	1.0	0.0	0.0	2.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	12.6	0.0	0.0	8.0	0.0	0.0	11.2	0.0	0.0	13.8	0.0	0.0
LnGrp LOS	B			A			B			B		
Approach Vol, veh/h		664			327			195			388	
Approach Delay, s/veh		12.6			8.0			11.2			13.8	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	18.2	23.9	18.2	23.9
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	6.0	16.7	11.7	7.7
Green Ext Time (p_c), s	0.9	2.7	1.9	1.8

Intersection Summary	
HCM 7th Control Delay, s/veh	11.7
HCM 7th LOS	B

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	439	196	5	21	4
Future Vol, veh/h	2	439	196	5	21	4
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	84	84	84	84
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	2	523	233	6	25	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	239	0	-	0	764	236
Stage 1	-	-	-	-	236	-
Stage 2	-	-	-	-	527	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1333	-	-	-	375	808
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	596	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1333	-	-	-	374	808
Mov Cap-2 Maneuver	-	-	-	-	374	-
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	596	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.03	0	14.49
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	8	-	-	-	409
HCM Lane V/C Ratio	0.002	-	-	-	0.073
HCM Ctrl Dly (s/v)	7.7	0	-	-	14.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	8	558	1	9	212	28	5	2	26	14	1	13
Future Vol, veh/h	8	558	1	9	212	28	5	2	26	14	1	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	0	0	0
Mvmt Flow	9	620	1	10	236	31	6	2	29	16	1	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	267	0	0	621	0	0	894	925	621	910	910	251
Stage 1	-	-	-	-	-	-	638	638	-	271	271	-
Stage 2	-	-	-	-	-	-	256	287	-	639	639	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1303	-	-	960	-	-	264	271	491	258	277	792
Stage 1	-	-	-	-	-	-	468	474	-	739	689	-
Stage 2	-	-	-	-	-	-	753	678	-	468	474	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1303	-	-	960	-	-	252	265	491	235	270	792
Mov Cap-2 Maneuver	-	-	-	-	-	-	252	265	-	235	270	-
Stage 1	-	-	-	-	-	-	463	469	-	730	680	-
Stage 2	-	-	-	-	-	-	729	670	-	434	469	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.11	0.32	14.62	16.24
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	411	25	-	-	64	-	-	351
HCM Lane V/C Ratio	0.089	0.007	-	-	0.01	-	-	0.089
HCM Ctrl Dly (s/v)	14.6	7.8	0	-	8.8	0	-	16.2
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	592	2	25	242	55	5	1	75	118	1	2
Future Vol, veh/h	4	592	2	25	242	55	5	1	75	118	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	0	0	0
Mvmt Flow	4	658	2	28	269	61	6	1	83	131	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	330	0	0	660	0	0	993	1053	659	1022	1024	299
Stage 1	-	-	-	-	-	-	668	668	-	355	355	-
Stage 2	-	-	-	-	-	-	325	386	-	667	669	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1235	-	-	928	-	-	226	228	467	216	237	745
Stage 1	-	-	-	-	-	-	451	460	-	666	633	-
Stage 2	-	-	-	-	-	-	692	614	-	451	459	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1235	-	-	928	-	-	215	218	467	169	227	745
Mov Cap-2 Maneuver	-	-	-	-	-	-	215	218	-	169	227	-
Stage 1	-	-	-	-	-	-	448	457	-	642	610	-
Stage 2	-	-	-	-	-	-	663	591	-	368	456	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.05	0.7	15.57	75.9
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	430	12	-	-	135	-	-	172
HCM Lane V/C Ratio	0.209	0.004	-	-	0.03	-	-	0.783
HCM Ctrl Dly (s/v)	15.6	7.9	0	-	9	0	-	75.9
HCM Lane LOS	C	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.8	0	-	-	0.1	-	-	5.1

Intersection	
Intersection Delay, s/veh	57.8
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	1064	455	990	1146
Demand Flow Rate, veh/h	1085	469	1020	1157
Vehicles Circulating, veh/h	1186	1115	1158	467
Vehicles Exiting, veh/h	438	1063	1113	1117
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	105.8	15.3	76.8	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	0.469	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	510	575	220	249	479	541	544	613
Cap Entry Lane, veh/h	453	518	484	550	465	531	878	955
Entry HV Adj Factor	0.980	0.981	0.973	0.969	0.971	0.970	0.990	0.990
Flow Entry, veh/h	500	564	214	241	465	525	538	607
Cap Entry, veh/h	445	508	471	533	452	515	869	946
V/C Ratio	1.125	1.110	0.455	0.452	1.030	1.020	0.619	0.642
Control Delay, s/veh	111.1	101.2	16.1	14.5	80.7	73.2	13.7	13.6
LOS	F	F	C	B	F	F	B	B
95th %tile Queue, veh	18	18	2	2	14	15	4	5

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	23	260	10	33	183
Future Vol, veh/h	7	23	260	10	33	183
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	8	27	302	12	38	213

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	598	308	0	0	314	0
Stage 1	308	-	-	-	-	-
Stage 2	290	-	-	-	-	-
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	469	737	-	-	1258	-
Stage 1	750	-	-	-	-	-
Stage 2	764	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	452	737	-	-	1258	-
Mov Cap-2 Maneuver	452	-	-	-	-	-
Stage 1	750	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.93	0	1.21
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	642	275	-
HCM Lane V/C Ratio	-	-	0.054	0.031	-
HCM Ctrl Dly (s/v)	-	-	10.9	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Intersection Delay, s/veh	16.3
Intersection LOS	C

Approach	WB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	1	1
Adj Approach Flow, veh/h	487	1840	1298
Demand Flow Rate, veh/h	487	1840	1311
Vehicles Circulating, veh/h	1515	168	334
Vehicles Exiting, veh/h	493	1477	1478
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	29.7	15.6	12.4
Approach LOS	D	C	B

Lane	Left	Bypass	Left	Right	Left	Right
Designated Moves	L	R	LT	TR	LT	TR
Assumed Moves	L		LT	TR	LT	TR
RT Channelized		Yield				
Lane Util	1.000		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.327	4.544	4.544	4.544	4.544
A (Intercept)	1420	1420	1420	1420	1420	1420
B (Slope)	8.501e-4	8.499e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	297	190	865	975	616	695
Cap Entry Lane, veh/h	392	404	1219	1219	1048	1048
Entry HV Adj Factor	1.000	1.000	1.000	1.000	0.990	0.990
Flow Entry, veh/h	297	190	865	975	610	688
Cap Entry, veh/h	392	404	1218	1219	1038	1037
V/C Ratio	0.758	0.470	0.710	0.800	0.588	0.663
Control Delay, s/veh	36.7	18.9	13.4	17.5	11.2	13.3
LOS	E	C	B	C	B	B
95th %tile Queue, veh	6	2	6	9	4	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	276	19	38	366	114	52	173	54	68	115	22
Future Volume (veh/h)	23	276	19	38	366	114	52	173	54	68	115	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	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	27	325	22	45	431	134	61	204	64	80	135	26
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	135	711	46	140	562	166	178	313	89	245	300	49
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	52	1544	100	62	1220	361	197	1114	317	381	1067	175
Grp Volume(v), veh/h	374	0	0	610	0	0	329	0	0	241	0	0
Grp Sat Flow(s),veh/h/ln	1695	0	0	1644	0	0	1627	0	0	1623	0	0
Q Serve(g_s), s	0.0	0.0	0.0	3.3	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.2	0.0	0.0	10.9	0.0	0.0	6.2	0.0	0.0	4.1	0.0	0.0
Prop In Lane	0.07		0.06	0.07		0.22	0.19		0.19	0.33		0.11
Lane Grp Cap(c), veh/h	891	0	0	868	0	0	580	0	0	594	0	0
V/C Ratio(X)	0.42	0.00	0.00	0.70	0.00	0.00	0.57	0.00	0.00	0.41	0.00	0.00
Avail Cap(c_a), veh/h	1330	0	0	1305	0	0	1292	0	0	1251	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	6.5	0.0	0.0	8.0	0.0	0.0	11.2	0.0	0.0	10.5	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.0	1.1	0.0	0.0	0.9	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	0.8	0.0	0.0	1.8	0.0	0.0	1.4	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	6.8	0.0	0.0	9.0	0.0	0.0	12.1	0.0	0.0	10.9	0.0	0.0
LnGrp LOS	A			A			B			B		
Approach Vol, veh/h		374			610			329			241	
Approach Delay, s/veh		6.8			9.0			12.1			10.9	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	14.3	20.5	14.3	20.5
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	8.2	7.2	6.1	12.9
Green Ext Time (p_c), s	1.6	1.9	1.2	3.1

Intersection Summary	
HCM 7th Control Delay, s/veh	9.4
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	311	512	24	14	1
Future Vol, veh/h	5	311	512	24	14	1
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, %	1	1	0	0	0	0
Mvmt Flow	6	349	575	27	16	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	602	0	-	0	949	589
Stage 1	-	-	-	-	589	-
Stage 2	-	-	-	-	361	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	980	-	-	-	291	512
Stage 1	-	-	-	-	559	-
Stage 2	-	-	-	-	710	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	980	-	-	-	289	512
Mov Cap-2 Maneuver	-	-	-	-	289	-
Stage 1	-	-	-	-	555	-
Stage 2	-	-	-	-	710	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.14	0	17.81
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	28	-	-	-	298
HCM Lane V/C Ratio	0.006	-	-	-	0.057
HCM Ctrl Dly (s/v)	8.7	0	-	-	17.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	343	7	28	534	44	4	3	17	39	2	13
Future Vol, veh/h	17	343	7	28	534	44	4	3	17	39	2	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	19	381	8	31	593	49	4	3	19	43	2	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	642	0	0	389	0	0	1079	1127	385	1101	1107	618
Stage 1	-	-	-	-	-	-	423	423	-	680	680	-
Stage 2	-	-	-	-	-	-	657	704	-	421	427	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	942	-	-	1175	-	-	198	206	667	191	212	493
Stage 1	-	-	-	-	-	-	613	591	-	444	454	-
Stage 2	-	-	-	-	-	-	457	442	-	614	589	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	942	-	-	1175	-	-	177	193	667	171	198	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	177	193	-	171	198	-
Stage 1	-	-	-	-	-	-	597	576	-	426	435	-
Stage 2	-	-	-	-	-	-	423	424	-	578	574	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.41	0.38	15.27	29.87
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	377	83	-	-	82	-	-	204
HCM Lane V/C Ratio	0.071	0.02	-	-	0.026	-	-	0.294
HCM Ctrl Dly (s/v)	15.3	8.9	0	-	8.1	0	-	29.9
HCM Lane LOS	C	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.1	-	-	1.2

Intersection	
Int Delay, s/veh	16.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	387	6	79	598	129	3	2	49	95	2	5
Future Vol, veh/h	6	387	6	79	598	129	3	2	49	95	2	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	7	430	7	88	664	143	3	2	54	106	2	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	808	0	0	437	0	0	1288	1430	433	1356	1362	736
Stage 1	-	-	-	-	-	-	447	447	-	912	912	-
Stage 2	-	-	-	-	-	-	841	983	-	444	450	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	817	-	-	1128	-	-	142	136	627	128	149	422
Stage 1	-	-	-	-	-	-	595	577	-	331	356	-
Stage 2	-	-	-	-	-	-	362	329	-	597	575	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	817	-	-	1128	-	-	117	115	627	~ 97	126	422
Mov Cap-2 Maneuver	-	-	-	-	-	-	117	115	-	~ 97	126	-
Stage 1	-	-	-	-	-	-	588	571	-	283	304	-
Stage 2	-	-	-	-	-	-	303	281	-	537	569	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.14	0.83	14.34	204.1
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	445	27	-	-	170	-	-	101
HCM Lane V/C Ratio	0.135	0.008	-	-	0.078	-	-	1.12
HCM Ctrl Dly (s/v)	14.3	9.4	0	-	8.5	0	-	204.1
HCM Lane LOS	B	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.5	0	-	-	0.3	-	-	7.3

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

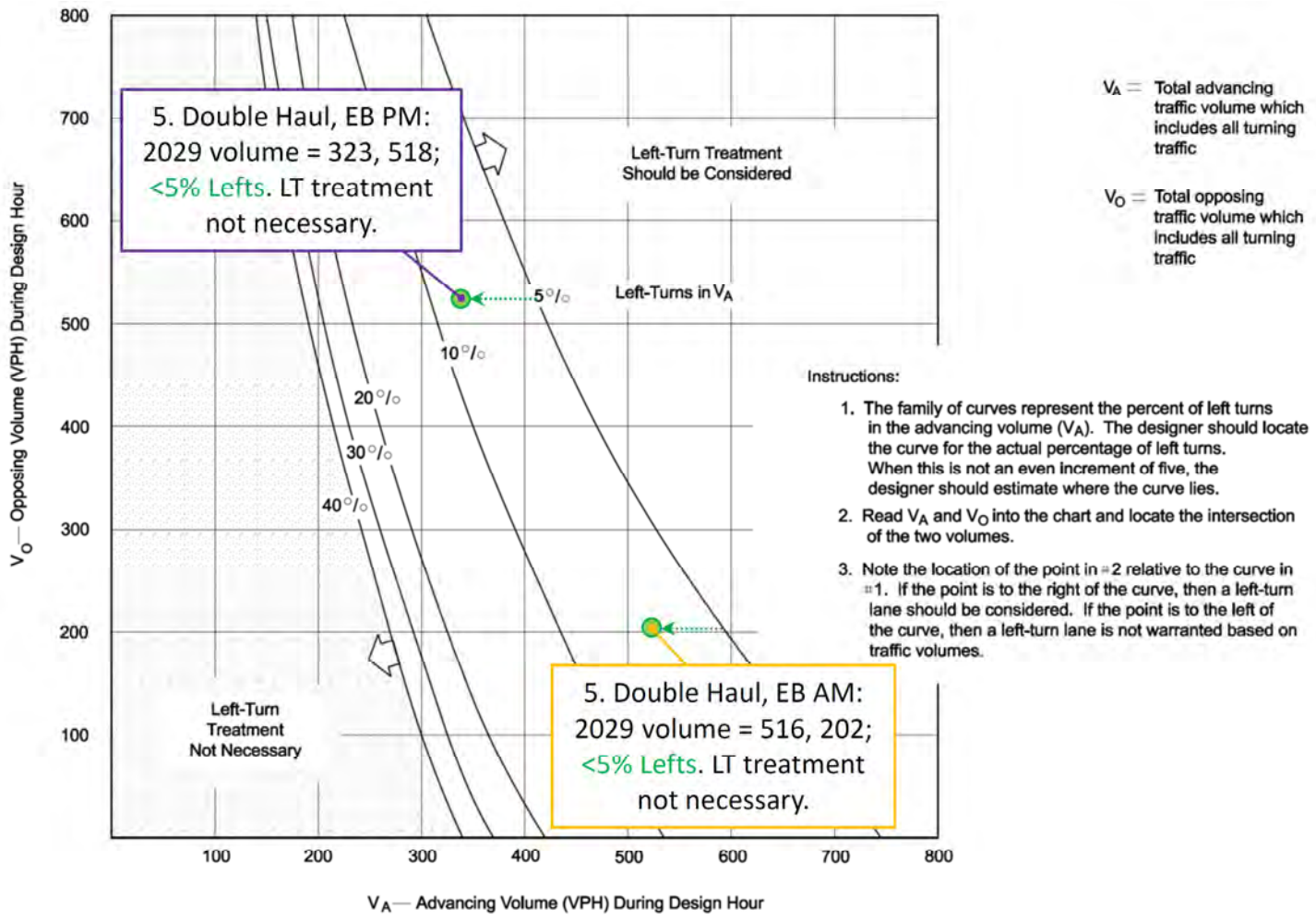
Intersection	
Intersection Delay, s/veh	102.6
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	656	915	1597	1222
Demand Flow Rate, veh/h	656	915	1597	1234
Vehicles Circulating, veh/h	1286	1630	669	1023
Vehicles Exiting, veh/h	971	636	1273	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	31.3	226.2	66.9	94.9
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	0.470	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	308	348	430	485	751	846	580	654
Cap Entry Lane, veh/h	414	476	301	355	729	804	527	595
Entry HV Adj Factor	1.001	0.999	1.000	1.000	0.999	1.000	0.990	0.990
Flow Entry, veh/h	308	348	430	485	751	846	574	648
Cap Entry, veh/h	414	475	301	355	729	805	522	589
V/C Ratio	0.745	0.731	1.427	1.365	1.029	1.052	1.101	1.099
Control Delay, s/veh	33.8	29.2	242.9	211.3	64.9	68.7	97.4	92.7
LOS	D	D	F	F	F	F	F	F
95th %tile Queue, veh	6	6	23	24	18	21	18	20

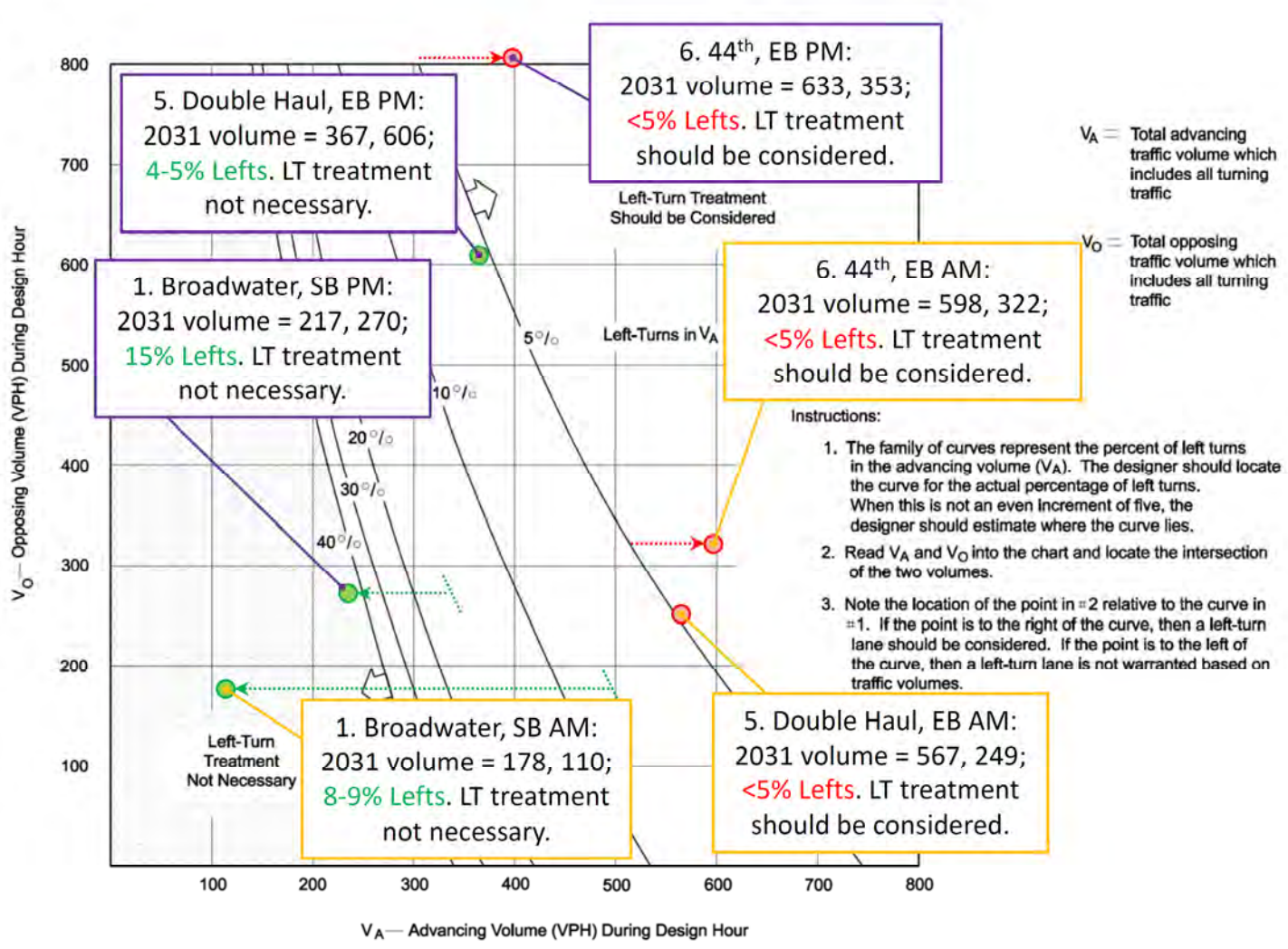
Appendix C: Auxiliary Turn Lane Analysis Charts

Exhibit C-1: 2029 Left Turns



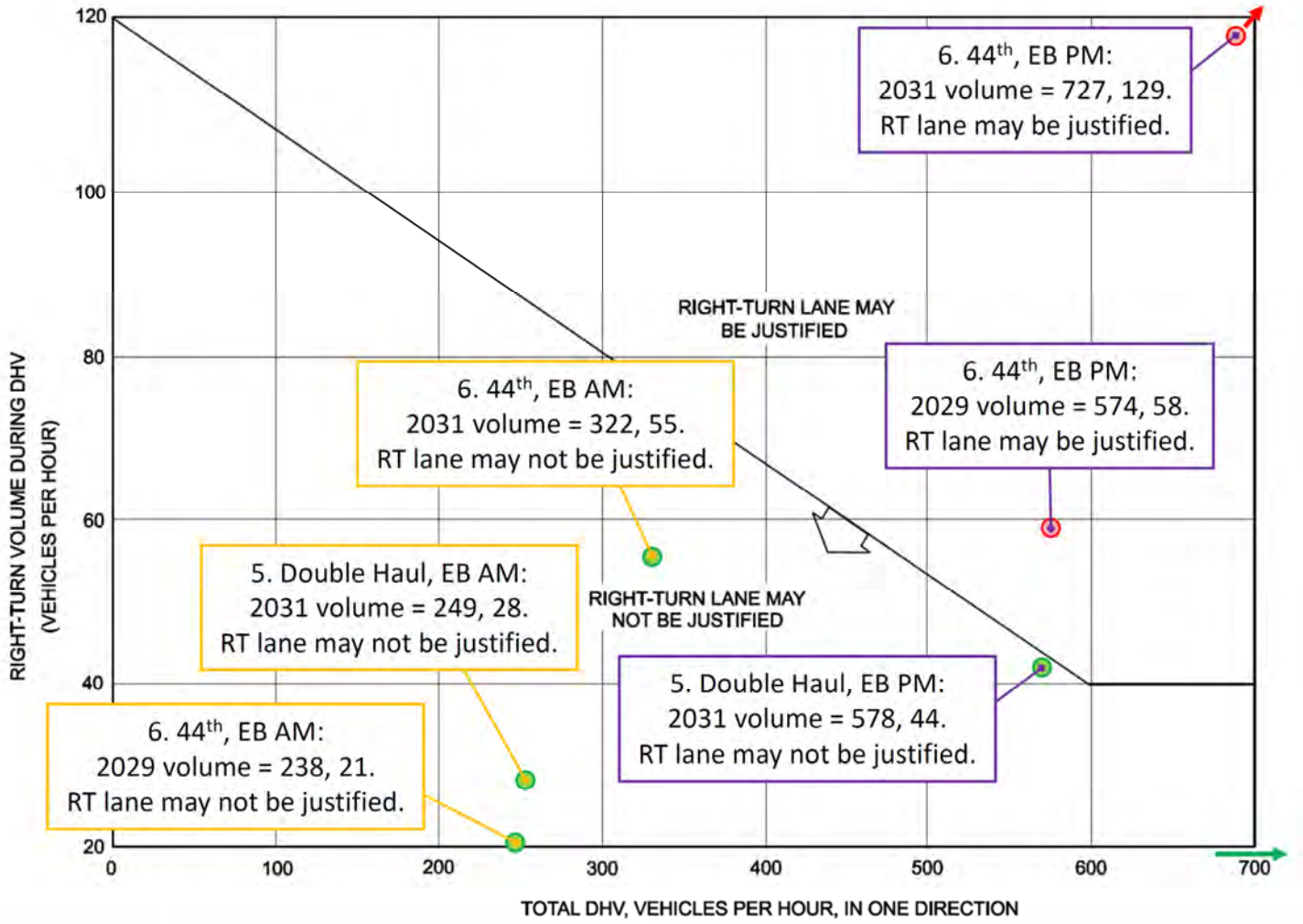
VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)

Exhibit C-2: 2031 Left Turns



VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH)

Exhibit C-3: Right Turns



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.

Note that while northbound right turns on 48th at Broadwater were examined, total right turn volume is too low for the data point to appear on the graph (20 vph), so no right turn treatment is justified.

Appendix D: Central Avenue at 44th Intersection Signal Warrant Summaries

Traffic Signal Needs Analysis Summary: 44th St W at Central Ave

Scenario: **Completion of Barber Subdivision Phase 1 in 2029**
Analysis Date: 10/17/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 4

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:	216	224	240	266	334	394	381	388	491	541	642	453
44th St W Northbound:	62	48	34	27	29	29	29	33	30	34	38	33
44th St W Southbound:	82	58	43	27	35	32	30	38	30	32	42	41
Total Entering Volume:	866	816	742	701	797	856	776	742	847	882	1050	750
TEV Rank:	3	6	10	12	7	**4**	**8**	10	5	2	**1**	9
Use for:						Warrant 2	Warrant 1				Warrant 3	
Major, Both Directions:	722	710	665	647	733	795	717	671	787	816	970	676
Minor, Higher Direction:	82	58	43	27	35	32	30	38	30	34	42	41

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.) Value: 717; Minimum: 350[c]; Minor (Higher Dir.) Value: 30; Minimum: 105[c]; Met?: No	Major (Both Dir.) Value: 717; Minimum: 525[c]; Minor (Higher Dir.) Value: 30; Minimum: 53[c]; Met?: No	**No**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph*: Major (Both Dir.) Value: 795; Minimum: -; Minor (Higher Dir.) Value: 32; Minimum: 60; Met?: No		**No**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)*	*or Condition B (MUTCD Figure 4C-4)*	
	1. Veh-Hrs of Delay: Value 0.4; Minimum 4; Met? No	Major (Both Dir.) Value: 970; Minimum: N/A; Minor (Higher Dir.) Value: 42; Minimum: 75; Met?: No	
	2. Minor Volume: Value 42; Minimum 100; Met? No		
	3. Total Ent. Volume: Value 1050; Minimum 800; Met? 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.) Value: 795; Minimum: ; Pedestrians Value: ; Minimum: ; Met?: n/a	Major (Both Dir.) Value: 970; 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: 717; Minimum: ; Minor (Higher Dir.) Value: 30; 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: 717; Minimum: ; Minor (Higher Dir.) Value: 30; 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: 44th St W at Central Ave

Scenario: **Completion of Barber Subdivision Phase 2 in 2031**
Analysis Date: 10/17/2025 Conducted by: 406 Traffic & Transportation Consulting
Major Street: Central Ave (E/W), 1 moving lane per direction Minor Street: 44th St W (N/S), 1 moving lane per direction
Speed Limit: 45 mph Number of Approaches: 4

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:	554	544	485	442	460	462	396	335	356	336	393	280
Central Ave Westbound:	280	319	345	382	464	533	516	529	680	757	891	661
44th St W Northbound:	88	69	49	39	42	42	43	47	44	50	55	49
44th St W Southbound:	232	175	139	97	119	109	107	125	109	117	145	141
Total Entering Volume:	1154	1107	1018	960	1085	1146	1062	1036	1189	1260	1484	1131
TEV Rank:	**4**	7	11	12	**8**	5	9	10	3	2	**1**	6
Use for:	Warrant 2				Warrant 1						Warrant 3	
Major, Both Directions:	834	863	830	824	924	995	912	864	1036	1093	1284	941
Minor, Higher Direction:	232	175	139	97	119	109	107	125	109	117	145	141

Warrants

		Met?
1 Eight-Hour Vehicular Volume *(either condition)*	*Condition A: Large Volume of Intersecting Traffic* — Major (Both Dir.) Value: 924; Minimum: 350[c]; Minor (Higher Dir.) Value: 119; Minimum: 105[c]; Met?: Yes. *or Condition B: Interruption of Continuous Traffic* — Major (Both Dir.) Value: 924; Minimum: 525[c]; Minor (Higher Dir.) Value: 119; Minimum: 53[c]; Met?: Yes	**Yes**
2 Four-Hour Vehicular Volume	*MUTCD Figure 4C-2 for speed over 40 mph* — Major (Both Dir.) Value: 834; Minimum: -; Minor (Higher Dir.) Value: 232; Minimum: 60; Met?: Yes	**Yes**
3 Peak Hour* *(either condition)*	*Condition A (must meet all three subconditions)*: 1. Veh-Hrs of Delay — Value: 5.8; Minimum: 4; Met?: Yes. 2. Minor Volume — Value: 102; Minimum: 100; Met?: Yes. 3. Total Ent. Volume — Value: 1484; Minimum: 800; Met?: Yes. *or Condition B (MUTCD Figure 4C-4)* — Major (Both Dir.) Value: 1284; Minimum: N/A; Minor (Higher Dir.) Value: 145; Minimum: 280; Met?: No	**Yes***
4 Pedestrian Volume *(either criterion)*	*Criterion A: Four-hour (MUTCD Figure 4C-7)* — Major (Both Dir.) Value: 834; Minimum: -; Pedestrians Value: -; Minimum: -; Met?: n/a. *or Criterion B: One Hour (MUTCD Figure 4C-8)* — Major (Both Dir.) Value: 1284; 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: 924; Minimum: -; Minor (Higher Dir.) Value: 119; Minimum: -; Met?: n/a. *or Condition C, 80% of Warrant 1 [Condition B]* — Major (Both Dir.) Value: 924; Minimum: -; Minor (Higher Dir.) Value: 119; 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:	**3***
	Recommendation:	**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 E: Intersection Cost Participation Calculations

City of Billings Intersection Cost Participation Worksheet: Barber Farm Phase 1

Shading Key: **No such movement** **Movement has no project traffic in this phase**

1: Broadwater 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	0				
WB L	1				
WB T	0				
EB L	0				
NB T	1	1	**1**	1	1
SB L	1				
SB T	1	0	0	1	**1**
NB L	0				
Project **Critical** Lane Volume			**1**		**1**
Critical Lane Capacity			1140		1140
% Increase			0.1%		0.1%
Max % Increase			0.1%		

2: Broadwater at Shiloh

Lane Group (critical)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	0				
WB L	1	1	**1**	3	**3**
WB T	0				
EB L	0				
NB T	2	18	**9**	11	6
SB L	1				
SB T	2	6	3	16	**8**
NB L	1				
Project **Critical** Lane Volume			**10**		**11**
Critical Lane Capacity			1140		1140
% Increase			0.9%		1.0%
Max % Increase			1.0%		

3: 48th 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	1	2	2	4	**4**
WB L	1	1	1	0	0
WB T	1	5	**5**	3	3
EB L	1				
NB T	1				
SB L	1	0	0	1	**1**
SB T	1				
NB L	1				
Project **Critical** Lane Volume			**5**		**5**
Critical Lane Capacity			1200		1200
% Increase			0.4%		0.4%
Max % Increase			0.4%		

4: Sundance Ridge 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	1	2	2	6	**6**
WB L	0				
WB T	1	7	**7**	4	4
EB L	1				
NB T	0				
SB L	1				
SB T	0				
NB L	0				
Project **Critical** Lane Volume			**7**		**6**
Critical Lane Capacity			1140		1140
% Increase			0.6%		0.5%
Max % Increase			0.6%		

5: Double Haul Lane 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	1				
WB L	1				
WB T	1				
EB L	1	2	**2**	6	**6**
NB T	1				
SB L	1				
SB T	1				
NB L	1				
Project **Critical** Lane Volume			**2**		**6**
Critical Lane Capacity			1200		1200
% Increase			0.2%		0.5%
Max % Increase			0.5%		

6: Central at 44th

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				
WB L	1				
WB T	1				
EB L	1				
NB T	1				
SB L	1	63	**63**	40	**40**
SB T	1				
NB L	1				
Project **Critical** Lane Volume			**63**		**40**
Critical Lane Capacity			1200		1200
% Increase			5.3%		3.3%
Max % Increase			5.3%		

7: Central at Shiloh

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	21	11	13	7
WB L	1				
WB T	2	7	**4**	19	**10**
EB L	1	7	**7**	19	**19**
NB T	2				
SB L	1				
SB T	2				
NB L	1	7	**7**	19	**19**
Project **Critical** Lane Volume			**18**		**48**
Critical Lane Capacity			1200		1200
% Increase			1.5%		4.0%
Max % Increase			4.0%		

City of Billings Intersection Cost Participation Worksheet: Barber Farm Phase 2

Shading Key: **No such movement** **Movement has no project traffic in this phase**

1: Broadwater 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	0				
WB L	1	4	**4**	2	**2**
WB T	0				
EB L	0				
NB T	1	1	**1**	3	3
SB L	1	6	**6**	16	**16**
SB T	1	2	2	3	**3**
NB L	0				
Project **Critical** Lane Volume			**11**		**21**
Critical Lane Capacity			1140		1140
% Increase			1.0%		1.8%
Max % Increase			1.8%		

2: Broadwater at Shiloh

Lane Group (**critical**)	Lanes	AM Peak Hour Vproject	AM Peak Hour Per Lane	PM Peak Hour Vproject	PM Peak Hour Per Lane
EB T	0				
WB L	1	4	**4**	8	**8**
WB T	0				
EB L	0				
NB T	2	6	3	16	8
SB L	1				
SB T	2	12	**6**	18	**9**
NB L	1				
Project **Critical** Lane Volume			**10**		**17**
Critical Lane Capacity			1140		1140
% Increase			0.9%		1.5%
Max % Increase			1.5%		

3: 48th 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	1	7	**7**	12	**12**
WB L	1	1	**1**	2	**2**
WB T	1	6	6	10	10
EB L	1				
NB T	1				
SB L	1	6	**6**	10	**10**
SB T	1				
NB L	1				
Project **Critical** Lane Volume			**14**		**24**
Critical Lane Capacity			1200		1200
% Increase			1.2%		2.0%
Max % Increase			2.0%		

4: Sundance Ridge 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	1	10	**10**	17	**17**
WB L	0				
WB T	1	8	8	14	14
EB L	1				
NB T	0				
SB L	1				
SB T	0				
NB L	0				
Project **Critical** Lane Volume			**10**		**17**
Critical Lane Capacity			1140		1140
% Increase			0.9%		1.5%
Max % Increase			1.5%		

5: Double Haul Lane 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	1	4	4	6	6
WB L	1				
WB T	1	2	**2**	5	**5**
EB L	1	6	**6**	11	**11**
NB T	1	2	**2**	3	**3**
SB L	1	14	**14**	39	**39**
SB T	1	1	1	2	2
NB L	1				
Project **Critical** Lane Volume			**24**		**58**
Critical Lane Capacity			1200		1200
% Increase			2.0%		4.8%
Max % Increase			4.8%		

6: Central at 44th

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	14	14	39	39
WB L	1				
WB T	1	28	**28**	44	**44**
EB L	1	4	**4**	6	**6**
NB T	1	1	**1**	2	**2**
SB L	1	55	**55**	55	**55**
SB T	1	1	1	2	2
NB L	1				
Project **Critical** Lane Volume			**88**		**107**
Critical Lane Capacity			1200		1200
% Increase			7.3%		8.9%
Max % Increase			8.9%		

7: Central at Shiloh

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	30	15	38	19
WB L	1				
WB T	2	25	**13**	47	**24**
EB L	1	25	**25**	47	**47**
NB T	2				
SB L	1				
SB T	2				
NB L	1	25	**25**	47	**47**
Project **Critical** Lane Volume			**63**		**118**
Critical Lane Capacity			1200		1200
% Increase			5.2%		9.8%
Max % Increase			9.8%		