

Report for Archipelago Village, LLC, Wisconsin

Traffic Impact Analysis



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TABLE OF CONTENTS

Page No.
or Following

EXECUTIVE SUMMARY

SECTION 1–INTRODUCTION, SITE DESCRIPTION, AND RECOMMENDATION SUMMARY

1.01	Introduction	1-1
1.02	Proposed Redevelopment Description	1-1
1.03	Purpose of the Study.....	1-3
1.04	Summary of Effects and Recommendations.....	1-4

SECTION 2–DATA COLLECTION

2.01	Existing Daily Traffic.....	2-1
2.02	Intersection Turning Movements	2-1
2.03	Pedestrian and Bicycles	2-2
2.04	Typical City Development Trip Generation Rates	2-4

SECTION 3–TRIP GENERATION AND ASSIGNMENT

3.01	Site Description	3-1
3.02	Trip Generation	3-1
3.03	Trip Distribution and Assignment.....	3-2

SECTION 4–2017 EXISTING CONDITIONS

4.01	Pedestrians and Bicycles	4-1
4.02	Transit.....	4-2
4.03	Motor Vehicles	4-4

SECTION 5–2037 EXISTING GEOMETRY WITHOUT DEVELOPMENT

5.01	Pedestrians and Bicycles	5-1
5.02	Transit.....	5-1
5.03	Motor Vehicles	5-1

SECTION 6–2037 EXISTING GEOMETRY WITH DEVELOPMENT

6.01	Pedestrians and Bicycles	6-1
6.02	Transit.....	6-1
6.03	Motor Vehicles	6-1

SECTION 7–RECOMMENDATIONS

7.01	Pedestrian and Bicycle Improvements.....	7-1
7.02	Transit.....	7-1
7.03	Motor Vehicles	7-1

TABLE OF CONTENTS Continued

Page No.
or Following

TABLES

1.04-1	Archipelago Village Trip Generation Summary	1-4
1.04-2	Archipelago Village Bicycle Parking.....	1-6
1.04-3	2037 Intersection Operations, with Archipelago Village Development and with Recommended Geometric Improvements	1-9
2.04-1	Observed vs Calculated Trip Generation for Constellation	2-4
3.02-1	Development Trip Generation Summary	3-2
4.03-1	LOS Thresholds	4-6
4.03-2	2017 Existing Conditions Intersection Operations.....	4-6
5.03-1	Travel Demand Model TAZ Parameters	5-3
5.03-2	2037 Existing Geometry Without Development Traffic Operations	5-5
6.03-1	2037 AM Peak Hour Operations, With and Without Development	6-3
6.03-2	2037 PM Peak Hour Operations, With and Without Development	6-4
7.01-1	Archipelago Village Bicycle Parking.....	7-1
7.03-1	2037 East Washington Avenue and Paterson Street Traffic Modeling Results, with Recommended Improvements.....	7-4
7.03-2	2037 East Washington Avenue and Brearly Street Traffic Modeling Results, with Recommended Improvements.....	7-6
7.03-3	2037 East Washington Avenue and Ingersoll Street Build Traffic Modeling Results, with Recommended Improvements	7-7
7.03-4	Williamson Street and Paterson Street 2037 Traffic Modeling Results, with Recommended Improvements.....	7-9
7.03-5	Williamson Street and Brearly Street 2037 Traffic Modeling Results, with Recommended Improvements,.....	7-10

FIGURES

1.01-1	Study Area	1-1
1.02-1	Proposed Site.....	1-2
1.02-2	Possible Arrangement and Massing of Buildings.....	1-3
1.04-1	AM Peak Hour Operational Challenges	1-7
1.04-2	PM Peak Hour Operational Challenges	1-8
2.01-1	City of Madison Average Weekday Traffic Volume (2013).....	2-1
2.02-1	Existing (2017) Peak-Hour Turning Movement Volumes	2-2
2.03-1	Pedestrian and Bike (2017) Peak-Hour Volumes.....	2-3
3.03-1	Peak-Hour Development Trip Distribution.....	3-3
4.01-1	Existing Pedestrian and Bicycle Network.....	4-2
4.02-1	Metro Routes and Bus Stops near Archipelago Village.....	4-3
4.02-2	Planned BRT Routes.....	4-4
4.03-1	Average Weekday Traffic Volumes (2013)	4-5

TABLE OF CONTENTS Continued

		<u>Page No. or Following</u>
5.03-1	Adjacent Development	5-1
5.03-2	Traffic Analysis Zones in Travel Demand Model.....	5-2
5.03-3	2037 Turning Movement Volumes Without Development	5-4
6.03-1	Proposed Archipelago Access Configuration.....	6-1
6.03-2	2037 Turning Movement Volumes with Development.....	6-2
7.03-1	AM Peak Hour Operational Challenges	7-2
7.03-2	PM Peak Hour Operational Challenges	7-3

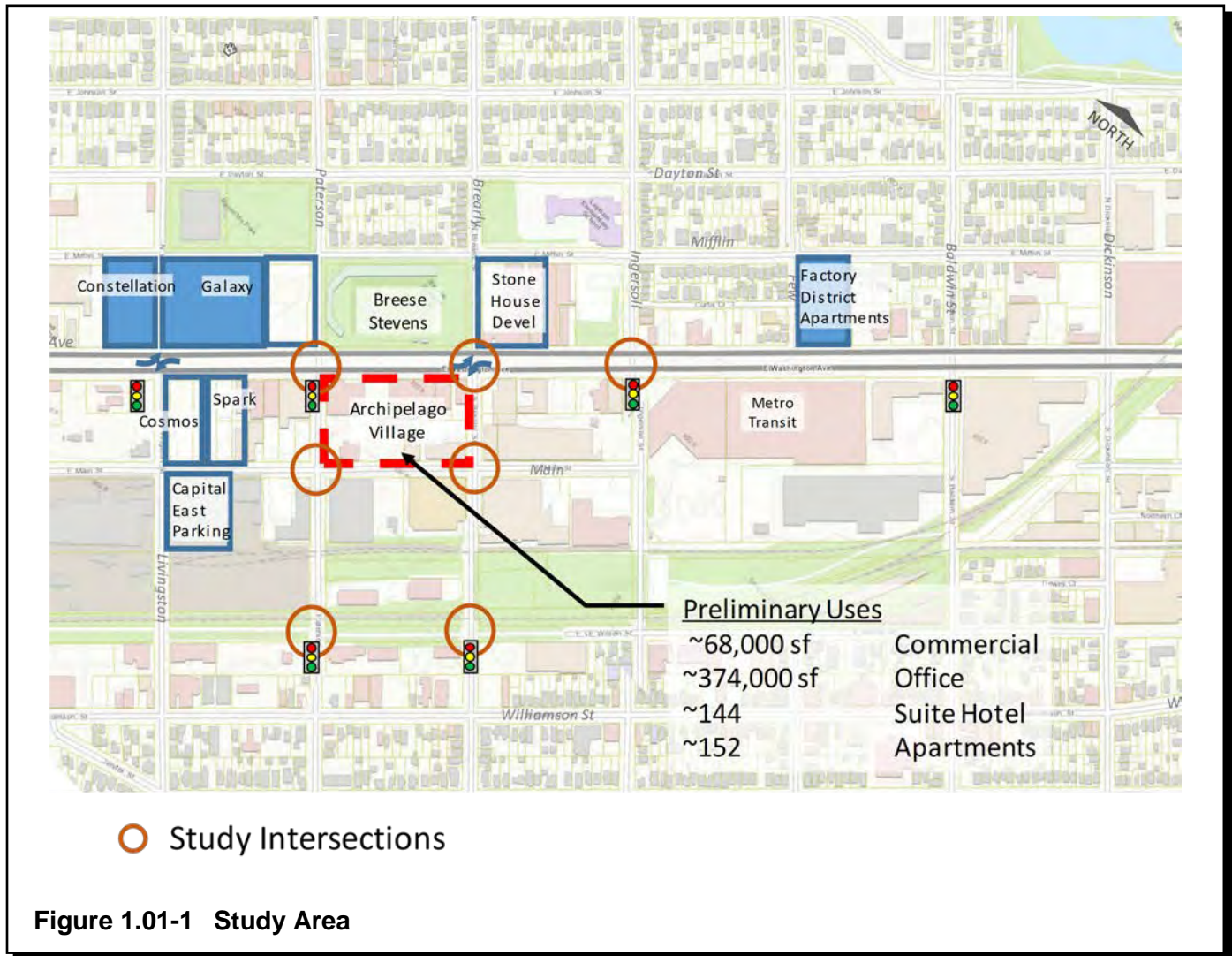
APPENDICES

APPENDIX A—ARCHIPELAGO VILLAGE SITE PLAN
APPENDIX B—2017 RAW PEAK HOUR TRAFFIC VOLUMES
APPENDIX C—ITE TRIP GENERATION FOR CONSTELLATION
APPENDIX D—ITE TRIP GENERATION FOR ARCHIPELAGO VILLAGE
APPENDIX E—2017 EXISTING CONDITIONS HCM REPORTS
APPENDIX F—2037 EXISTING GEOMETRY WITHOUT DEVELOPMENT HCM REPORTS
APPENDIX G—2037 EXISTING GEOMETRY WITH DEVELOPMENT HCM REPORTS
APPENDIX H—2037 BUILD GEOMETRY WITH DEVELOPMENT HCM REPORTS
APPENDIX I—TRAFFIC OPERATIONS SUMMARY TABLES

SECTION 1
INTRODUCTION, SITE DESCRIPTION, AND RECOMMENDATION SUMMARY

1.01 INTRODUCTION

Strand Associates, Inc.® (Study Team) performed a Traffic Impact Analysis (TIA) for the proposed Archipelago Village, LLC (Archipelago Village) Development site bounded by East Washington Avenue/US 151, Brearly Street, Main Street, and Paterson Street in the City of Madison, Wisconsin (City). The study area is shown in Figure 1.01-1. This figure illustrates the location of Archipelago Village in relation to other recent and planned developments on East Washington Avenue. The figure also highlights the intersections that will be most influenced from traffic being generated from Archipelago Village.



1.02 PROPOSED REDEVELOPMENT DESCRIPTION

The Archipelago Village Development Team (Development Team) proposes to redevelop the south/east side of the 900 block of East Washington Avenue. The proposed redevelopment site (site) master plan includes four access points to the site: one on East Washington Avenue (North

Access), which would be right-in/right-out only; one on Brearly Street (East Access), one on Main Street (South Access), and one on Paterson Street (West Access). The site plan is located in Appendix A. Figure 1.02-1 illustrates the proposed site plan including proposed access locations. At full build-out, Archipelago Village is planned to include:

- 68,000 square feet (sf) of commercial space
- 374,000 sf of office space
- 144-unit boutique hotel
- 152 apartment units

Figure 1.02-2 shows a possible site arrangement of the buildings.



Source: Potter Lawson

Figure 1.02-1 Proposed Site



Source: Potter Lawson

Figure 1.02-2 Possible Arrangement and Massing of Buildings

1.03 PURPOSE OF THE STUDY

This study:

1. Identifies the existing (2017) traffic volumes and analyzes the existing operation of study intersections during the weekday AM and PM peak hours.
2. Develops horizon year (2037) traffic volume forecasts for the study intersections and analyzes the future operation of these intersections without Archipelago Village.
3. Performs a trip generation for the proposed Archipelago Village using trip generation rates from the *Institute of Transportation Engineer's (ITE) Trip Generation Manual*, 10th Edition, to estimate the traffic generated from the proposed development.
4. Distributes the trips from the proposed Archipelago Village and evaluates the impact of these future trips on pedestrians, bicyclists, and transit riders.
5. Evaluates future impacts the proposed Archipelago Village would have on motor vehicles with and without the proposed development.
6. Recommends improvements to better accommodate travel to and from the site.

1.04 SUMMARY OF EFFECTS AND RECOMMENDATIONS

A. Trip Generation and Distribution

Trips were generated for the proposed redevelopment site using the *ITE Trip Generation Manual*, 10th Edition. A 30 percent reduction was applied to the baseline trips to account for linked trips, pass-by trips, alternate mode trips, and mixed-use trips.¹ Table 1.04-1 shows the AM peak hour, PM peak hour, and daily trips generated for Archipelago Village.

	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
		AM In	AM Out	Trips	PM In	PM Out	Trips
Total New Development Trips	6,252	382	125	506	211	410	622

Table 1.04-1 Archipelago Village Trip Generation Summary

The trips generated by Archipelago Village were distributed to the roadway network based on existing peak-hour turning movements of the study intersections. During the morning peak hour in 2037, trips from Archipelago Village are anticipated to make up 3 percent of the traffic on East Washington Avenue. During the 2037 evening peak hour, trips from Archipelago Village are also anticipated to make up approximately 3 percent of the traffic on East Washington Avenue.

On Williamson Street during the 2037 morning peak hour, trips from Archipelago Village are projected to make up about 9 percent of the peak-hour Williamson Street traffic. During the 2037 evening peak hour, trips from Archipelago Village are anticipated to make up between 7 and 8 percent of the Williamson Street traffic. Table 1.04-1 summarizes the trip generation from Archipelago Village. A more detailed trip summary is presented in Section 3 of this report.

B. Travel Demand Management (TDM)

It is important to acknowledge that the site will benefit from TDM by the nature of the project and location. The mix of commercial, office, hotel, and apartment uses within the same block will reduce total external trips as well as experience peaking characteristics that vary in intensity and time of day. Furthermore, the site’s contribution toward continued mixed-use redevelopment along the East Washington Avenue corridor as well the density of surrounding nearby destinations will make trips by foot, bike, and bus attractive and practical for a wide range of residents, guests, and visitors. The location of the project on the proposed east-west BRT route potentially further increases the utility of travel to and from the site by bus.

Following are specific TDM recommendations:

¹ Driveway counts of recent development on East Washington Avenue show trip generation rates 30 to 50 percent of those predicted by the *ITE Trip Generation Manual*, which would correspond with a 50 to 70 percent reduction. The use of a 30 percent reduction is conservative, potentially overestimating the motor vehicle traffic generated by the site.

1. The hotel, office, and apartment Web sites should include information regarding options for traveling to the site via alternate modes. This includes walking, bicycling, Metro Transit bus service (and future BRT service), taxi, and ridesharing services.
2. The property operator(s) should distribute information to residents and employees regarding options for traveling via alternate modes. In addition to walking, bicycling, Metro Transit bus service (and potentially future BRT service), taxi, and ridesharing services, this should also include the following.
 - a. The Madison Area Transportation Planning Board (MATPB) administers Rideshare, Etc. in partnership with the Wisconsin Department of Transportation (WisDOT). The program includes a Web site (www.rideshareetc.org) where commuters can set up a profile and tailor searches for potential carpool partners, available vanpools, transit routes, and biking partners.
 - b. The Guaranteed Ride Home program offers commuters that do not drive alone a taxi voucher, so they are not stranded at work if an emergency arises. Up to six passes per year worth up to \$75 per ride are available. The program is administered by the MATPB and funded by the Dave County Highway and Transportation Department.
3. The property operator(s) should explore hosting a B-Cycle Bike Share service station within the development.
4. The property operator(s) should explore free or discounted B-Cycle passes to residents, employees, and hotel guests.
5. The property operator(s) should explore free or discounted Metro Transit passes to residents, employees, and guests.

C. Pedestrian and Bicycle Accommodations

The Archipelago Village site is well located for pedestrian and bicycle access. The Capital City trail lies just two blocks south, East Washington Avenue has bike lanes in both directions, and the surrounding development density supports non-motorized vehicle use. With the exception of Livingston Street south of Main Street, sidewalks exist on both sides of the blocks surrounding Archipelago Village.

If or when the recommended signalization of the East Washington Avenue and Brearly Street occurs (see motor vehicle recommendations), the Study Team recommends adding pedestrian signal heads and push buttons at this intersection. No additional alternatives are proposed external to the site.

Based on the City's requirements for off-street parking, Table 1.4-2 shows the bicycle parking spaces for this development site assuming shared use. Archipelago Village LLC is working with the City to determine the appropriate number of bicycle parking spaces. As of February 18, 2019, the proposed bicycle parking at build-out is 200 spaces.

Specified Land Use	Off-Street Parking Requirements	Shared Parking Calc	
		Daytime Use	Evening Use
High-Turnover (Sit-Down) Restaurant	5% of capacity of persons	8	9
Quality Restaurant	5% of capacity of persons	20	25
General Retail	1 per 2,000 sf	34	34
Hospital/Clinic	1 per 5 employees	2	2
General Office Building	1 per 2,000 sf	136	
Hotel	1 per 10 bedrooms	13	25
Apartment	1/unit up to 2 bedrooms; 1 guest space per 10 units	59	235
Totals		271	330
Mixed use/local trip rates reduction (-30%)		-81	-99
Adjusted Totals		190	231

Off-Street Parking Requirements from the City of Madison.

Table 1.04-2 Archipelago Village Bicycle Parking

D. Transit

Being on East Washington Avenue, the site has high levels of transit service. Additionally, Archipelago Village is on the east-west Bus Rapid Transit routing that is currently under study.

E. Motor Vehicles

Figures 1.04-1 and 1.04-2 graphically illustrate the 2037 Peak Hour operational challenges associated in the roadway network surrounding Archipelago Village when it is fully developed. Many of these challenges currently exist, or would exist even without the Archipelago Village development and result from the background traffic growth.

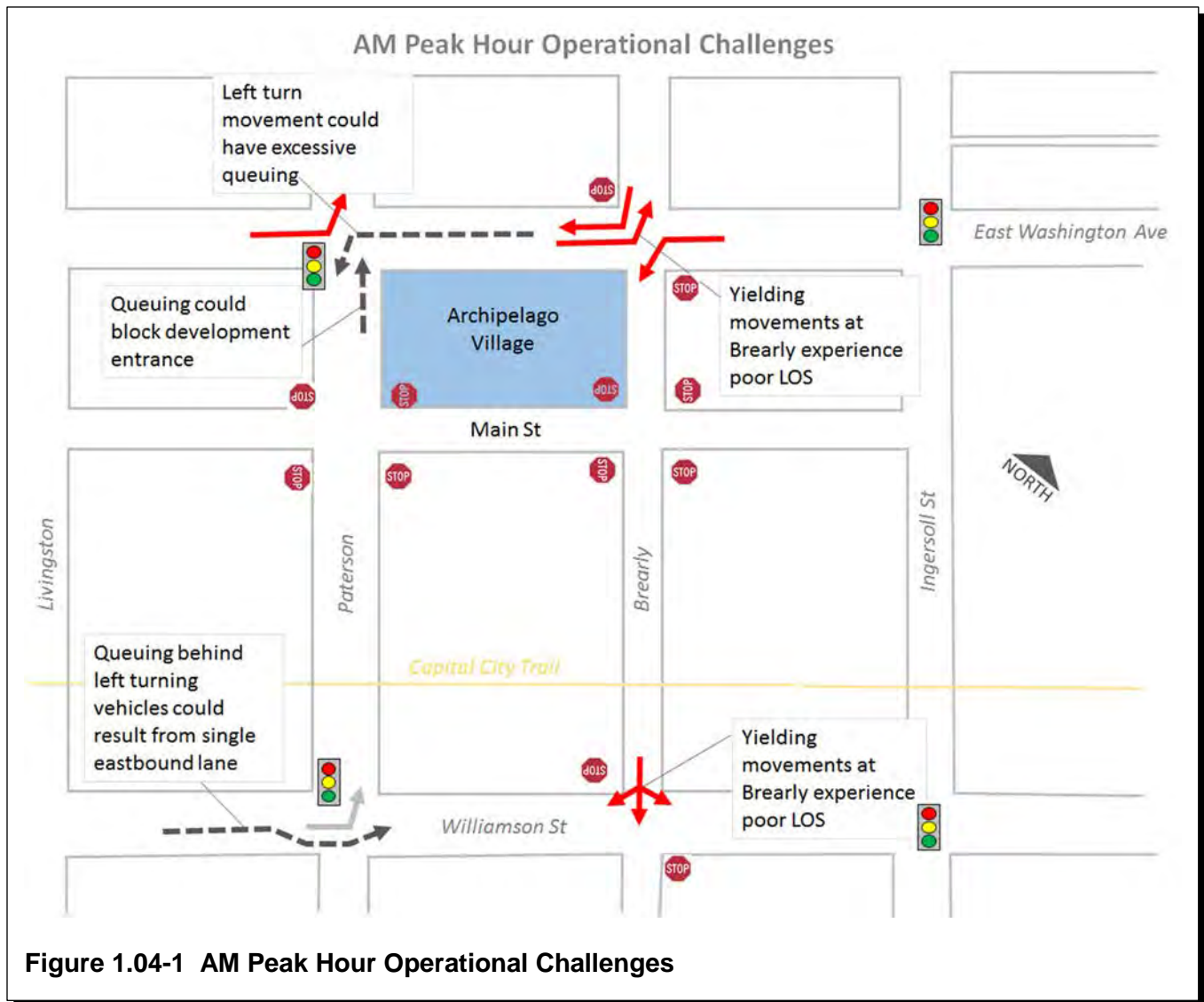


Figure 1.04-1 AM Peak Hour Operational Challenges

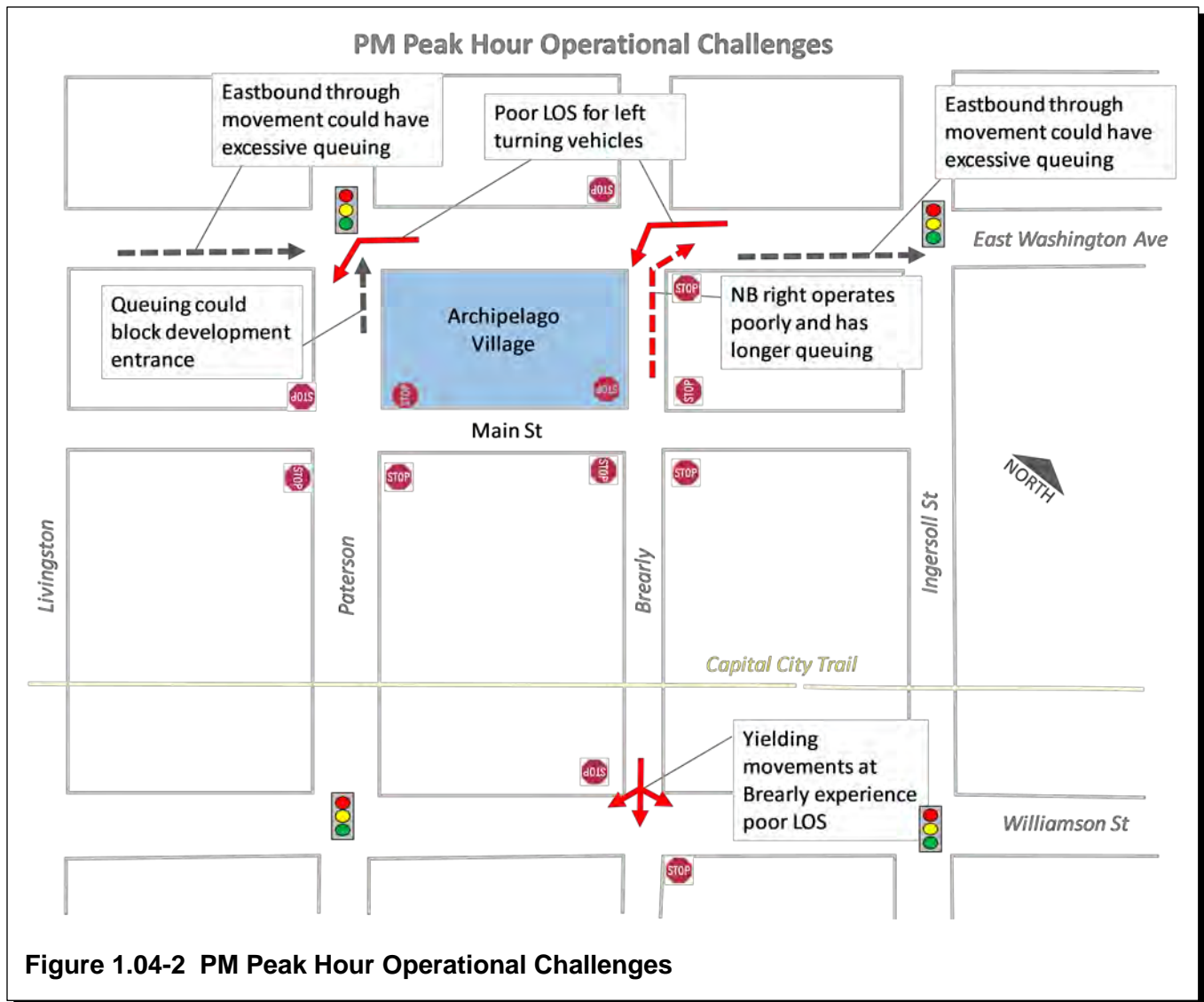


Figure 1.04-2 PM Peak Hour Operational Challenges

The Study Team analyzed the existing and proposed intersections at or near Archipelago Village. Some of the analyzed intersections will operate poorly with or without the proposed site. This includes the Brearly Street and Williamson Street intersection, which currently does not have signals, and it is not feasible to install signals. It is possible to mitigate much of the traffic impacts created by the Archipelago Village. Table 1.04-3 shows the AM and PM peak hour overall Level of Service (LOS) at the study intersections with the proposed geometric and control recommendations. The paragraphs following Table 1.04-3 describe the recommendations.

Location	2037 Recommended Geometric Improvements Intersection Operations					
	AM Peak Hour			PM Peak Hour		
	Overall LOS	LOS E Movement (s)	LOS F Movement (s)	Overall LOS	LOS E Movement (s)	LOS F Movement (s)
E Washington Avenue and Paterson Street (Signalized)	A	---	---	B	---	---
E Washington Avenue and Brearly Street (Signalized)	A	---	---	A	---	---
E Washington Avenue and Ingersoll Street (Signalized)	B	---	---	A	SBL/T/R	---
Main Street and Paterson Street (Unsignalized)	A	---	---	B	---	---
Main Street and Brearly Street (Unsignalized)	A	---	---	B	---	---
Williamson Street and Paterson Street (Signalized)	B	---	---	B	---	---
Williamson Street and Brearly Street (Unsignalized)	F	---	SBL/T/R	F	---	NBL/T/R, SBL/T/R
North Access (Unsignalized)	C	---	---	F	---	NBR
East Access (Unsignalized)	A	---	---	A	---	---
South Access (Unsignalized)	A	---	---	B	---	---
West Access (Unsignalized)	B	---	---	B	---	---

Note:
 SBL/T/R = southbound left/through/right
 NBL/T/R = northbound left/through/right

Table 1.04-3 2037 Intersection Operations, with Archipelago Village Development and with Recommended Geometric Improvements

1. East Washington Avenue and Paterson Street

The Study Team recommends adding a northbound left-turn bay at the intersection of East Washington Avenue and Paterson Street. This left-turn bay could be accomplished by restricting parking on the northern 200 feet of Paterson Street. With this treatment, all movements operate at LOS D or better during the AM and PM peak hours.

2. East Washington Avenue and Brearly Street

The Study Team recommends a partial signal, similar to the one at Livingston Street that would provide signal control for the eastbound and westbound left turns at this intersection. Signaling these left turns would also allow a northbound and southbound right-turn overlap, addressing the queuing concerns. Because this intersection prohibits north and southbound through movements, the signal could be coordinated with adjacent signals and minimize the impact of the time taken away from the East Washington Avenue coordinated through movements.

Adding a signal improves operations to LOS A during the AM and PM peak hours. All individual movements operate at LOS D or better during the AM and PM peak hours.

3. East Washington Avenue and Ingersoll Street

Despite the queuing, overall LOS remain acceptable with the development traffic. Because the overall intersection operation is acceptable, the Study Team recommends no additional improvements to the intersection of East Washington Avenue and Ingersoll Street.

4. Main Street and Paterson Street

The Main Street and Paterson Street intersection will operate acceptably as an all-way stop-controlled intersection. No further improvements are recommended.

5. Main Street and Brearly Street

The Main Street and Brearly Street intersection will operate acceptably as an all-way stop-controlled intersection. No further improvements are recommended.

6. Williamson Street and Paterson Street

The Study Team recommends extending the eastbound no parking restriction on the corner of Williamson Street to the west/upstream, which would help eastbound through vehicles bypass left-turning traffic during the AM peak hour. The Study Team coded a 50-foot turn bay to resemble the no parking restriction in the operations model, and this modification reduced the eastbound queues by 50 percent or more during the AM peak hour.

7. Williamson Street and Brearly Street

Because of the close spacing of signals on Williamson Street, the Study Team does not recommend signalizing the Williamson Street and Brearly Street intersection. Delays associated with this intersection may cause some travelers to use alternate intersections, such as Ingersoll Street, to access Williamson Street.

8. North Access and East Washington Avenue

The Study Team recommends an eastbound parking restriction on East Washington Avenue for approximately 150 feet to provide adequate sight distance for exiting vehicles.

9. East Access and Brearly Street

The Study Team recommends restricting parking on the west side of the street and shifting the centerline marking 4 feet to the west. This would allow through vehicles and cyclists the opportunity to travel around northbound vehicles making a left into Archipelago Village parking lot.

10. South Access and Main Street.

The Study Team recommends restricting parking on the north side of the street and shifting the centerline marking 4 feet to the north. This would allow through vehicles and cyclists the opportunity to travel around eastbound vehicles making a left into the Archipelago Parking lot.

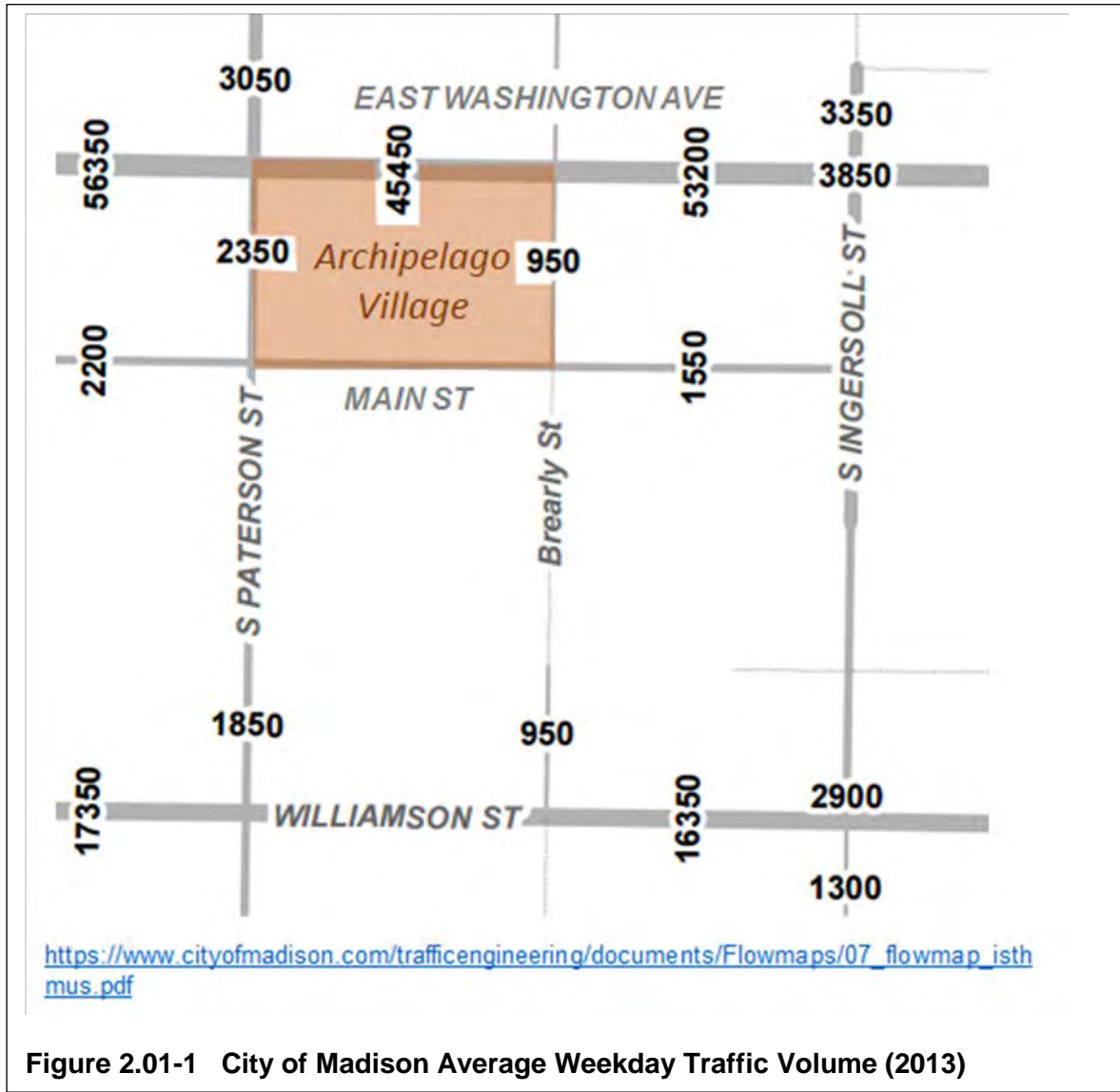
11. West Access and Paterson Street.

The Study Team recommends restricting parking on both sides of the street to allow a northbound left-turn lane at the East Washington Avenue intersection, and to provide a southbound left-turn refuge for vehicles turning into the Archipelago Village Parking Lot. This likely will require a 50-foot northbound left-turn storage bay at East Washington Avenue, a 75-foot taper, and a 25-foot left-turn bay for the Archipelago Village Parking lot.

SECTION 2
DATA COLLECTION

2.01 EXISTING DAILY TRAFFIC

The City performs traffic volume counts on city streets on a three-year cycle. The posted counts for the area near Archipelago Village were performed in 2013. Figure 2.01-1 illustrates the average daily weekday volumes for streets in the vicinity of Archipelago Village.



2.02 INTERSECTION TURNING MOVEMENTS

The morning and evening rush hours are the controlling peak hours for the roadways surrounding the development. The Study Team performed peak period turning-movement counts for some of the study area intersections on March 16 and March 22, 2017, and used previously collected counts provided by the City at some intersections. The hours counted by the Study Team were from 6:30 to 8:30 A.M. and from 4 to 6 P.M. The highest morning peak hour occurred from 7:30 to 8:30 A.M. The highest evening

peak hour occurred from 4:30 to 5:30 P.M. The existing (2017) peak-hour traffic volumes then were balanced and are shown in Figure 2.02-1. Appendix B includes the raw AM and PM peak-hour traffic volumes.

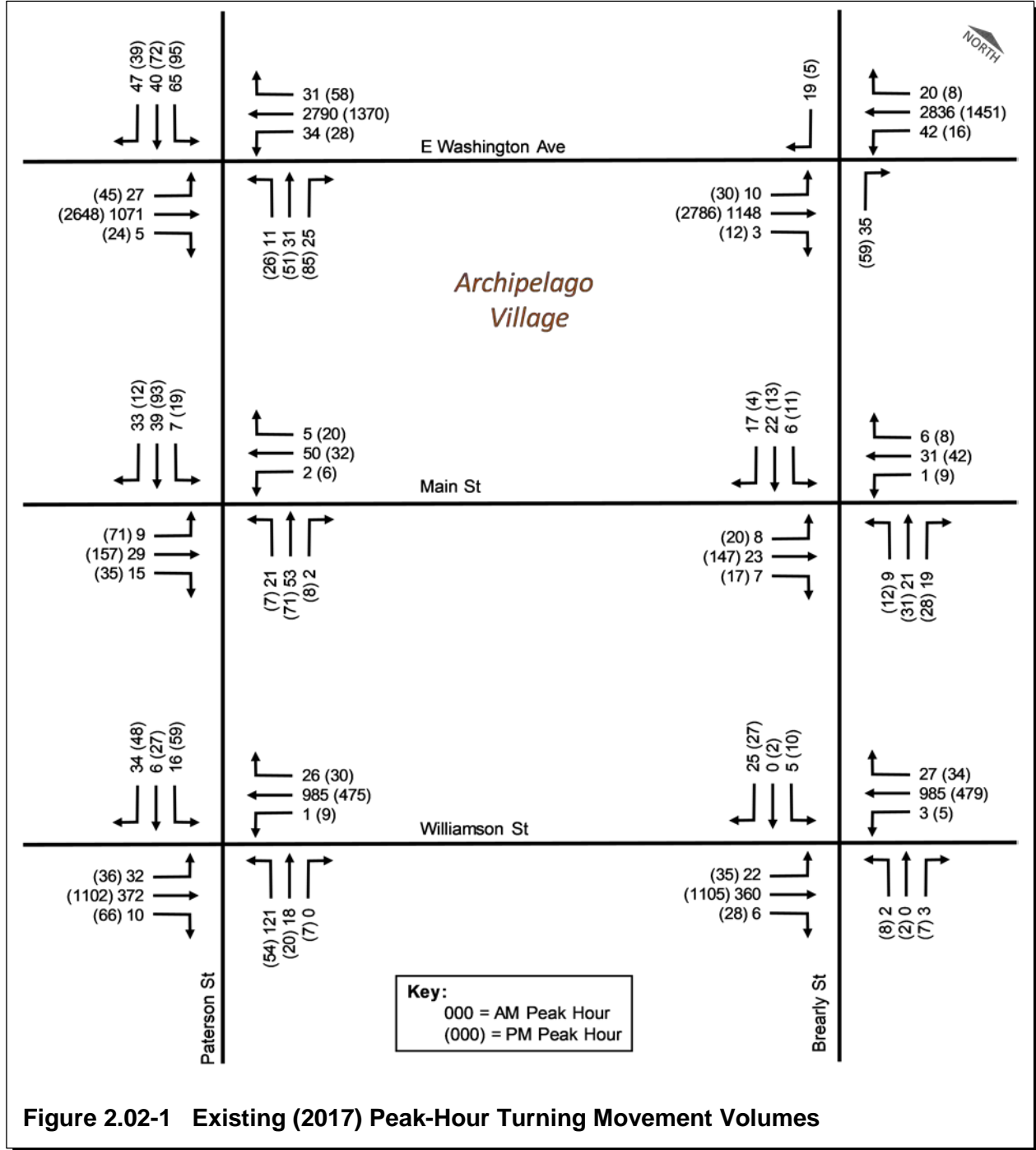


Figure 2.02-1 Existing (2017) Peak-Hour Turning Movement Volumes

2.03 PEDESTRIANS AND BICYCLES

Pedestrians and bikes were also counted during the same peak hours as the motor vehicles on March 16 and March 22, 2017. The highest pedestrian and bike crossing locations were at the intersections of Williamson Street and Paterson Street and East Washington Avenue and Paterson Street during the PM peak hour. Figure 2.03-1 shows the number of pedestrians and bikes during peak hours at each intersection crossing. It is likely these volumes would be greater during the summer months.

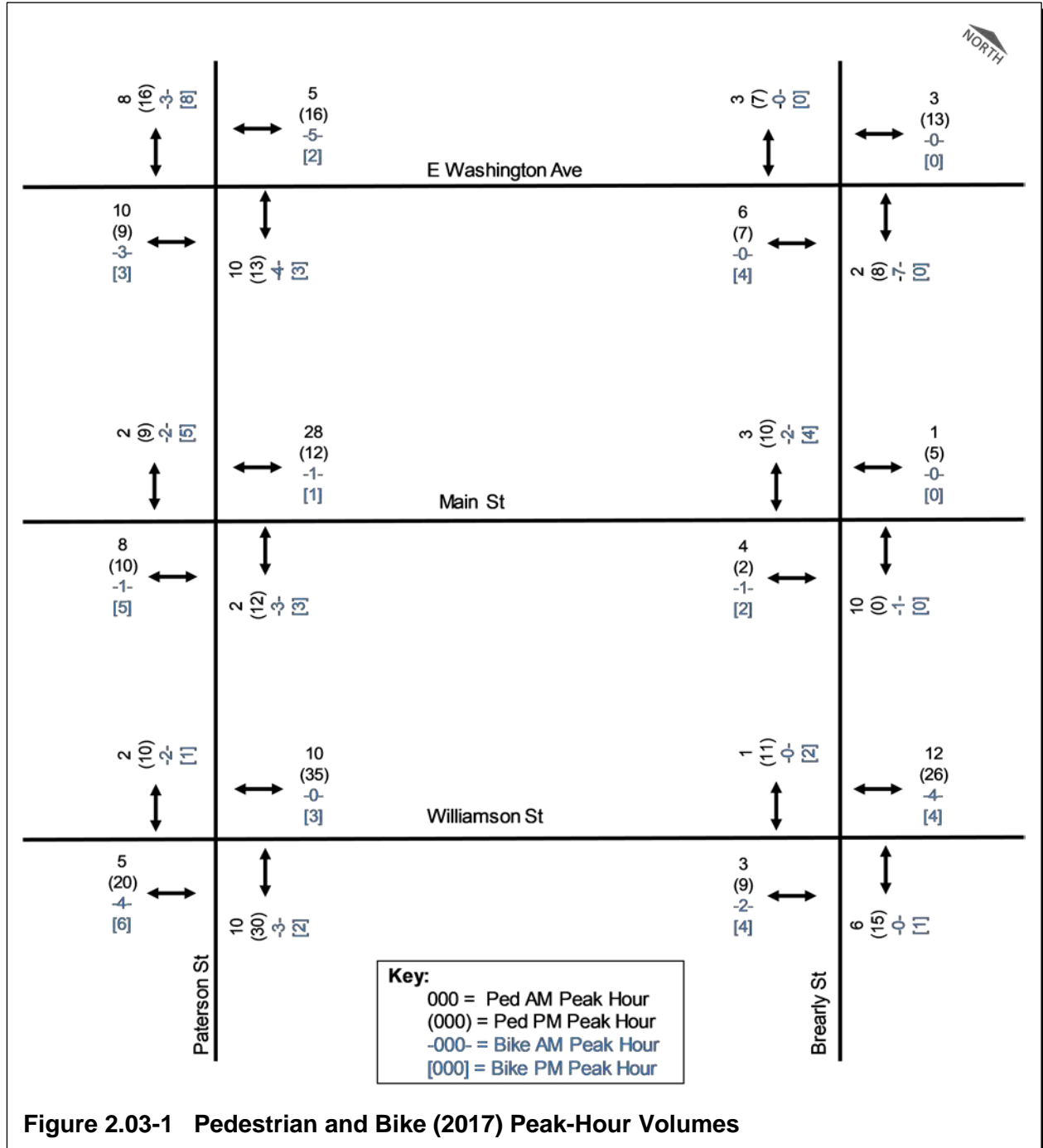


Figure 2.03-1 Pedestrian and Bike (2017) Peak-Hour Volumes

2.04 TYPICAL CITY DEVELOPMENT TRIP GENERATION RATES

The ITE Trip Generation Manual compiles trip generation rates for different land uses across North America. The land use samples have different contexts (urban, suburban, and rural), and size characteristics which may not accurately reflect trip generation rates for City development. The study performed traffic counts on the newly completed Constellation Development (Constellation) driveways during the morning and evening peak hours to understand the trip generation characteristics of development in Madison. Then the study compared these rates with the trip generation rates contained in the ITE Trip Generation Manual, 10th Edition.

Table 2.04-1 shows the trip generation comparison for the Constellation. Based on this comparison, near east side development was generating between 25 and 30 percent of the trips predicted by the ITE Trip Generation Manual. Possible reasons for this lower generation rate could include greater numbers of residents and patrons using alternate modes (walking, biking, and transit), staggered work hours, mixed uses, and lower overall trip generation rates across all modes. Appendix C includes the ITE Trip Generation for Constellation.

ITE Trip Generation Calculation for Constellation								
ITE Landuse for Constellation	Given Units	Unit	Daily Rate	Daily Trips	AM Peak Hour		PM Peak Hour	
					Hour Rate	Trips	Hour Rate	Trips
Apartment	218	Dwelling	6.65	1450	0.51	112	0.62	136
High-Turnover (Sit-Down) Restaurant	15.0	1000 GSF	127.15	1908	10.81	--	9.85	148
Drinking Place	3.5	1000 GSF	15.49	55	--	--	11.34	40
Coffee/Donut Shop with Drive-Through Window	3.5	1000 GSF	818.58	2866	100.58	353	42.8	150
Medical-Dental Office Building	3.5	1000 GSF	36.13	127	2.39	9	3.57	13
General Office Building ¹	7.0	1000 GSF	11.03	78	1.56	11	1.49	11
1 - Includes financial, and software engineering offices.								
Calculated ITE Trip Gen Manual Development Trips for Constellation:				6,484		485		498
Observed Trip Generation from Constellation:						142		123
Observed as a Percentage of Calculated:						29%		25%

Table 2.04-1 Observed vs Calculated Trip Generation for Constellation

SECTION 3
TRIP GENERATION AND ASSIGNMENT

3.01 SITE DESCRIPTION

The proposed Archipelago Village includes residential units, mixed commercial use, a hotel, and general office space. The Development Team provided the following proposed uses, sizes in sf , and number of units (depending on their purpose) for full build-out of the site.

1. Residential Units–152 dwelling units
2. Mixed Commercial–68,000 sf
3. Hotel–144 units
4. Office Space–374,000 sf

Access to the site is planned for each of the four streets surrounding it: North Access (right-in/right-out only) on East Washington Avenue; East Access on Brearly Street; South Access on Main Street; and West Access on Paterson Street.

3.02 TRIP GENERATION

The Study Team generated trips for the proposed redevelopment site using the *ITE Trip Generation Manual*, 10th Edition. The ITE Manual provides several factors to estimate the traffic of a particular land use. For this analysis, the trips generated by the mixed commercial use and office building were determined using their building size in square feet, and the trips generated by the residential units and hotel were determined using the number of dwelling units and number of rooms, respectively. The breakdown of the 68,000 sf of commercial land uses is a best estimate at the time of this report. Two restaurant uses were assumed totaling 15,000 sf. The remaining 53,000 sf of commercial space was assumed to be one-half general retail/shopping (26,500 sf) and one-half clinic/medical uses (26,500 sf).

As mentioned in the development comparison in Section 2.04, motor vehicle trip generation characteristics of recent development on East Washington Avenue appear to be up to 70 percent lower than those predicted by the ITE Trip Generation Manual. Discussions with City Traffic Engineering in April 2017 resulted in an agreement to use a 30 percent reduction to ITE Trip Generation rates. Reasons for this more modest trip rate reduction included Archipelago Village having a higher proportion of office uses that have more predictable trip patterns. The 30 percent trip reduction accounts for lower trip generation rates, pass-by trips that are already on the street network, and the use of alternate modes.

Table 3.02-1 lists the land use assumptions used to develop the trip generation for Archipelago Village. These uses are meant to be a reasonable representation of the space use listed in Section 3.01-1. Actual and more descriptive uses will be determined as the development is approved and tenants are enlisted.

Using these stated base assumptions, the total number of daily new personal motor vehicle trips created by the proposed site is 6,252 trips. Of the total daily new trips, 506 would occur during the

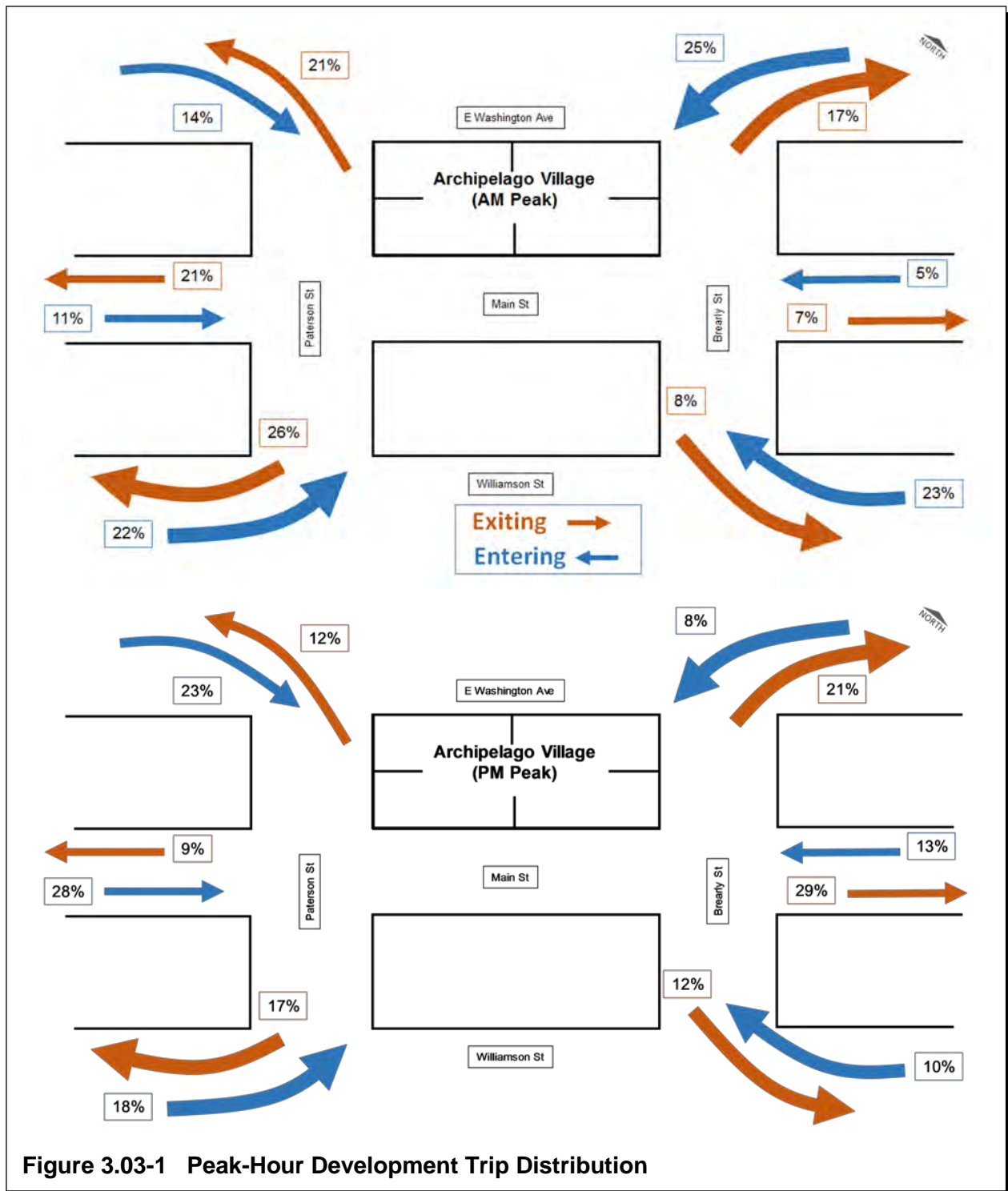
AM peak hour, and 622 would occur during the PM peak hour as shown in Table 3.02-1. Appendix D includes the trip generation for the proposed redevelopment.

ITE Land Use	ITE Land Use Code	Daily Trips	AM Peak-Hour Trips			PM Peak-Hour Trips		
			AM In	AM Out	Trips	PM In	PM Out	Trips
High-Turnover (Sit-Down) Restaurant	932	561	28	22	50	30	19	49
Quality Restaurant	931	834	--	--	--	52	26	78
Shopping Mall	820	1001	16	9	25	48	53	101
General Office Building	710	3643	373	61	434	69	362	431
Clinic	630	1012	76	22	98	25	62	87
Hotel	310	1204	40	28	68	44	43	87
Multifamily Housing (High Rise)	222	677	12	36	48	34	21	55
Total Trips:		8,932	545	178	723	302	586	888
30% Reduction		(2,680)	(164)	(53)	(217)	(91)	(176)	(266)
Total New Development Trips:		6,252	382	125	506	211	410	622

Table 3.02-1 Development Trip Generation Summary

3.03 TRIP DISTRIBUTION AND ASSIGNMENT

The Study Team distributed the trips generated by Archipelago Village to the roadway network based on existing peak-hour turning movements of the study intersections. A percentage of the total new trips was assigned to each direction of travel during the AM and PM peak hours. Figure 3.03-1 shows the assigned percentages. It should be noted that in the PM peak hour, eastbound Main Street captures much of the traffic leaving the study area. This traffic is likely destined for the signalized East Washington Avenue and Ingersoll Street intersection.



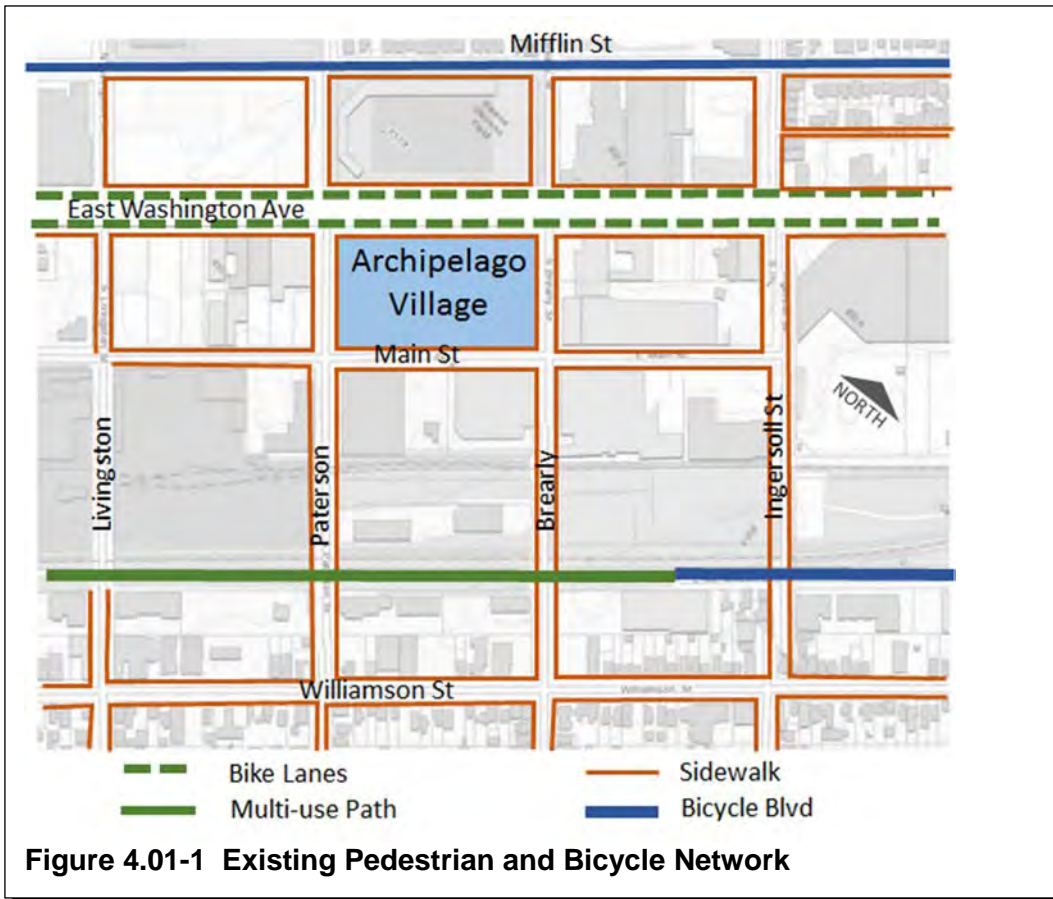
4.01 PEDESTRIANS AND BICYCLES

Pedestrians have access to the site via East Washington Avenue, Brearly Street, Main Street, Paterson Street, and Williamson Street. Sidewalk is continuous on all of these streets on both sides. All study intersections have traditionally marked crosswalks. Pedestrian signal heads exist at all the signalized study intersections: East Washington Avenue and Paterson Street; East Washington Avenue and Ingersoll Street; and Williamson Street and Paterson Street.

Cyclists have access to the site via the streets and paths that surround it. The following bullets summarize the bicycle accommodations to and from the site.

- East Washington Avenue—On-street bike lanes in both directions.
- Paterson Street—Low volume road, no bike lanes.
- Brearly Street—Low volume road, no bike lanes.
- Capital City Trail—Regional bike path two blocks south of Archipelago Village.
- Williamson Street—Higher volume road without marked bike lanes. Parking is allowed in the off-peak direction, which also provides a widened outside lane that some cyclists feel comfortable using.

Figure 4.01-1 illustrates the existing pedestrian and bicycle facilities adjacent to the proposed Archipelago Village.



4.02 TRANSIT

There are nine bus routes that use and serve East Washington Avenue: one is in service all day, and eight are in service during the peak hours from 6 to 9 A.M. and 3 to 7 P.M.

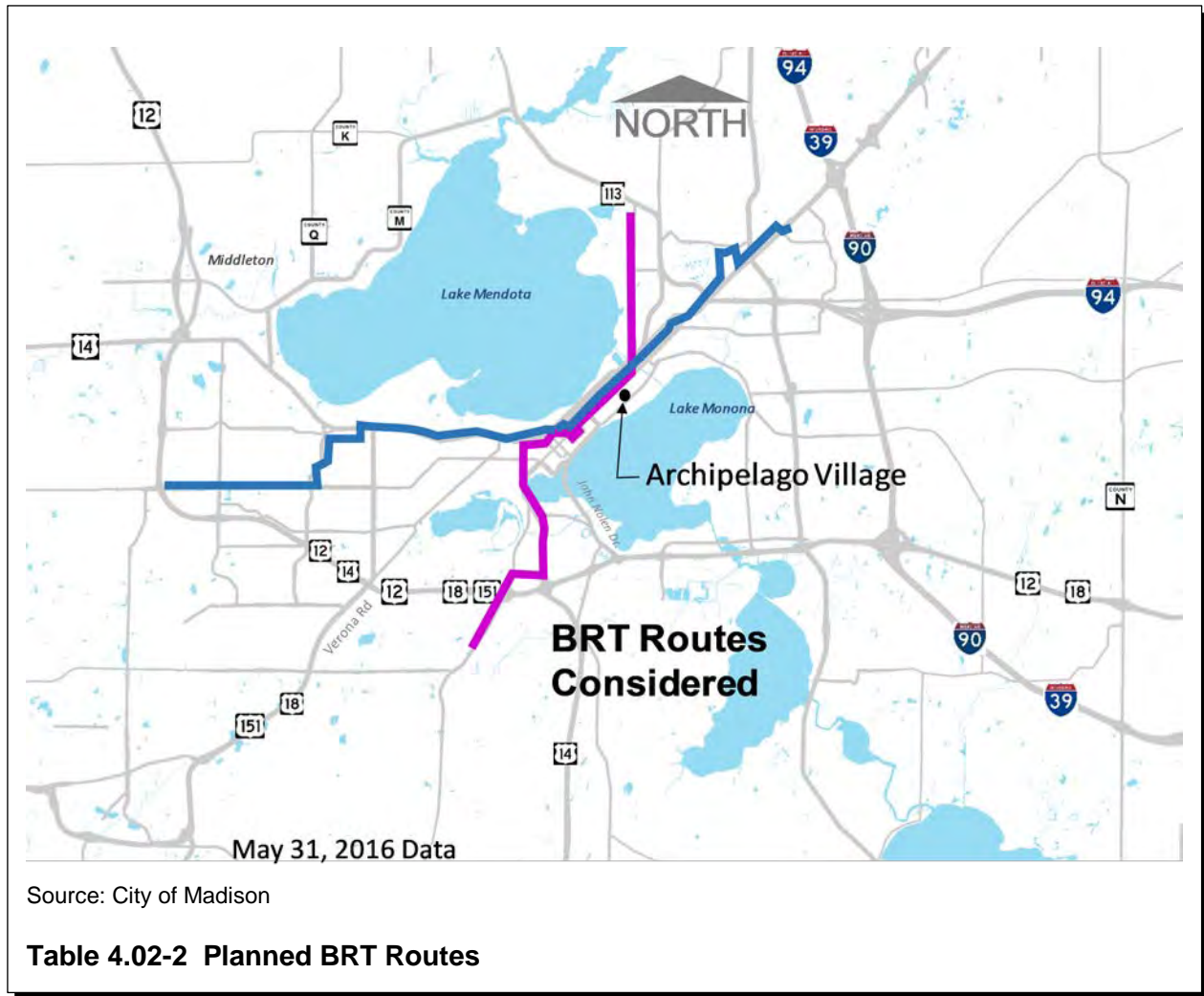
There are five bus stops at the study intersections:

- Two at the East Washington Avenue and Paterson Street intersection.
- One at the East Washington Avenue and Brearly Street intersection.
- Two at the East Washington Avenue and Ingersoll Street intersection.

Figure 4.02-1 shows bus routes and bus stops near the proposed development.



In addition to existing transit service, East Washington Avenue is one of four proposed routes for the City’s Bus Rapid Transit (BRT) initiative. Implementation of BRT is currently being studied. Initial implementation is currently anticipated to include the east-west BRT routes that include this portion of East Washington Avenue. When implemented, BRT will provide a very high service level from and to Archipelago Village. Figure 4.02-2 illustrates the current BRT routes being considered.

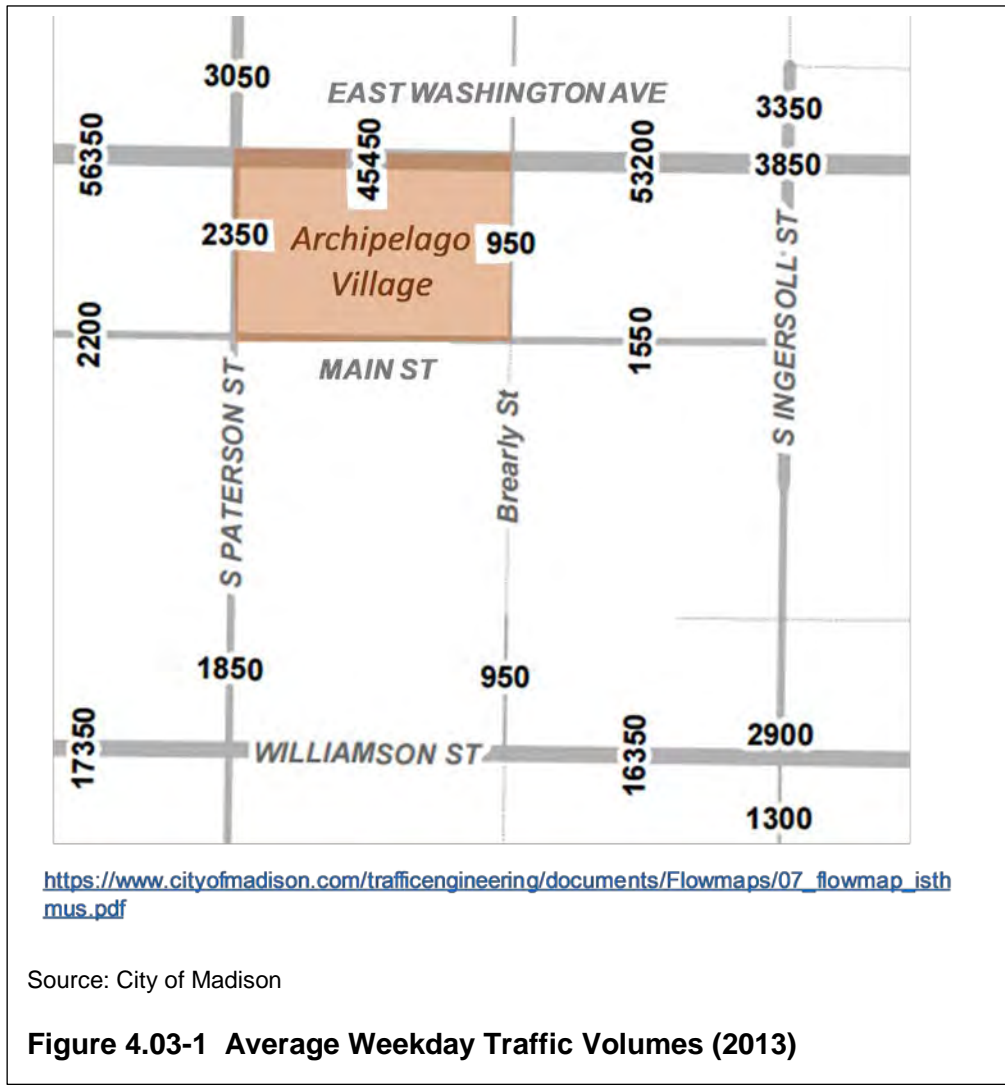


4.03 MOTOR VEHICLES

A. Traffic Volumes

East Washington Avenue is a primary arterial in the City’s roadway functional classification system. It is one of two primary arterials that link east and northeast Madison, Sun Prairie, and I-39/90/94 to the downtown. According to the City’s traffic count data, the average weekday traffic (AWT) count on East Washington Avenue in the vicinity of Archipelago Village is about 45,000 vehicles per day (vpd). The AWT count on Brearly Street is about 1,100 vpd; the AWT count on Main Street is about 2,200 vpd, and is about 2,050 vpd on Paterson Street.

Williamson Street serves as a link between the Atwood Avenue neighborhoods and the west and south sides of the City. Williamson Street carries about 17,000 vehicles on an average weekday. During the AM peak hours, on-street parking is restricted in the westbound direction. During the PM peak hours parking is restricted in the eastbound direction. Figure 4.03-1 shows the 2013 AWT counts near the site.



B. Traffic Operations–2017 Existing Conditions Without Development

Study intersection operations were analyzed using Synchro 10 software. Synchro is a macroscopic (equation based) program that uses the processes outlined in the Highway Capacity Manual (HCM) developed by the Federal Highway Administration (FHWA). The HCM 6 results are documented in this report. HCM 2000 was occasionally used where non-NEMA phasing was implemented. The Study Team also used SimTraffic software, which is microscopic (simulates individual vehicles on the street network), to observe traffic flow and queuing during the peak hours.

The Study Team evaluated operations based on existing conditions at seven intersections surrounding the site. The operations analysis for most intersections was on turning movement volumes taken in spring 2017. An intersection’s LOS is based on average delay in seconds per vehicle for traffic entering the intersection. LOS A indicates minimal average delay at an intersection (less than 10 seconds) while LOS F indicates a higher delay (more than 50 seconds at an unsignalized intersection and 80 seconds at a signalized intersection). For unsignalized intersections, the LOS of the poorest yielding movement is

reported as the intersection LOS. This is because there could be a high volume on a non-yielding movement skewing the overall average delay even if a lower volume yielding movement is failing. Table 4.03-1 shows the delay thresholds for LOS at signalized and unsignalized intersections.

LOS	Signalized Intersections (average delay, seconds)	Unsignalized Intersections (average delay, seconds)
A	<10	<10
B	10 to 20	10 to 15
C	>20 to 35	>15 to 25
D	>35 to 55	>25 to 35
E	>55 to 80	>35 to 50
F	>80	>50

Table 4.03-1 LOS Thresholds

Table 4.03-2 is a summary of the 2017 Existing Conditions operations modeling results. The modeling reports are provided in Appendix E. Summary tables of all the modeling scenarios are included in Appendix I.

Location	Existing Conditions (2017) Intersection Operations					
	AM Peak Hour			PM Peak Hour		
	Overall LOS	LOS E Movement (s)	LOS F Movement (s)	Overall LOS	LOS E Movement (s)	LOS F Movement (s)
E Washington Avenue and Paterson Street (Signalized)	A	---	---	B	---	---
E Washington Avenue and Brearly Street (Unsignalized)	F	---	EBL, SBR	F	---	NBR, WBL
E Washington Avenue and Ingersoll Street (Signalized)	A	---	---	A	---	---
Main Street and Paterson Street (Unsignalized)	A	---	---	A	---	---
Main Street and Brearly Street (Unsignalized)	A	---	---	A	---	---
Williamson Street and Paterson Street (Signalized)	A	---	---	A	---	---
Williamson Street and Brearly Street (Unsignalized)	C	---	---	F	---	NBL/T/R

Table 4.03-2 2017 Existing Conditions Intersection Operations

1. AM Peak Hour Operations–Existing Conditions

a. East Washington Avenue and Livingston Street

Field observations made during traffic movement counts indicate that the westbound left-turn queues at the Livingston Street intersection extend out of the existing storage bay during the AM peak hours. This queuing reached the East Washington Avenue and Paterson Street intersection, increasing East Washington travel delays.

b. East Washington Avenue and Paterson Street.

The signalized intersection of East Washington Avenue and Paterson Street operates at LOS A with a maximum volume to capacity (V/C) ratio of 0.77. The westbound through movements operate at LOS A with 95th and 50th percentile queues of approximately 355 feet and 230 feet, respectively. The 95th percentile queues represent the length exceeded during 5 percent of the weekday peak hours. The 50th percentile queues represent average peak hour conditions, so queues will sometimes be shorter and sometimes be longer. The Brearly Street intersection is located about 540 feet east of the East Washington Avenue and Paterson Street intersection, so the longest through queues in the westbound direction do not block the Brearly Street intersection (based on HCM 6 results).

c. East Washington Avenue and Brearly Street

The side-street stop-controlled intersection of East Washington Avenue and Brearly Street operates at LOS F with a maximum V/C ratio of 0.36. The eastbound left-turn and southbound right-turn movements operate at LOS F with 95th percentile queues of less than 50 feet (two vehicles or less).

d. East Washington Avenue and Ingersoll Street

The signalized intersection of East Washington Avenue and Ingersoll Street operates at LOS A with a maximum V/C ratio of 0.75. The westbound through movements operate at LOS A with 95th and 50th percentile queues of approximately 290 feet and 180 feet, respectively. Few Street is located about 575 feet east of Ingersoll Street on East Washington Avenue, so the longest through queues in the westbound direction do not block the Few Street intersection based on HCM 6 results.

e. Main Street and Paterson Street

The all-way stop-controlled intersection of Main Street and Paterson Street operates at LOS A with a maximum V/C ratio of 0.11. All of the movements have 95th percentile queues of 25 feet or less.

f. Main Street and Brearly Street

The all-way stop controlled intersection of Main Street and Brearly Street operates at LOS A with a maximum V/C ratio of 0.07. All the movements have 95th percentile queues of 25 feet or less.

g. Williamson Street and Paterson Street

The signalized intersection of Williamson Street and Paterson Street operates at LOS A with a maximum V/C ratio of 0.58. The westbound traffic has a 95th percentile queues of about 170 feet.

h. Williamson Street and Brearly Street

The side-street stop-controlled intersection of Williamson Street and Brearly Street operates at LOS C with a maximum V/C ratio of 0.14. All of the movements have 95th percentile queues of 25 feet or less.

2. PM Peak Hour Operations–Existing Conditions

a. East Washington Avenue and Paterson Street.

The signalized East Washington Avenue and Paterson Street intersection operates at LOS B with a maximum V/C ratio of 0.74. The eastbound through movements operate at LOS A with 95th and 50th percentile queues of approximately 355 feet and 245 feet, respectively. The Livingston Street intersection is located about 550 feet west of the East Washington Avenue and Paterson Street intersection, so the eastbound longest through queues do not block the Livingston Street intersection based on HCM 6 results.

b. East Washington Avenue and Brearly Street

The unsignalized East Washington Avenue and Brearly Street intersection operates at LOS F with a maximum V/C ratio of 0.57. The northbound right-turn and westbound left-turn movements operate at LOS F with 95th percentile queues of less than 75 feet (three vehicles or less). SimTraffic microsimulation model observations indicate queues of similar lengths.

c. East Washington Avenue and Ingersoll Street

The signalized East Washington Avenue and Ingersoll Street intersection operates at LOS A with a maximum V/C ratio of 0.85. All movements operate at LOS D or better with 95th percentile queues of 180 feet or less. These queues are not expected to block adjacent intersections.

d. Main Street and Paterson Street

The all-way stop-controlled Main Street and Paterson Street intersection operates at LOS A with a maximum V/C ratio of 0.36. All the movements have 95th percentile queues of 40 feet or less.

e. Main Street and Brearly Street

The all-way stop-controlled Main Street and Brearly Street intersection operates at LOS A with a maximum V/C ratio of 0.26. All the movements have 95th percentile queues of 30 feet or less.

f. Williamson Street and Paterson Street

The signalized Williamson Street and Paterson Street intersection operates at LOS A with a maximum V/C ratio of 0.55. The eastbound movements have 95th percentile queues of approximately 205 feet. SimTraffic microsimulation model observations indicate that all the queues generally clear during each signal cycle.

g. Williamson Street and Brearly Street

The side-street stop-controlled Williamson Street and Brearly Street intersection operates at LOS F with a maximum V/C ratio of 0.22. The northbound movements operate at LOS F with 95th percentile queues of 25 feet or less without the proposed site traffic. SimTraffic microsimulation observations show similar queueing results.

5.01 PEDESTRIANS AND BICYCLES

The 2037 Existing Geometry Without Development Alternative would not make any improvements to pedestrian or bike accommodations. Pedestrians and cyclists would continue to use the existing sidewalks and bike lanes. Because of the existing bike lanes on East Washington Avenue and the adjacent Capital City trail, this location has relatively high levels of connections for nonmotorized transportation modes.

5.02 TRANSIT

Because the site is adjacent to East Washington Avenue, it would maintain relatively high transit service levels with or without the development.

Without development, this site would not have the higher density/trip-making potential that would help support future BRT implementation.

5.03 MOTOR VEHICLES

A. Traffic Volumes

The East Washington Avenue corridor is experiencing high levels of redevelopment. Figure 5.03-1 illustrates the developments that are under way or have been recently completed during the preparation of this traffic impact analysis; yet their full trip-making potential has not yet been experienced. When analyzing future traffic operations, it is important to account for trips generated from adjacent development.

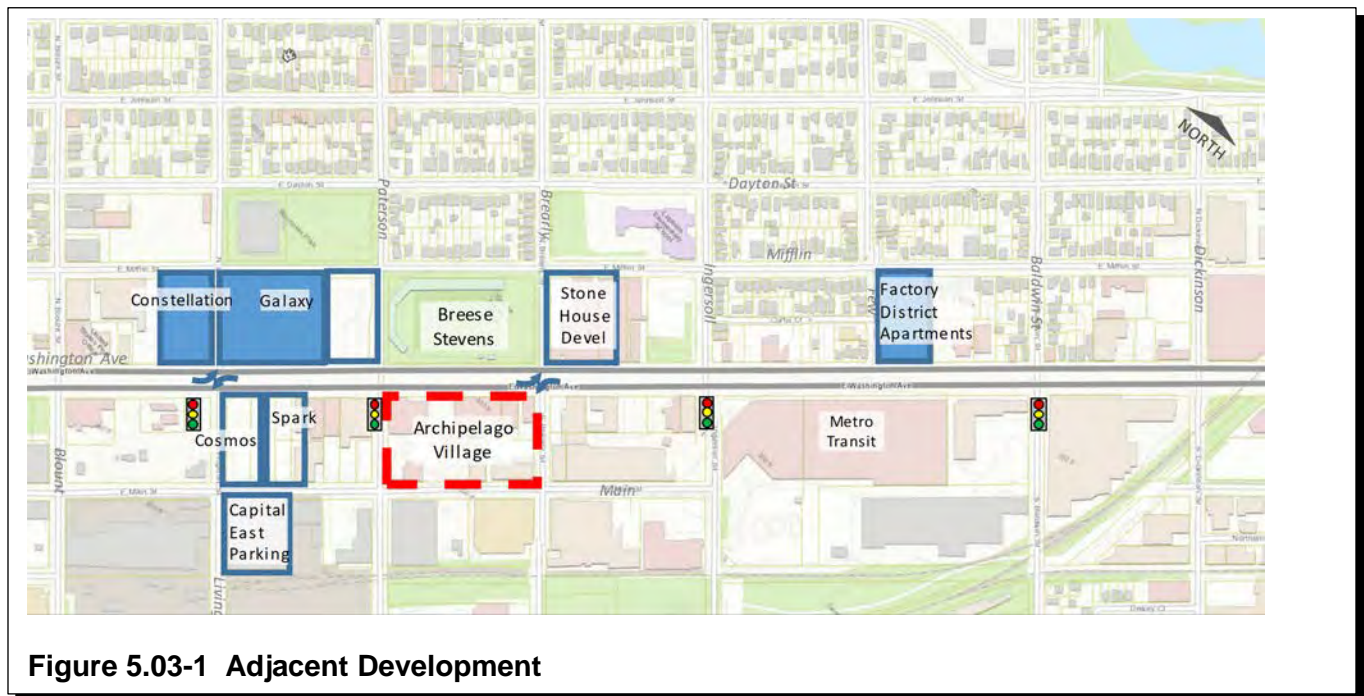


Figure 5.03-1 Adjacent Development

The Madison Area Transportation Planning Board maintains a travel demand model. This model is federally funded and mandated for Metropolitan Planning Organizations (MPOs). The travel demand model uses the transportation network and predicts traffic volumes based on population, land use, households, employment, trip rates, travel costs, and other data. The model is calibrated to the base year—typically a census year. Then population, land use, household, and employment data is modified to reflect future, or horizon year, plans and conditions. With these modifications, the demand model provides traffic volume projections that acknowledge the planned changes in land use, including redevelopment.

Figure 5.03-2 illustrates the traffic analysis zones (TAZs) in the travel demand model for the East Washington Avenue corridor.



Figure 5.03-2 Traffic Analysis Zones in Travel Demand Model

Table 5.03-1 shows the projected population, household, and employment growth for the year 2050 as contained in the travel demand model. TAZ 40 contains Archipelago Village and is highlighted. All zones in the vicinity show greater densities of population, households, and employment. Discussions with Madison Traffic Engineering indicated that these TAZ growth projections reasonably represent the background traffic growth resulting from redevelopment along the East Washington Avenue corridor.

Consequently, projected traffic growth predicted by the travel demand model provides a reasonable rate of background growth.

Traffic Analysis Zone	2010	2050			2010	2050			2010	2050
	Population	Population	Households	Households	Retail Employment	Retail Employment	Service Employment	Service Employment		
31	648	1194	305	656	49	116	241	343		
32	21	29	6	11	0	78	745	823		
36	182	542	137	362	19	87	96	135		
37	140	818	72	496	91	173	57	92		
39	242	322	124	174	20	20	17	92		
40 Archipelago Village	7	367	3	228	65	155	242	332		
41	72	432	42	267	0	48	41	72		
42	141	443	72	261	5	13	153	174		
45	584	906	318	519	95	227	73	129		
46	0	0	0	0	10	10	108	108		
Total	2037	5053	1079	2974	354	927	1773	2300		

Table 5.03-1 Travel Demand Model TAZ Parameters

The 2050 travel demand model assignments, when compared against the 2010 travel demand model assignments, grow at approximately 0.9 percent per year. The 2050 travel demand model assignments, when compared against the 2013 traffic volume counts, grow at approximately 0.5 percent per year.¹ The Study Team projected the Existing Geometry Without Development Alternative traffic volumes using a 0.70 percent increase per year to account for background traffic growth. This resulted in a 14 percent increase applied to 2017 turning-movement volumes to obtain 2037 turning-movement volumes at the seven study intersections.

Figure 5.03-3 illustrates the 2037 peak-hour turning movement volumes used for the Existing Geometry Without Development analysis.

¹ The 2013 traffic volume counts are higher than the 2010 demand model assignments, and, therefore, there is less growth between 2013 and 2050.

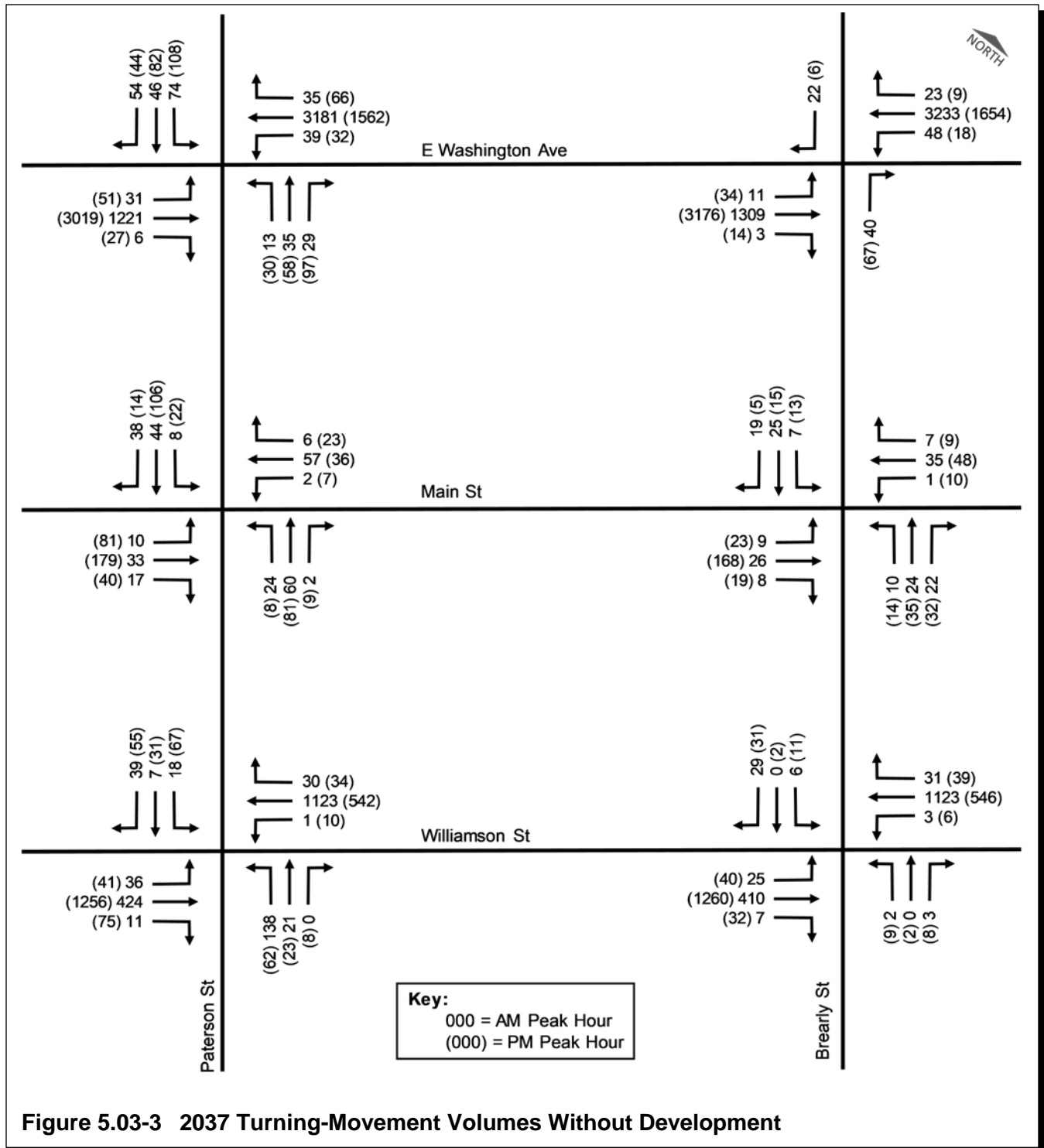


Figure 5.03-3 2037 Turning-Movement Volumes Without Development

B. Traffic Operations–2037 Existing Geometry Without Development

Table 5.03-2 summarizes the operations modeling results for the 2037 Existing Geometry morning and evening peak hours without the development. The modeling reports are provided in Appendix F. Summary tables of all the modeling scenarios are included in Appendix I.

Location	2037 Existing Geometry Intersection Operations					
	AM Peak Hour			PM Peak Hour		
	Overall LOS	LOS E Movement (s)	LOS F Movement (s)	Overall LOS	LOS E Movement (s)	LOS F Movement (s)
E Washington Avenue and Paterson Street (Signalized)	B	EBL	---	B	---	---
E Washington Avenue and Brearly Street (Unsignalized)	F	---	EBL, SBR	F	---	NBR, WBL
E Washington Avenue and Ingersoll Street (Signalized)	B	---	---	B	---	---
Main Street and Paterson Street (Unsignalized)	A	---	---	A	---	---
Main Street and Brearly Street (Unsignalized)	A	---	---	A	---	---
Williamson Street and Paterson Street (Signalized)	B	---	---	B	---	---
Williamson Street and Brearly Street (Unsignalized)	D	---	---	F	---	NBL/T/R

Notes:
 EBL = eastbound left

Table 5.03-2 2037 Existing Geometry Without Development Traffic Operations

1. 2037 AM Peak Hour Operations–Without Development
 - a. East Washington Avenue and Paterson Street

The signalized East Washington Avenue and Paterson Street intersection will operate at LOS B with a maximum V/C ratio of 0.88. The westbound through movements will operate at LOS B with 95th and 50th percentile queues of approximately 485 feet and 335 feet, respectively. The 95th percentile queues represent the length expected to be exceeded during 5 percent of the weekday peak hours. The 50th percentile queues represent average peak-hour conditions, so queues will sometimes be shorter and sometimes be longer. The Brearly Street intersection is located about 540 feet east of the East Washington Avenue and Paterson Street intersection, so the longest through queues in the westbound direction would not block the Brearly Street intersection based on HCM 6 results. SimTraffic microsimulation model observations show longer westbound queues, reaching the Brearly Street intersection at times.

The eastbound left-turn movement deteriorates with background traffic growth and is projected to operate at LOS E with 95th percentile queues of approximately 50 feet.

SimTraffic microsimulation model observations indicate that this queueing would spill out of the existing 115-foot storage bay at times.

b. East Washington Avenue and Brearly Street

The side-street stop-controlled East Washington Avenue and Brearly Street intersection will operate at LOS F with a maximum V/C ratio of 0.66. The eastbound left-turn and southbound right-turn movements operate at LOS F with 95th percentile queues of less than 45 feet without the proposed site traffic. SimTraffic microsimulation observations indicate similar operational conditions.

c. East Washington Avenue and Ingersoll Street

The signalized East Washington Avenue and Ingersoll Street intersection will operate at LOS B with a maximum V/C ratio of 0.91. The westbound through movement is projected to operate at LOS B with 95th and 50th percentile queues of approximately 555 feet and 395 feet, respectively. The Few Street intersection is located about 575 feet east of the East Washington Avenue and Ingersoll Street intersection, so the westbound longest through queues may reach the Few Street intersection on rare occasions. The eastbound left-turn will operate at LOS D with 95th percentile queues of approximately 25 feet. SimTraffic microsimulation observations indicate that the westbound through queueing generally would clear during each signal cycle, and the eastbound left-turn queueing would be stored within the existing turn bay.

d. Main Street and Paterson Street

The all-way stop-controlled Main Street and Paterson Street intersection will operate at LOS A with a maximum V/C ratio of 0.12. All the movements have 95th percentile queues of 25 feet or less.

e. Main Street and Brearly Street

The all-way stop-controlled Main Street and Brearly Street intersection will operate at LOS A with a maximum V/C ratio 0.09. All of the movements would have 95th percentile queues of 25 feet or less.

f. Williamson Street and Paterson Street

The signalized Williamson Street and Paterson Street intersection operates at LOS B with a maximum V/C ratio of 0.66. The westbound movements would have 95th percentile queues of approximately 205 feet.

g. Williamson Street and Brearly Street

The side-street stop-controlled Williamson Street and Brearly Street intersection LOS deteriorates with the added background traffic and would operate at LOS D with a

maximum V/C ratio of 0.22. While the LOS deteriorates, all the movements would have 95th percentile queues of less than 25 feet. SimTraffic microsimulation observations indicate similar operations.

2. 2037 PM Peak Hour Operations–Without Development

a. East Washington Avenue and Paterson Street.

The signalized East Washington Avenue and Paterson Street intersection is projected to operate at LOS B with a maximum V/C ratio of 0.86. The eastbound through movements will operate at LOS B with 95th and 50th percentile queues of approximately 465 feet and 360 feet, respectively. The 95th and 50th percentile queues would not block the Livingston Street intersection (based on HCM 6 results). SimTraffic microsimulation model observations indicate that this queueing generally would clear during each signal cycle.

The westbound left-turn movement would deteriorate and operate at LOS D with 95th percentile queues of approximately 40 feet. SimTraffic microsimulation observations indicate that this queuing extends beyond the existing 150-foot storage bay without the proposed site traffic.

b. East Washington Avenue and Brearly Street

The side-street stop controlled East Washington Avenue and Brearly Street intersection will operate at LOS F with a maximum V/C ratio of 0.90 without the proposed site traffic. The northbound right-turn movement would operate at LOS F with 95th percentile queues of approximately 115 feet. The westbound left-turn movement operates at LOS F with 95th percentile queues of approximately 55 feet. SimTraffic microsimulation observations indicate similar queueing results.

c. East Washington Avenue and Ingersoll Street

The signalized East Washington Avenue and Ingersoll Street intersection would operate at LOS B with a maximum V/C ratio of 0.98. All movements operate at LOS D or better with 95th percentile queues of 215 feet or less. These queues are not expected to block adjacent intersections. SimTraffic observations indicate the northbound right-turn queuing spills out of the existing turn-bay.

d. Main Street and Paterson Street

The all-way stop-controlled Main Street and Paterson Street intersection will operate at LOS A with a maximum V/C ratio of 0.42. All the movements have 95th percentile queues of 50 feet or less.

e. Main Street and Brearly Street

The all-way stop-controlled Main Street and Brearly Street intersection will operate at LOS A with a maximum V/C ratio 0.30. All the movements have 95th percentile queues of 35 feet or less.

f. Williamson Street and Paterson Street

The signalized Williamson Street and Paterson Street intersection will operate at LOS B with a maximum V/C ratio of 0.64. The westbound movements are projected to operate at LOS A with 95th percentile queues of 205 feet. SimTraffic microsimulation model observations indicate that the westbound to southbound left-turn movement causes some queues because of the restricted single shared lane on westbound Williamson Street during the PM peak hours, but this queueing would not reach the Brearly Street intersection.

g. Williamson Street and Brearly Street

The side-street stop-controlled Williamson Street and Brearly Street intersection will operate at LOS F with a maximum V/C ratio of 0.39. The northbound movements operate at LOS F with 95th percentile queues of approximately 35 feet. SimTraffic microsimulation model observations indicate the northbound queues are less than two vehicles.

6.01 PEDESTRIANS AND BICYCLES

The proposed redevelopment plan would maintain and upgrade pedestrian accommodations surrounding the site. Additionally, the parking area layout would prioritize pedestrian movements.

The surrounding bicycle network would be maintained. Archipelago Village would include a substantial amount of new bicycle parking to address code requirements. Additionally, Archipelago Village will investigate the possibility of hosting a B-Cycle rental bike station. Planned uses for the site, such as the specialty hotel, could benefit from convenient and available bicycle transportation.

6.02 TRANSIT

Because the site is adjacent to East Washington Avenue, it would maintain relatively high transit service levels with development.

The development will create higher densities for both households and employment. This in turn could provide more potential for ridership. It may also help provide the higher density/trip making potential that would support BRT implementation.

6.03 MOTOR VEHICLES

A. Site Access Configuration

Figure 6.03-1 illustrates the proposed access configuration of the site. By having access points on all streets bordering the site, development traffic is distributed more evenly to the adjacent road network. The proposed site provides four new access points; North Access on East Washington Avenue (right-in/right out), East Access on Brearly Street, South Access on Main Street, and West Access on Paterson Street. The East, West, and South Access points provide full access at their respective locations. They are stop-controlled on the exiting approaches with a single shared left/right exiting lane.

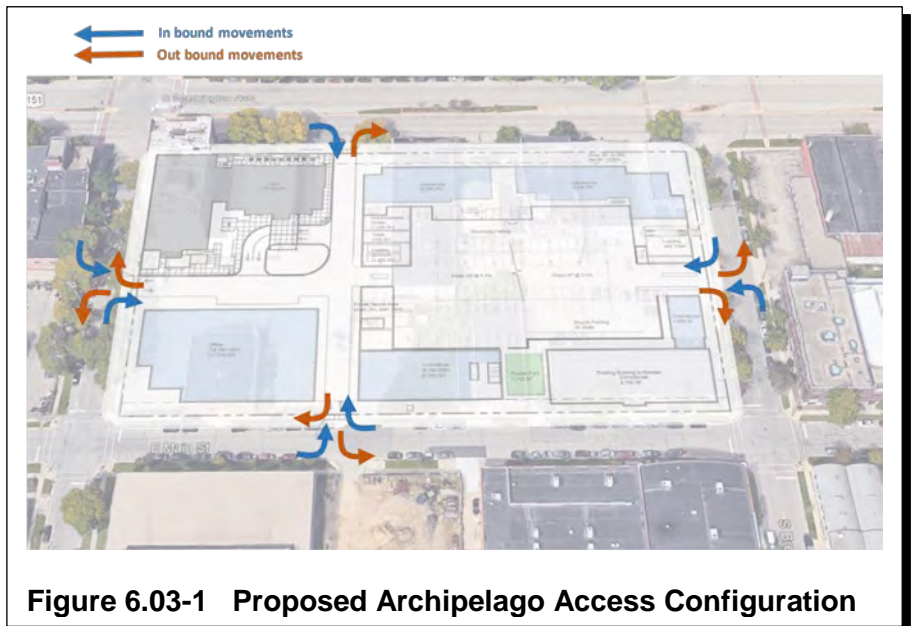


Figure 6.03-1 Proposed Archipelago Access Configuration

On-street parking would need to be restricted for 100 feet or so adjacent to the driveways to provide adequate sight distance for entering and exiting vehicles.

B. Traffic Volumes

As mentioned in Section 2 of this report, the development volumes were generated using the *ITE Trip Generation Manual*, 10th Edition and a 30 percent reduction. Figure 6.03-2 shows the 2037 Existing Geometry With Development volumes.

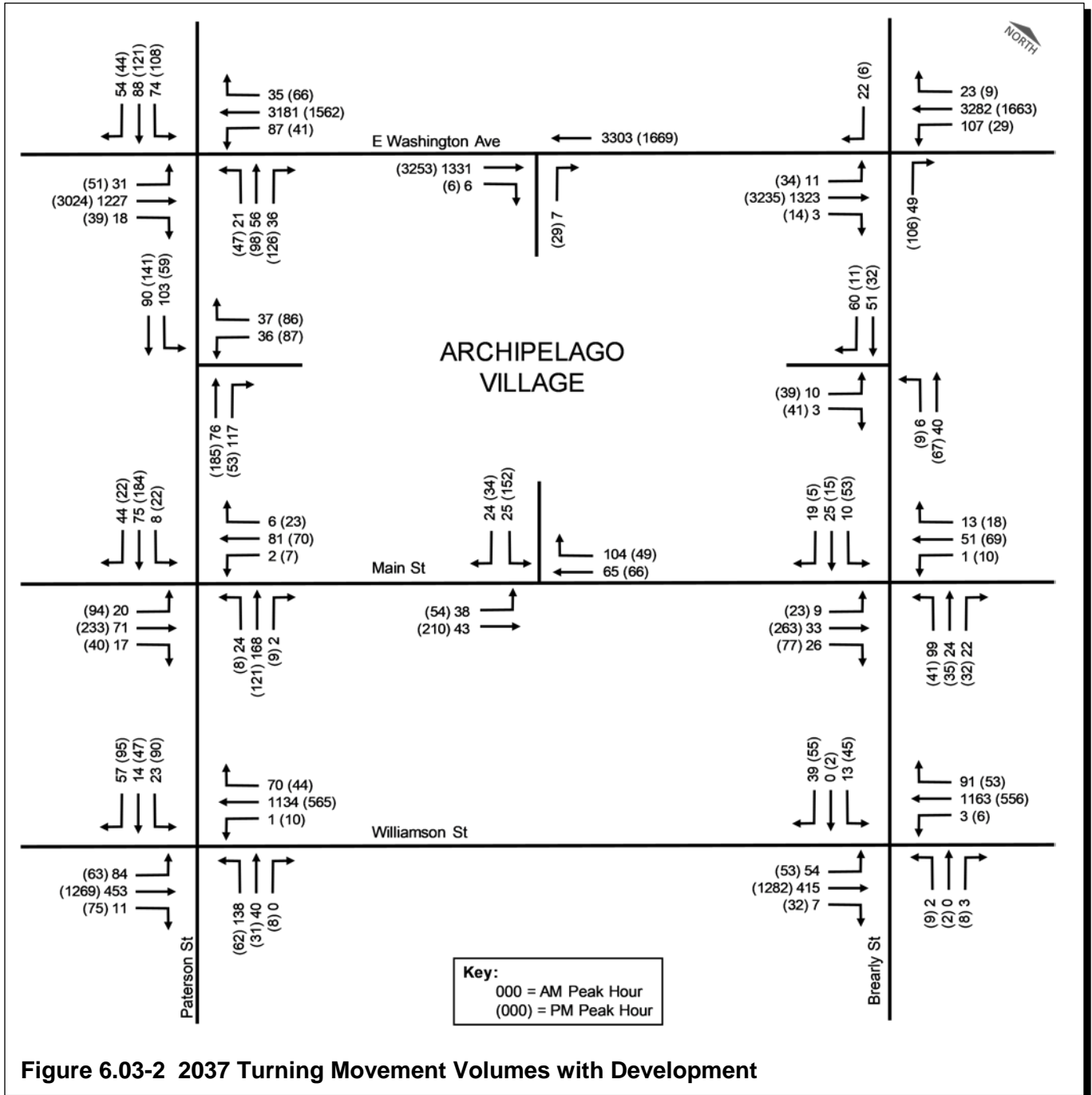


Figure 6.03-2 2037 Turning Movement Volumes with Development

C. Traffic Operations–2037 Existing Geometry With Development

Tables 6.03-1 and 6.03-2 summarize and compare the intersection operations with existing geometry without development, and with existing geometry with development. The modeling reports are provided in Appendix G. Summary tables of all the modeling scenarios are included in Appendix I.

Location	2037 Existing Geometry w/o and w/ Development Intersection Operations					
	AM Peak Hour w/o Development			AM Peak Hour w/Development		
	Overall LOS (s)	LOS E Movement (s)	LOS F Movement (s)	Overall LOS (s)	LOS E Movement (s)	LOS F Movement (s)
E Washington Avenue and Paterson Street (Signalized)	B (12)	EBL (57)	---	B (13)	EBL (60)	---
E Washington Avenue and Brearly Street (Unsignalized)	F (>150)	---	EBL (>150) SBR (94)	F (>150)	---	EBL (>150) SBR (98)
E Washington Avenue and Ingersoll Street (Signalized)	B (12)	---	---	B (13)	---	---
Main Street and Paterson Street (Unsignalized)	A (8)	---	---	A (9)	---	---
Main Street and Brearly Street (Unsignalized)	A (8)	---	---	A (9)	---	---
Williamson Street and Paterson Street (Signalized)	B (11)	---	---	B (15)	---	---
Williamson Street and Brearly Street (Unsignalized)	D (30)	---	---	F (71)	---	SBL/T/R (71)
North Access (Unsignalized)	NA	NA	NA	C (16)	---	---
East Access (Unsignalized)	NA	NA	NA	A (9)	---	---
South Access (Unsignalized)	NA	NA	NA	A (10)	---	---
West Access (Unsignalized)	NA	NA	NA	B (11)	---	---

Table 6.03-1 2037 AM Peak Hour Operations, With and Without Development

Location	2037 Existing Geometry w/o and w/ Development Intersection Operations					
	PM Peak Hour w/o Development			PM Peak Hour w/ Development		
	Overall LOS (s)	LOS E Movement (s)	LOS F Movement (s)	Overall LOS (s)	LOS E Movement (s)	LOS F Movement (s)
E Washington Avenue and Paterson Street (Signalized)	B (13)	---	---	B (16)	---	---
E Washington Avenue and Brearly Street (Unsignalized)	F (>150)	---	WBL (>150) NBR (>150)	F (>150)	---	WBL (>150) NBR (>150)
E Washington Avenue and Ingersoll Street (Signalized)	B (11)	---	---	B (13)	SBL/T/R (57)	---
Main Street and Paterson Street (Unsignalized)	A (10)	---	---	B (13)	---	---
Main Street and Brearly Street (Unsignalized)	A (9)	---	---	B (11)	---	---
Williamson Street and Paterson Street (Signalized)	B (11)	---	---	B (14)	---	---
Williamson Street and Brearly Street (Unsignalized)	F (118)	---	NBL/T/R (118)	F (>150)	---	NBL/T/R (>150) SBL/T/R (94)
North Access (Unsignalized)	NA	NA	NA	F (95)	---	NBR (95)
East Access (Unsignalized)	NA	NA	NA	A (9)	---	---
South Access (Unsignalized)	NA	NA	NA	B (14)	---	---
West Access (Unsignalized)	NA	NA	NA	B (13)	---	---

Table 6.03-2 2037 PM Peak Hour Operations, With and Without Development

1. 2037 AM Peak Hour Operations–With Development

a. East Washington Avenue and Paterson Street.

The signalized East Washington Avenue and Paterson Street intersection would operate at LOS B with a maximum V/C ratio of 0.90. The westbound through movements operate at LOS B with 95th and 50th percentile queues of approximately 535 feet and 380 feet, respectively. The 95th percentile queues represent the length expected to be exceeded during 5 percent of the weekday peak hours. The 50th percentile queues represent average peak-hour conditions, so queues will sometimes be shorter and sometimes be longer. The 95th percentile westbound queues may extend into the Brearly Street intersection, which is located about 540 feet east of the East Washington Avenue and Paterson Street intersection. SimTraffic microsimulation model observations indicate that this queueing would clear during each signal cycle.

The eastbound left-turn movement would operate at LOS E with 95th percentile queues of approximately 50 feet. The northbound movements would operate at LOS D with 95th and 50th percentile queues of approximately 130 feet and 70 feet, respectively. The West Access intersection is located about 150 feet south of the East Washington Avenue and Paterson Street intersection, so the longest northbound queues may reach the West Access intersection leading to internal exiting queues.

SimTraffic microsimulation model observations indicate that the eastbound left-turn queueing would be stored within the existing 115 feet storage bay. The observations also indicate the northbound queueing would generally clear during each signal cycle.

b. East Washington Avenue and Brearly Street

The side-street stop-controlled East Washington Avenue and Brearly Street intersection would operate at LOS F with a maximum V/C ratio of 0.75. The eastbound left-turn movement operates at LOS F with 95th percentile queues of approximately 50 feet. The southbound right-turn movement operates at LOS F with 95th percentile queues of approximately 40 feet. SimTraffic microsimulation model observations indicate the queueing from these two LOS F movements would be stored within the existing turn bays/lanes.

c. East Washington Avenue and Ingersoll Street

The signalized East Washington Avenue and Ingersoll Street intersection would operate at LOS B with a maximum V/C ratio of 0.93. The westbound through movement would operate at LOS B with 95th and 50th percentile queues of approximately 590 feet and 425 feet, respectively. The Few Street intersection is located about 575 feet east of the East Washington Avenue and Ingersoll Street intersection, so the westbound longest through queue may extend into the Few Street intersection. SimTraffic microsimulation model observations indicate that this queueing would generally clear during each signal cycle.

d. Main Street and Paterson Street

The all-way stop-controlled Main Street and Paterson Street intersection would operate at LOS A with a maximum V/C ratio of 0.29. All the movements have 95th percentile queues of 30 feet or less.

e. Main Street and Brearly Street

The all-way stop-controlled Main Street and Brearly Street intersection would operate at LOS A with a maximum V/C ratio 0.24. All the movements have 95th percentile queues of 25 feet or less.

f. Williamson Street and Paterson Street

The signalized Williamson Street and Paterson Street intersection would operate at LOS B with a maximum V/C ratio of 0.77. The westbound movements have 95th percentile queues of approximately 220 feet.

The eastbound movements would operate at LOS B with 95th and 50th percentile queues of approximately 365 feet and 180 feet, respectively. The Livingston Street intersection is located about 580 feet west of the Williamson Street and Paterson

Street intersection. SimTraffic microsimulation model observations indicate that the eastbound queues may block the Livingston Street intersection because of the single eastbound-shared lane available during the AM peak hours. It is worth noting that under field conditions the eastbound through traffic will be able to bypass one or two left-turning vehicles; therefore, the SimTraffic microsimulation model may be overstating the queue lengths.

g. Williamson Street and Brearly Street

The side-street stop-controlled Williamson Street and Brearly Street intersection operates at LOS F with a maximum V/C ratio of 0.54. The southbound movements operate at LOS F with 95th percentile queues of approximately 65 feet. SimTraffic microsimulation model observations indicate that the southbound queues are six vehicles or less.

h. Archipelago Village North Access

The North Access intersection is unsignalized, and operates at LOS C with a maximum V/C ratio of 0.02. All the movements have 95th percentile queues of less than 25 feet.

i. Archipelago Village East Access

The East Access intersection is unsignalized, and operates at LOS A with a maximum V/C ratio of 0.02. All the movements have 95th percentile queues of less than 25 feet.

j. Archipelago Village South Access

The South Access intersection is unsignalized, and operates at LOS B with a maximum V/C ratio of 0.07. All the movements have 95th percentile queues of less than 25 feet.

k. Archipelago Village West Access

The West Access intersection is unsignalized, and operates at LOS B with a maximum V/C ratio of 0.12. All the movements have 95th percentile queues of less than 25 feet.

2. 2037 PM Peak-Hour Operations–With Development

a. East Washington Avenue and Paterson Street.

The signalized East Washington Avenue and Paterson Street intersection would operate at LOS B with a maximum V/C ratio of 0.90. The eastbound through movements would operate at LOS B with 95th and 50th percentile queues of approximately 535 feet and 420 feet, respectively. The 95th percentile queues may extend into the Livingston Street intersection. SimTraffic microsimulation model

observations indicate that this queueing would generally clear during each signal cycle.

The westbound left-turn movement operates at LOS D with 95th percentile queues of approximately 55 feet. The northbound movements operate at LOS D with 95th and 50th percentile queues of approximately 270 feet and 165 feet, respectively. The West Access intersection is located approximately 150 feet south of the East Washington Avenue and Paterson Street intersection, so the northbound average and longest queues may block the West Access intersection leading to internal exiting queues. SimTraffic microsimulation model observations indicate that the westbound left-turn queueing would be stored within the existing 150-foot storage bay, and the northbound queueing may block the West Access intersection.

b. East Washington Avenue and Brearly Street

The side-street stop controlled East Washington Avenue and Brearly Street intersection would operate at LOS F with a maximum V/C ratio of 1.48. The northbound right-turn movement would operate at LOS F with 95th percentile queues of approximately 225 feet. The East Access intersection is located approximately 150 feet south of the East Washington Avenue and Brearly Street intersection, so the northbound queueing may block the East Access intersection, which could lead to internal exiting queues. The westbound left-turn movement operates at LOS F with 95th percentile queues of approximately 90 feet. The existing westbound left-turn storage bay is approximately 75 feet, so the 95th percentile queues may extend beyond the turn bay. SimTraffic microsimulation model observations indicate the northbound queue may block the East Access, and the and westbound left-turn queue would be stored within the existing turn bay.

c. East Washington Avenue and Ingersoll Street

The signalized East Washington Avenue and Ingersoll Street intersection would operate at LOS B with a maximum V/C ratio of 0.99. The eastbound through movement would operate at LOS B with 95th and 50th percentile queues of approximately 200 feet and 110 feet, respectively. The northbound right turn operates at LOS D with 95th and 50th percentile queues of approximately 70 feet and 35 feet, respectively. SimTraffic microsimulation model observations indicate that the eastbound queueing would generally clear during each signal cycle.

d. Main Street and Paterson Street

The Main Street and Paterson Street intersection operates at LOS B with a maximum V/C ratio of 0.57. All the movements operate at LOS B or better with 95th percentile queues of less than 100 feet.

e. Main Street and Brearly Street

The Main Street and Brearly Street intersection operates at LOS B with a maximum V/C ratio 0.55. All the movements operate at LOS B or better with 95th percentile queues of less than 100 feet.

f. Williamson Street and Paterson Street

The signalized Williamson Street and Paterson Street intersection would operate at LOS B with a maximum V/C ratio of 0.78. The westbound movements would operate at LOS A with 95th percentile queues of 225 feet. SimTraffic microsimulation model observations indicate that the westbound left-turn movement causes some queues because of the restricted single shared lane available during the PM peak hours, but this queueing would not reach the Brearly Street intersection. It is worth noting that under field conditions, the westbound through traffic will be able to bypass one or two left-turning vehicles, therefore the SimTraffic microsimulation model may be overstating the queue lengths.

g. Williamson Street and Brearly Street

The side-street stop controlled Williamson Street and Brearly Street intersection would operate at LOS F with a maximum V/C ratio of 0.79. The northbound movements would operate at LOS F with 95th percentile queues of approximately 45 feet. The southbound movements would operate at LOS F with 95th percentile queues of approximately 120 feet. Observation of the SimTraffic microsimulation model indicates the northbound and southbound queues are six vehicles or less.

h. Archipelago Village North Access

The North Access intersection would operate at LOS F with a maximum V/C ratio of 0.45. The northbound right-turn movement would operate at LOS F with 95th percentile queues of 45 feet or less. SimTraffic microsimulation model observations indicate this internal queueing could be two vehicles or less.

i. Archipelago Village East Access

The East Access intersection would operate at LOS A with a maximum V/C ratio of 0.09. All of the movements have 95th percentile queues of less than 25 feet. SimTraffic microsimulation model observations indicate this internal queueing could be four vehicles or less.

j. Archipelago Village South Access

The South Access intersection would operate at LOS B with a maximum V/C ratio of 0.33. All the movements have 95th percentile queues of less than 35 feet. SimTraffic

microsimulation model observations indicate this internal queueing could be four vehicles or less.

k. Archipelago Village West Access

The West Access intersection would operate at LOS B with a maximum V/C ratio of 0.29. All the movements have 95th percentile queues of less than 30 feet. SimTraffic microsimulation model observations indicate that the northbound through movement and exiting westbound movements may experience delays/queues because of the northbound queuing at the East Washington Avenue and Paterson Street intersection.

**SECTION 7
RECOMMENDATIONS**

7.01 PEDESTRIAN AND BICYCLE IMPROVEMENTS

If or when the proposed signalization of the East Washington Avenue and Brearly Street occurs the Study Team recommends pedestrian signal heads and push buttons at this intersection. No additional alternatives are proposed external to the site.

Based on the City’s requirements for off-street parking, Table 7.01-1 shows the bicycle parking spaces for this development site assuming shared use. Archipelago Village LLC is working with the City to determine the appropriate number of bicycle parking spaces. As of February 18, 2019, the proposed bicycle parking at build-out is 200 spaces.

Specified Land Use	Off-Street Parking Requirements	Shared Parking Calc	
		Daytime Use	Evening Use
High-Turnover (Sit-Down) Restaurant	5% of capacity of persons	8	9
Quality Restaurant	5% of capacity of persons	20	25
General Retail	1 per 2,000 sf	34	34
Hospital/Clinic	1 per 5 employees	2	2
General Office Building	1 per 2,000 sf	136	
Hotel	1 per 10 bedrooms	13	25
Apartment	1/unit up to 2 bedrooms; 1 guest space per 10 units	59	235
Totals		271	330
Mixed use/local trip rates reduction (-30%)		-81	-99
Adjusted Totals		190	231

Off-Street Parking Requirements from the City of Madison.

Table 7.01-1 Archipelago Village Bicycle Parking

7.02 TRANSIT

The site has high levels of transit service, which will grow higher if BRT is implemented. Archipelago Village will work with the City to determine the appropriate transit accommodations for the site.

7.03 MOTOR VEHICLES

Figures 7.03-1 and 7.03-2 graphically illustrate the operational challenges associated in the roadway network surrounding Archipelago Village. Many of these challenges currently exist, or would exist even without the Archipelago Village development as a result of background traffic growth alone. Appendix H includes the recommendations modeling reports and Appendix I includes the summary tables for all scenarios.

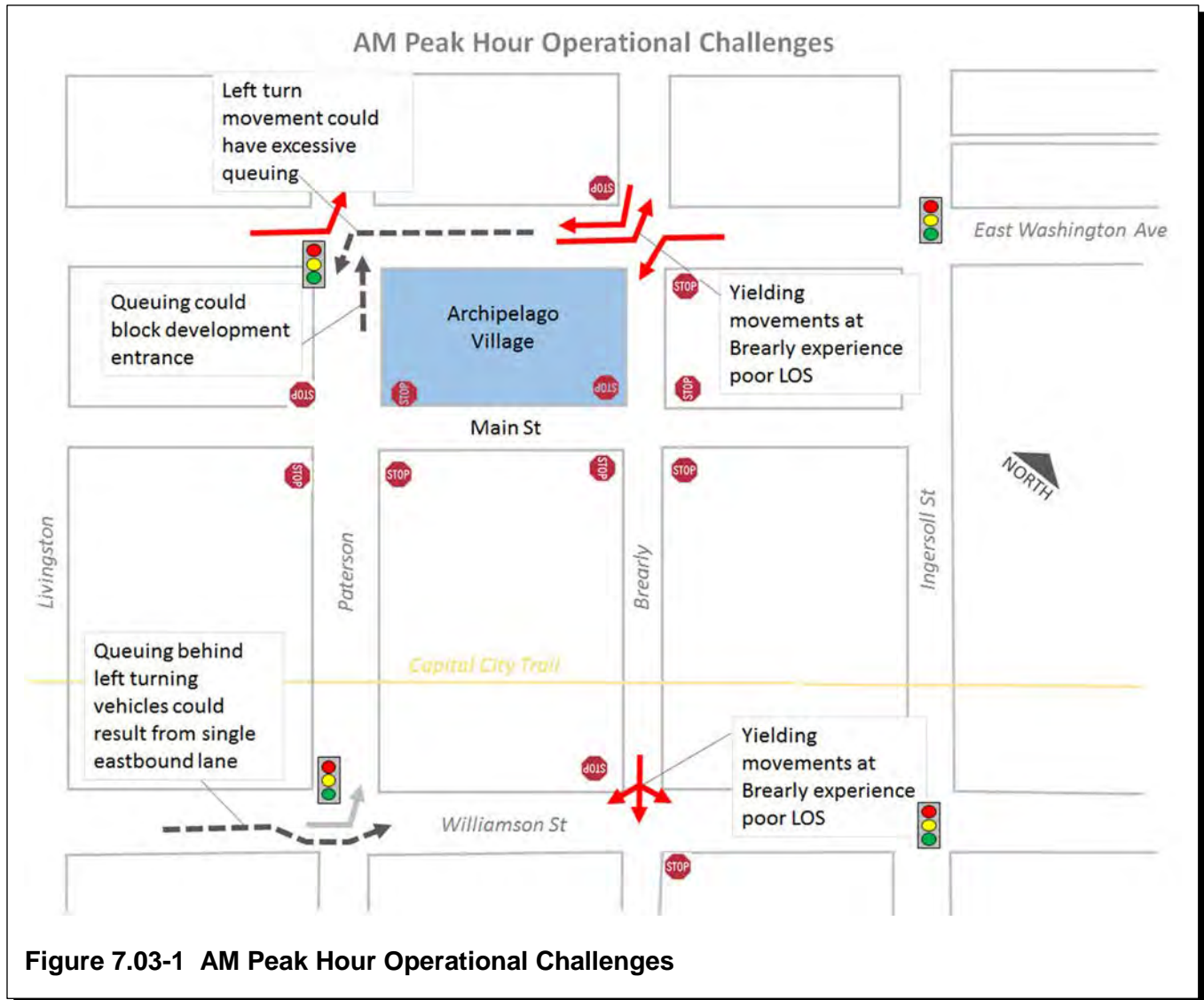


Figure 7.03-1 AM Peak Hour Operational Challenges

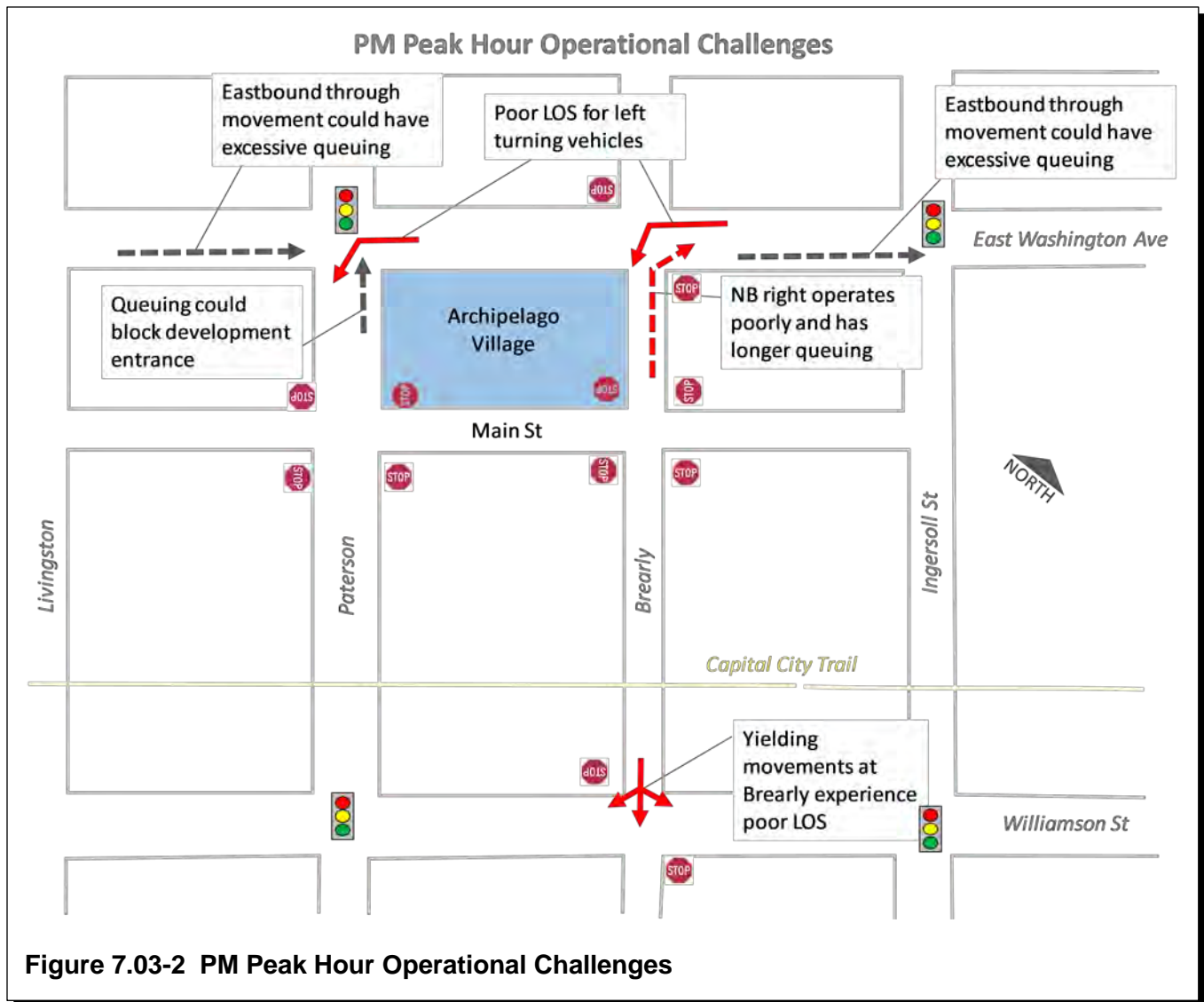


Figure 7.03-2 PM Peak Hour Operational Challenges

1. East Washington Avenue and Paterson Street

The traffic modeling indicates that sometime between 2017 and 2037 queuing will become more substantial for a few movements with or without the proposed development site. As noted previously, some movements in the AM and PM may approach or reach upstream intersections, or exceed the existing storage length.

The Study Team recommends adding a northbound left-turn bay at the intersection of East Washington Avenue and Paterson Street. This left turn bay could be accomplished by restricting parking on the northern 200 feet of Paterson Street. With this treatment, all movements operate at LOS D or better during the AM and PM peak hours. Table 7.03-1 shows the AM and PM traffic modeling results of this alternative.

AM PEAK							
Control	Signal Control						
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	21	38.3	D	0.10	25	8.2
	NBT	56	37.5	D	0.36	100	
	NBR	36					
Eastbound	EBL	31	20.3	C	0.31	35	Intersection LOS
	EBT	1227	5.9	A	0.38	135	
	EBR	18	4.2	A	0.02	25	
Southbound	SBL	74	41.7	D	0.35	85	A
	SBT	88	36.8	D	0.30	95	
	SBR	54	36.2	D	0.23	60	
Westbound	WBL	87	3.4	A	0.29	25	Max Movement V/C
	WBT	3181	6.1	A	0.94	95	0.94
	WBR	35	0.1	A	0.03		
Operations:							HCM 6

PM PEAK							
Control	Signal Control						
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	47	33.4	C	0.15	45	11.8
	NBT	98	34.4	C	0.56	220	
	NBR	126					
Eastbound	EBL	51	9.3	A	0.24	25	Intersection LOS
	EBT	3024	8.6	A	0.94	175	
	EBR	39	2.7	A	0.04	25	
Southbound	SBL	108	43.0	D	0.49	125	B
	SBT	121	30.9	C	0.27	110	
	SBR	44	29.6	C	0.12	40	
Westbound	WBL	41	50.8	D	0.49	50	Max Movement V/C
	WBT	1562	9.5	A	0.49	230	0.94
	WBR	66	6.8	A	0.07	25	
Operations:							HCM 6

Table 7.03-1 2037 East Washington Avenue and Paterson Street Traffic Modeling Results, with Recommended Improvements

2. East Washington Avenue and Brearly Street

The traffic modeling of existing conditions indicates that some yielding movements at the stop-controlled intersection operate at LOS F during the AM and PM peak hours today. The eastbound left-turn and southbound right-turn movements operate at LOS F during the AM peak hour, and

the northbound right-turn and westbound left-turn movements operate at LOS F during the PM peak hour. Operations deteriorate with or without the proposed traffic from Archipelago Village.

The Study Team recommends a partial signal similar to the one at Livingston Street that would provide signal control for the eastbound and westbound left turns at this intersection. Signalizing these left turns would also allow a northbound and southbound right-turn overlap, addressing the queuing concerns. Because this intersection prohibits north and southbound through movements, the signal could be coordinated with adjacent signals and minimize the impact of the time taken away from the East Washington Avenue coordinated through movements.

Adding a signal improves operations to LOS A during the AM and PM peak hours. All individual movements operate at LOS D or better during the AM and PM peak hours. Table 7.03-2 shows the traffic modeling results of this alternative including the 50th and 95th percentile queues.

AM PEAK							
Control	Signal Control						
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL						4.2
	NBT						
	NBR	49	38.7	D	0.03	25	
Eastbound	EBL	11	44.3	D	0.18	25	Intersection LOS
	EBT	1323	2.9	A	0.40	95	
	EBR	3	1.9	A	0.00		
Southbound	SBL						A
	SBT						
	SBR	22	46.2	D	0.04	30	
Westbound	WBL	107	51.0	D	0.57	90	Max Movement V/C
	WBT	3282	2.3	A	0.87	25	
	WBR	23	0.0	A	0.02		
Operations:							HCM 2000

PM PEAK							
Control	Signal Control						
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL						4.5
	NBT						
	NBR	106	44.5	D	0.51	105	
Eastbound	EBL	34	42.3	D	0.40	30	Intersection LOS
	EBT	3235	3.9	A	0.86	170	
	EBR	14	1.0	A	0.01	25	
Southbound	SBL						A
	SBT						
	SBR	6	44.9	D	0.00		
Westbound	WBL	29	37.6	D	0.17	40	Max Movement V/C
	WBT	1663	1.6	A	0.42	100	
	WBR	9	0.9	A	0.01	25	
Operations:							HCM 2000

Table 7.03-2 2037 East Washington Avenue and Brearly Street Traffic Modeling Results, with Recommended Improvement

3. East Washington Avenue and Ingersoll Street

Traffic modeling indicates that sometime between 2017 and 2037 queueing will become more substantial for a few movements with or without traffic from Archipelago Village. The westbound and eastbound queueing may reach the upstream intersections during the AM and PM peak

hours, respectively. Despite the LOS E movement during the PM peak hour, overall LOS remains acceptable with the development traffic. Because the overall intersection operation is acceptable, the Study Team recommends no additional improvements to the intersection of East Washington Avenue and Ingersoll Street. Table 7.03-3 shows the traffic modeling results of this alternative including the 50th and 95th percentile queues.

AM PEAK								
Control	Signal Control							
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)	
Northbound	NBL	30	41.1	D	0.30	90	14.5	
	NBT	52						
	NBR	50	38.1	D				
Eastbound	EBL	22	48.9	D	0.29	30		
	EBT	1301	7.2	A	0.40	165		Intersection LOS
	EBR	50	5.4	A	0.05	25		
Southbound	SBL	54	44.7	D	0.49	125	B	
	SBT	30						
	SBR	22						
Westbound	WBL	51	5.0	A	0.16	25	Max Movement V/C	
	WBT	3361	15.6	B	0.93	590	0.93	
	WBR	48	3.4	A	0.04	25		
Operations:							HCM 6	
PM PEAK								
Control	Signal Control							
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)	
Northbound	NBL	52	38.2	D	0.34	100	9.8	
	NBT	46						
	NBR	68						35.4
Eastbound	EBL	38	1.0	A	0.17	25		
	EBT	3217	8.6	A	0.99	110		Intersection LOS
	EBR	87	0.1	A	0.09			
Southbound	SBL	96	56.9	E	0.75	225	A	
	SBT	43						
	SBR	36						
Westbound	WBL	41	4.7	A	0.28	25	Max Movement V/C	
	WBT	1612	5.3	A	0.45	165	0.99	
	WBR	43	3.6	A	0.04	25		
Operations:							HCM 6	

Table 7.03-3 2037 East Washington Avenue and Ingersoll Street Traffic Modeling Results, with Recommended Improvements

4. Main Street and Paterson Street

The Main Street and Paterson Street intersection will operate acceptably as an all-way stop-controlled intersection. No further improvements are recommended.

5. Main Street and Brearly Street

The Main Street and Brearly Street intersection will operate acceptably as an all-way stop-controlled intersection. No further improvements are recommended.

6. Williamson Street and Paterson Street

The traffic modeling indicates that sometime between 2017 and 2037 queueing will become more substantial for the eastbound movements during the AM peak hour. These queues may reach the Livingston Street intersection upstream. As noted previously, the eastbound through traffic will be able to bypass one or two left-turning vehicles under field conditions. Despite the queueing, overall LOS remain acceptable with the development traffic.

The Study Team recommends extending the eastbound no parking restriction on the corner of Williamson Street to the west/upstream, which would help eastbound through vehicles bypass left-turning traffic during the AM peak hour. The Study Team coded a 50-foot turn bay to resemble the no parking restriction in the operations model, and this modification reduced the eastbound queues by about 50 percent during the AM peak hour.

AM PEAK							
Control	Signal Control						
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	138	44.7	D	0.76	205	12.7
	NBT	40					
	NBR	0					
Eastbound	EBL	84	14.7	B	0.48	70	Intersection LOS
	EBT	453	7.2	A	0.42	160	
	EBR	11					
Southbound	SBL	23	27.6	C	0.18	60	B
	SBT	14					
	SBR	57					
Westbound	WBL	1	8.8	A	0.59	245	Max Movement V/C
	WBT	1134	8.8	A	0.59	245	0.76
	WBR	70	8.8	A	0.59	245	
Operations:							HCM 2000

PM PEAK							
Control	Signal Control						
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	62	30.9	C	0.42	95	15.1
	NBT	31					
	NBR	8					
Eastbound	EBL	63	10.1	B	0.69	285	Intersection LOS
	EBT	1269	10.1	B	0.69	285	
	EBR	75					
Southbound	SBL	90	42.4	D	0.74	220	B
	SBT	47					
	SBR	95					
Westbound	WBL	10	13.7	B	0.53	385	Max Movement V/C
	WBT	565					0.74
	WBR	44					
Operations:							HCM 2000

Table 7.03-4 Williamson Street and Paterson Street 2037 Traffic Modeling Results, with Recommended Improvements

7. Williamson Street and Brearly Street

The existing conditions traffic modeling indicates that some yielding movements at the stop-controlled intersection operate at LOS F during the AM and PM peak hour. In 2037, all southbound movements operate at LOS F during the AM and PM peak hours, and all the

northbound movements operate at LOS F during the PM peak hour. Because of the close spacing of signals on Williamson Street, the Study Team does not recommend signaling the Williamson Street and Brearly Street intersection. Delays associated with this intersection may cause some travelers to use alternate intersections, such as Ingersoll Street, to access Williamson Street. Table 7.03-5 shows the traffic modeling results of this alternative.

AM PEAK							
Control	Two Way Stop Control						
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Max Delay (s)
Northbound	NBL	2	28.6	D	0.04	25	65.9
	NBT	0					
	NBR	3					
Eastbound	EBL	54	13.8	B	0.13	25	Intersection LOS
	EBT	415					
	EBR	7					
Southbound	SBL	13	65.9	F	0.51	60	F
	SBT	0					
	SBR	39					
Westbound	WBL	3	8.3	A	0.00		Max Movement V/C
	WBT	1163					
	WBR	91					
Operations:							HCM 6

PM PEAK							
Control	Two Way Stop Control						
Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Max Delay (s)
Northbound	NBL	9	>150	F	0.50	45	>150
	NBT	2					
	NBR	8					
Eastbound	EBL	53	9.2	A	0.06	25	Intersection LOS
	EBT	1282					
	EBR	32					
Southbound	SBL	45	93.8	F	0.79	120	F
	SBT	2					
	SBR	55					
Westbound	WBL	6	12.3	B	0.01		Max Movement V/C
	WBT	556					
	WBR	53					
Operations:							HCM 6

Table 7.03-5 Williamson Street and Brearly Street 2037 Traffic Modeling Results, with Recommended Improvements

8. North Access and East Washington Avenue

The Study Team recommends an eastbound parking restriction on East Washington Avenue for about 150 feet to provide adequate sight distance for exiting vehicles.

9. East Access and Brearly Street

The Study Team recommends restricting parking on the west side of the street and shifting the centerline marking four feet to the west. This would allow through vehicles and cyclists the opportunity to travel around northbound vehicles making a left into the Archipelago Village parking lot.

10. South Access and Main Street.

The Study Team recommends restricting parking on the north side of the street and shifting the centerline marking four feet to the north. This would allow through vehicles and cyclists the opportunity to travel around eastbound vehicles making a left into the Archipelago Village parking lot.

11. West Access and Paterson Street.

The study team recommends restricting parking on both sides of the street to allow for a northbound left-turn lane at the East Washington Avenue intersection, and to provide a southbound left-turn refuge for vehicles turning into the Archipelago Village parking lot. This likely will require a 50-foot northbound left-turn storage bay at East Washington, a 75-foot taper, and a 25-foot left-turn bay for the Archipelago Village parking lot.

APPENDIX A
ARCHIPELAGO VILLAGE SITE PLAN





Site Plan Overlay: Phase 1
929 E. Washington Avenue - 2016.36.00
December 19, 2018



Site Plan Overlay: Phase 2
929 E. Washington Avenue - 2016.36.00
December 19, 2018

APPENDIX B
2017 RAW PEAK HOUR TRAFFIC VOLUMES

Archipelago Village TIA

2017 Raw Volumes

February 2019

AM PEAK

	47	42	67	
27	E Washington Ave / Paterson St			33
1108				2930
5				35
	12	33	27	

	12	0	0	
10	E Washington Ave / Brearly St			18
1148				2588
3				42
	0	0	19	

	29	26	47	
19	E Washington Ave / Ingersonll St			42
1089				2953
44				45
	41	46	44	

	31	37	7	
8	Main St / Paterson St			5
31				48
12				2
	18	47	2	

	15	28	4	
6	Main St / Brearly St			10
19				31
5				2
	7	18	11	

	37	7	18	
35	Williamson St / Paterson St			28
378				997
10				1
	121	20	0	

	14	0	2	
22	Williamson St / Brearly St			42
356				979
5				3
	1	0	3	

PM PEAK

	39	48	95	
45	E Washington Ave / Paterson St			58
2534				1372
12				22
	24	46	80	

	13	0	0	
30	E Washington Ave / Brearly St			8
2709				1592
7				16
	0	0	64	

	22	38	84	
33	E Washington Ave / Ingersonll St			38
2753				1222
76				36
	36	40	60	

	16	108	25	
74	Main St / Paterson St			22
142				35
39				8
	9	71	10	

	5	17	18	
18	Main St / Brearly St			5
152				42
15				7
	12	31	28	

	47	27	61	
27	Williamson St / Paterson St			23
1107				487
66				11
	54	16	7	

	30	2	12	
29	Williamson St / Brearly St			26
1105				463
28				5
	4	2	7	

APPENDIX C
ITE TRIP GENERATION FOR CONSTELLATION

Constellation Trip Generation
Archipelago Village TIA
March 28, 2017

ITE Trip Generation Calculation for Constellation

ITE Landuse for Constellation	Given Units	Unit	Daily Rate	Daily Trips	AM Peak Hour		PM Peak Hour	
					Hour Rate	Trips	Hour Rate	Trips
Apartment	218	Dwelling	6.65	1450	0.51	112	0.62	136
High-Turnover (Sit-Down) Restaurant	15.0	1000 GSF	127.15	1908	10.81	--	9.85	148
Drinking Place	3.5	1000 GSF	15.49	55	--	--	11.34	40
Coffee/Donut Shop with Drive-Through Window	3.5	1000 GSF	818.58	2866	100.58	353	42.8	150
Medical-Dental Office Building	3.5	1000 GSF	36.13	127	2.39	9	3.57	13
General Office Building ¹	7.0	1000 GSF	11.03	78	1.56	11	1.49	11

1 - Includes financial, and software engineering offices.

Calculated ITE Trip Gen Manual Development Trips for Constellation:	6,484	485	498
Observed Trip Generation from Constellation:		142	123
Observed as a Percentage of Calculated :		29%	25%

APPENDIX D
ITE TRIP GENERATION FOR ARCHIPELAGO VILLAGE

Specified Land Use	ITE Land Use Code	Given Units	Unit	Daily Rate	AM Peak Hour Distribution			PM Peak Hour Distribution			Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
					Hour Rate	% In	% Out	Hour Rate	% In	% Out		AM In	AM Out	Trips	PM In	PM Out	Trips
High-Turnover (Sit-Down) Restaurant	932	5.0	1000 GSF	112.18	9.94	55%	45%	9.77	62%	38%	561	28	22	50	30	19	49
Quality Restaurant	931	10.0	1000 GSF	83.34	--	--	--	7.80	67%	33%	834	--	--	--	52	26	78
General Office Building	710	374.0	1000 GSF	9.74	1.16	86%	14%	1.15	16%	84%	3643	373	61	434	69	362	431
Hotel	310	144	Rooms	8.36	0.47	59%	41%	0.60	51%	49%	1204	40	28	68	44	43	87
Multifamily Housing (High Rise)	222	152	DUs	4.45	0.31	24%	76%	0.36	61%	39%	677	12	36	48	34	21	55
Shopping Mall	820	26.5	1000 GLA	37.75	0.94	62%	38%	3.81	48%	52%	1001	16	9	25	48	53	101
Clinic	630	26.5	1000 GSF	38.16	3.69	78%	22%	3.28	29%	71%	1012	76	22	98	25	62	87
Total Trips:											8,932	545	178	723	302	586	888
30% Reduction											(2,680)	(164)	(53)	(217)	(91)	(176)	(266)
Total New Development Trips:											6,252	382	125	506	211	410	622

APPENDIX E
2017 EXISTING CONDITIONS HCM REPORTS

HCM 6th Signalized Intersection Summary
 15: Paterson St. & East Washington Ave.

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	1071	5	34	2790	31	11	31	25	65	40	47
Future Volume (veh/h)	27	1071	5	34	2790	31	11	31	25	65	40	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.98		0.96	0.98		0.96
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	1796	1796	1796	1870	1870	1870	1752	1752	1752	1841	1841	1841
Adj Flow Rate, veh/h	29	1152	5	37	3000	33	12	33	27	70	43	51
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	7	7	7	2	2	2	10	10	10	4	4	4
Cap, veh/h	103	3730	1126	405	3884	1171	59	104	72	259	229	186
Arrive On Green	0.76	0.76	0.76	0.76	0.76	0.76	0.13	0.12	0.12	0.13	0.12	0.12
Sat Flow, veh/h	74	4904	1480	485	5106	1539	137	833	582	1298	1841	1496
Grp Volume(v), veh/h	29	1152	5	37	3000	33	72	0	0	70	43	51
Grp Sat Flow(s),veh/h/ln	74	1635	1480	485	1702	1539	1553	0	0	1298	1841	1496
Q Serve(g_s), s	37.7	7.3	0.1	2.6	34.1	0.5	0.0	0.0	0.0	0.0	2.1	3.1
Cycle Q Clear(g_c), s	71.8	7.3	0.1	9.9	34.1	0.5	4.1	0.0	0.0	3.9	2.1	3.1
Prop In Lane	1.00		1.00	1.00		1.00	0.17		0.37	1.00		1.00
Lane Grp Cap(c), veh/h	103	3730	1126	405	3884	1171	251	0	0	259	229	186
V/C Ratio(X)	0.28	0.31	0.00	0.09	0.77	0.03	0.29	0.00	0.00	0.27	0.19	0.27
Avail Cap(c_a), veh/h	103	3730	1126	405	3884	1171	462	0	0	442	488	397
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.97	0.97	0.97	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.8	3.7	2.9	5.3	6.9	2.9	40.0	0.0	0.0	39.2	39.3	39.7
Incr Delay (d2), s/veh	6.5	0.2	0.0	0.4	1.5	0.0	0.6	0.0	0.0	0.6	0.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	3.3	0.0	0.5	14.1	0.2	3.0	0.0	0.0	2.9	1.8	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.3	4.0	2.9	5.7	8.5	3.0	40.7	0.0	0.0	39.7	39.7	40.5
LnGrp LOS	C	A	A	A	A	A	D	A	A	D	D	D
Approach Vol, veh/h		1186			3070			72			164	
Approach Delay, s/veh		4.7			8.4			40.7			39.9	
Approach LOS		A			A			D			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		81.1		18.9		81.1		18.9				
Change Period (Y+Rc), s		5.0		6.5		5.0		6.5				
Max Green Setting (Gmax), s		62.0		26.5		62.0		26.5				
Max Q Clear Time (g_c+I1), s		73.8		5.9		36.1		6.1				
Green Ext Time (p_c), s		0.0		0.6		21.8		0.2				
Intersection Summary												
HCM 6th Ctrl Delay			9.1									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary
 15: Paterson St. & East Washington Ave.

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗		↕		↘	↑	↗
Traffic Volume (veh/h)	45	2648	24	28	1370	58	26	51	85	95	72	39
Future Volume (veh/h)	45	2648	24	28	1370	58	26	51	85	95	72	39
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.98		0.96	0.98		0.95
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	1885	1885	1885	1870	1870	1870	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	46	2702	24	29	1398	59	27	52	87	97	73	40
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	292	3646	1095	112	3617	1087	71	106	149	266	333	269
Arrive On Green	0.71	0.71	0.71	0.71	0.71	0.71	0.19	0.18	0.18	0.19	0.18	0.18
Sat Flow, veh/h	367	5147	1545	105	5106	1534	165	601	843	1240	1885	1521
Grp Volume(v), veh/h	46	2702	24	29	1398	59	166	0	0	97	73	40
Grp Sat Flow(s),veh/h/ln	367	1716	1545	105	1702	1534	1609	0	0	1240	1885	1521
Q Serve(g_s), s	5.7	32.2	0.5	23.5	11.0	1.2	2.5	0.0	0.0	1.0	3.3	2.2
Cycle Q Clear(g_c), s	16.7	32.2	0.5	55.8	11.0	1.2	9.1	0.0	0.0	10.2	3.3	2.2
Prop In Lane	1.00		1.00	1.00		1.00	0.16		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	292	3646	1095	112	3617	1087	342	0	0	266	333	269
V/C Ratio(X)	0.16	0.74	0.02	0.26	0.39	0.05	0.49	0.00	0.00	0.36	0.22	0.15
Avail Cap(c_a), veh/h	292	3646	1095	112	3617	1087	481	0	0	376	500	403
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.70	0.70	0.70	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.2	9.0	4.3	26.1	5.9	4.4	37.5	0.0	0.0	37.4	35.3	34.8
Incr Delay (d2), s/veh	0.8	1.0	0.0	5.5	0.3	0.1	1.1	0.0	0.0	0.8	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.9	14.1	0.2	1.3	5.9	0.6	6.8	0.0	0.0	4.0	2.8	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.0	9.9	4.3	31.6	6.2	4.5	38.6	0.0	0.0	38.3	35.6	35.1
LnGrp LOS	B	A	A	C	A	A	D	A	A	D	D	D
Approach Vol, veh/h		2772			1486			166			210	
Approach Delay, s/veh		9.9			6.6			38.6			36.7	
Approach LOS		A			A			D			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		75.8		24.2		75.8		24.2				
Change Period (Y+Rc), s		5.0		6.5		5.0		6.5				
Max Green Setting (Gmax), s		62.0		26.5		62.0		26.5				
Max Q Clear Time (g_c+I1), s		34.2		12.2		57.8		11.1				
Green Ext Time (p_c), s		21.1		0.7		3.0		0.6				

Intersection Summary		
HCM 6th Ctrl Delay		11.1
HCM 6th LOS		B

HCM 6th TWSC
2: Brearly St & East Washington Ave.

02/12/2019

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑	↗			↖			↗
Traffic Vol, veh/h	10	1148	3	42	2836	20	0	0	35	0	0	19
Future Vol, veh/h	10	1148	3	42	2836	20	0	0	35	0	0	19
Conflicting Peds, #/hr	3	0	6	6	0	3	0	0	2	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	50	75	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	2	2	2	1	1	1	1	1	1
Mvmt Flow	11	1248	3	46	3083	22	0	0	38	0	0	21

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	3108	0	0	1257	0	0	-	-	632	-	-	1548
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.44	-	-	5.34	-	-	-	-	7.12	-	-	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.17	-	-	3.12	-	-	-	-	3.91	-	-	3.91
Pot Cap-1 Maneuver	30	-	-	294	-	-	0	0	365	0	0	89
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	30	-	-	293	-	-	-	-	363	-	-	89
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	1.6		0.3		16.1		57.3	
HCM LOS					C		F	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	363	30	-	-	293	-	-	89
HCM Lane V/C Ratio	0.105	0.362	-	-	0.156	-	-	0.232
HCM Control Delay (s)	16.1	181.9	-	-	19.5	-	-	57.3
HCM Lane LOS	C	F	-	-	C	-	-	F
HCM 95th %tile Q(veh)	0.3	1.2	-	-	0.5	-	-	0.8

HCM 6th TWSC
2: Brearly St & East Washington Ave.

02/12/2019

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑	↗			↗			↗
Traffic Vol, veh/h	30	2786	12	16	1451	8	0	0	59	0	0	5
Future Vol, veh/h	30	2786	12	16	1451	8	0	0	59	0	0	5
Conflicting Peds, #/hr	13	0	7	7	0	13	0	0	8	0	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	50	75	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	1	1	1
Mvmt Flow	31	2843	12	16	1481	8	0	0	60	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1502	0	0	2862	0	0	-	-	1437	-	-	761
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.32	-	-	5.34	-	-	-	-	7.12	-	-	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.11	-	-	3.12	-	-	-	-	3.91	-	-	3.91
Pot Cap-1 Maneuver	225	-	-	45	-	-	0	0	106	0	0	300
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	223	-	-	45	-	-	-	-	105	-	-	295
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			1.4			77.7			17.4		
HCM LOS							F			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	105	223	-	-	45	-	-	295
HCM Lane V/C Ratio	0.573	0.137	-	-	0.363	-	-	0.017
HCM Control Delay (s)	77.7	23.7	-	-	125	-	-	17.4
HCM Lane LOS	F	C	-	-	F	-	-	C
HCM 95th %tile Q(veh)	2.7	0.5	-	-	1.3	-	-	0.1

HCM 6th Signalized Intersection Summary
 17: Ingersoll St. & East Washington Ave.

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗		↑	↗		↘	
Traffic Volume (veh/h)	19	1120	44	45	2853	42	26	46	44	47	26	19
Future Volume (veh/h)	19	1120	44	45	2853	42	26	46	44	47	26	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	20	1179	46	47	3003	44	27	48	46	49	27	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	109	3674	1141	452	4027	1250	96	128	161	108	48	27
Arrive On Green	1.00	1.00	1.00	0.03	0.79	0.79	0.13	0.10	0.10	0.13	0.10	0.10
Sat Flow, veh/h	76	5106	1585	1781	5106	1585	465	1262	1585	531	470	263
Grp Volume(v), veh/h	20	1179	46	47	3003	44	75	0	46	96	0	0
Grp Sat Flow(s),veh/h/ln	76	1702	1585	1781	1702	1585	1727	0	1585	1265	0	0
Q Serve(g_s), s	13.5	0.0	0.0	0.6	30.2	0.6	0.0	0.0	2.7	4.3	0.0	0.0
Cycle Q Clear(g_c), s	36.8	0.0	0.0	0.6	30.2	0.6	3.8	0.0	2.7	8.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.36		1.00	0.51		0.21
Lane Grp Cap(c), veh/h	109	3674	1141	452	4027	1250	267	0	161	214	0	0
V/C Ratio(X)	0.18	0.32	0.04	0.10	0.75	0.04	0.28	0.00	0.29	0.45	0.00	0.00
Avail Cap(c_a), veh/h	109	3674	1141	578	4027	1250	323	0	214	264	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.9	0.0	0.0	2.8	5.4	2.3	41.6	0.0	41.6	43.7	0.0	0.0
Incr Delay (d2), s/veh	3.7	0.2	0.1	0.0	1.3	0.1	0.6	0.0	1.0	1.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	0.1	0.0	0.3	11.6	0.3	3.1	0.0	2.0	4.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.6	0.2	0.1	2.8	6.7	2.3	42.2	0.0	42.6	45.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	A
Approach Vol, veh/h		1245			3094			121				96
Approach Delay, s/veh		0.4			6.6			42.3				45.2
Approach LOS		A			A			D				D
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.9	76.5		16.6		83.4		16.6				
Change Period (Y+Rc), s	4.0	4.5		6.5		4.5		6.5				
Max Green Setting (Gmax), s	10.0	61.5		13.5		75.5		13.5				
Max Q Clear Time (g_c+I1), s	2.6	38.8		5.8		32.2		10.1				
Green Ext Time (p_c), s	0.0	8.0		0.2		32.4		0.1				

Intersection Summary

HCM 6th Ctrl Delay	6.7
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 17: Ingersoll St. & East Washington Ave.

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑	↗		↑	↗		↖	↗
Traffic Volume (veh/h)	33	2736	76	36	1397	38	46	40	60	84	38	32
Future Volume (veh/h)	33	2736	76	36	1397	38	46	40	60	84	38	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	35	2880	80	38	1471	40	48	42	63	88	40	34
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	287	3393	1053	173	3731	1158	163	123	253	147	60	40
Arrive On Green	1.00	1.00	1.00	0.03	0.73	0.73	0.18	0.16	0.16	0.18	0.16	0.16
Sat Flow, veh/h	346	5106	1585	1781	5106	1585	678	771	1585	571	377	252
Grp Volume(v), veh/h	35	2880	80	38	1471	40	90	0	63	162	0	0
Grp Sat Flow(s),veh/h/ln	346	1702	1585	1781	1702	1585	1449	0	1585	1200	0	0
Q Serve(g_s), s	0.8	0.0	0.0	0.6	10.9	0.7	0.0	0.0	3.5	8.8	0.0	0.0
Cycle Q Clear(g_c), s	5.1	0.0	0.0	0.6	10.9	0.7	5.1	0.0	3.5	13.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.53		1.00	0.54		0.21
Lane Grp Cap(c), veh/h	287	3393	1053	173	3731	1158	322	0	253	277	0	0
V/C Ratio(X)	0.12	0.85	0.08	0.22	0.39	0.03	0.28	0.00	0.25	0.59	0.00	0.00
Avail Cap(c_a), veh/h	287	3393	1053	323	3731	1158	331	0	262	285	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.2	0.0	0.0	4.3	5.1	3.7	36.7	0.0	36.8	41.5	0.0	0.0
Incr Delay (d2), s/veh	0.9	2.9	0.1	0.2	0.3	0.1	0.5	0.0	0.5	2.9	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(95%),veh/ln	0.1	1.6	0.1	0.4	5.6	0.4	3.5	0.0	2.5	7.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.0	2.9	0.1	4.5	5.4	3.8	37.2	0.0	37.3	44.4	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	A
Approach Vol, veh/h		2995			1549			153				162
Approach Delay, s/veh		2.8			5.3			37.2				44.4
Approach LOS		A			A			D				D
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.6	71.0		22.4		77.6		22.4				
Change Period (Y+Rc), s	4.0	4.5		6.5		4.5		6.5				
Max Green Setting (Gmax), s	11.0	57.5		16.5		72.5		16.5				
Max Q Clear Time (g_c+I1), s	2.6	7.1		7.1		12.9		15.9				
Green Ext Time (p_c), s	0.0	35.6		0.4		10.3		0.0				

Intersection Summary

HCM 6th Ctrl Delay	6.1
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	29	15	2	50	5	21	53	2	7	39	33
Future Vol, veh/h	9	29	15	2	50	5	21	53	2	7	39	33
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	4	4	4
Mvmt Flow	10	33	17	2	57	6	24	61	2	8	45	38
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	7.6	7.7	7.9	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	28%	17%	4%	9%
Vol Thru, %	70%	55%	88%	49%
Vol Right, %	3%	28%	9%	42%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	76	53	57	79
LT Vol	21	9	2	7
Through Vol	53	29	50	39
RT Vol	2	15	5	33
Lane Flow Rate	87	61	66	91
Geometry Grp	1	1	1	1
Degree of Util (X)	0.104	0.072	0.079	0.104
Departure Headway (Hd)	4.297	4.264	4.348	4.121
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	820	844	827	875
Service Time	2.394	2.272	2.356	2.121
HCM Lane V/C Ratio	0.106	0.072	0.08	0.104
HCM Control Delay	7.9	7.6	7.7	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	0.2	0.3	0.3

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	71	157	35	6	32	20	7	71	8	19	93	12
Future Vol, veh/h	71	157	35	6	32	20	7	71	8	19	93	12
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	3	3	3
Mvmt Flow	76	169	38	6	34	22	8	76	9	20	100	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10	8.1	8.6	9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	27%	10%	15%
Vol Thru, %	83%	60%	55%	75%
Vol Right, %	9%	13%	34%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	86	263	58	124
LT Vol	7	71	6	19
Through Vol	71	157	32	93
RT Vol	8	35	20	12
Lane Flow Rate	92	283	62	133
Geometry Grp	1	1	1	1
Degree of Util (X)	0.125	0.355	0.08	0.179
Departure Headway (Hd)	4.851	4.516	4.629	4.844
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	736	795	771	739
Service Time	2.898	2.55	2.677	2.888
HCM Lane V/C Ratio	0.125	0.356	0.08	0.18
HCM Control Delay	8.6	10	8.1	9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	1.6	0.3	0.6

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	23	7	1	31	6	9	21	19	6	22	17
Future Vol, veh/h	8	23	7	1	31	6	9	21	19	6	22	17
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	10	10	10	9	9	9	3	3	3	2	2	2
Mvmt Flow	11	31	9	1	41	8	12	28	25	8	29	23
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	7.6	7.6	7.4	7.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	18%	21%	3%	13%
Vol Thru, %	43%	61%	82%	49%
Vol Right, %	39%	18%	16%	38%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	49	38	38	45
LT Vol	9	8	1	6
Through Vol	21	23	31	22
RT Vol	19	7	6	17
Lane Flow Rate	65	51	51	60
Geometry Grp	1	1	1	1
Degree of Util (X)	0.072	0.06	0.059	0.066
Departure Headway (Hd)	3.976	4.257	4.219	3.959
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	891	833	841	895
Service Time	2.044	2.322	2.285	2.028
HCM Lane V/C Ratio	0.073	0.061	0.061	0.067
HCM Control Delay	7.4	7.6	7.6	7.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.2	0.2	0.2	0.2

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	147	17	9	42	8	12	31	28	11	13	4
Future Vol, veh/h	20	147	17	9	42	8	12	31	28	11	13	4
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	4	4	4	2	2	2	1	1	1	1	1	1
Mvmt Flow	24	175	20	11	50	10	14	37	33	13	15	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

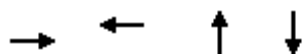
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.8	7.8	7.9	7.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	17%	11%	15%	39%
Vol Thru, %	44%	80%	71%	46%
Vol Right, %	39%	9%	14%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	71	184	59	28
LT Vol	12	20	9	11
Through Vol	31	147	42	13
RT Vol	28	17	8	4
Lane Flow Rate	85	219	70	33
Geometry Grp	1	1	1	1
Degree of Util (X)	0.103	0.261	0.086	0.043
Departure Headway (Hd)	4.402	4.295	4.384	4.657
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	816	841	819	770
Service Time	2.421	2.295	2.401	2.678
HCM Lane V/C Ratio	0.104	0.26	0.085	0.043
HCM Control Delay	7.9	8.8	7.8	7.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	1	0.3	0.1

Queues

20: Paterson St & Williamson St

02/12/2019



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	455	1112	153	62
v/c Ratio	0.42	0.49	0.62	0.23
Control Delay	7.4	7.2	42.1	16.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.4	7.2	42.1	16.9
Queue Length 50th (ft)	92	126	70	10
Queue Length 95th (ft)	147	168	130	43
Internal Link Dist (ft)	756	583	253	907
Turn Bay Length (ft)				
Base Capacity (vph)	1096	2289	272	299
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.42	0.49	0.56	0.21

Intersection Summary

HCM Signalized Intersection Capacity Analysis

20: Paterson St & Williamson St

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	32	372	10	1	985	26	121	18	0	16	6	34
Future Volume (vph)	32	372	10	1	985	26	121	18	0	16	6	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frbp, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			1.00			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		1830			3521			1798			1541	
Flt Permitted		0.88			0.95			0.77			0.92	
Satd. Flow (perm)		1611			3363			1452			1438	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	35	409	11	1	1082	29	133	20	0	18	7	37
RTOR Reduction (vph)	0	1	0	0	2	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	454	0	0	1110	0	0	153	0	0	32	0
Confl. Peds. (#/hr)	10		5	5		10	2		10	10		2
Confl. Bikes (#/hr)			4						3			2
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	1%	1%	1%	10%	10%	10%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4 3			4 3	
Permitted Phases	2			2			4 3			4 3		
Actuated Green, G (s)		54.4			54.4			17.6			17.6	
Effective Green, g (s)		54.4			54.4			14.6			14.6	
Actuated g/C Ratio		0.68			0.68			0.18			0.18	
Clearance Time (s)		4.0			4.0							
Vehicle Extension (s)		5.0			5.0							
Lane Grp Cap (vph)		1095			2286			264			262	
v/s Ratio Prot												
v/s Ratio Perm		0.28			0.33			0.11			0.02	
v/c Ratio		0.41			0.49			0.58			0.12	
Uniform Delay, d1		5.7			6.1			29.9			27.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.2			0.7			4.9			0.4	
Delay (s)		6.9			6.9			34.8			27.8	
Level of Service		A			A			C			C	
Approach Delay (s)		6.9			6.9			34.8			27.8	
Approach LOS		A			A			C			C	

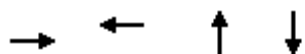
Intersection Summary

HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues

20: Paterson St & Williamson St

02/12/2019



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1255	535	84	139
v/c Ratio	0.55	0.42	0.38	0.54
Control Delay	7.4	6.8	32.6	31.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.4	6.8	32.6	31.5
Queue Length 50th (ft)	140	99	35	49
Queue Length 95th (ft)	204	168	75	102
Internal Link Dist (ft)	756	583	253	907
Turn Bay Length (ft)				
Base Capacity (vph)	2280	1264	269	306
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.55	0.42	0.31	0.45

Intersection Summary

HCM Signalized Intersection Capacity Analysis

20: Paterson St & Williamson St

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕↕			↕↕	
Traffic Volume (vph)	36	1102	66	9	475	30	54	20	7	59	27	48
Future Volume (vph)	36	1102	66	9	475	30	54	20	7	59	27	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			1.00			1.00			1.00	
Frbp, ped/bikes		1.00			0.99			0.99			0.98	
Flpb, ped/bikes		1.00			1.00			0.99			0.98	
Frt		0.99			0.99			0.99			0.95	
Flt Protected		1.00			1.00			0.97			0.98	
Satd. Flow (prot)		3523			1854			1769			1691	
Flt Permitted		0.93			0.98			0.78			0.87	
Satd. Flow (perm)		3271			1815			1417			1502	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	38	1148	69	9	495	31	56	21	7	61	28	50
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	26	0
Lane Group Flow (vph)	0	1250	0	0	533	0	0	80	0	0	113	0
Confl. Peds. (#/hr)	35		20	20		35	10		30	30		10
Confl. Bikes (#/hr)			6			3			2			1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4 3			4 3	
Permitted Phases	2			2			4 3			4 3		
Actuated Green, G (s)		55.6			55.6			16.4			16.4	
Effective Green, g (s)		55.6			55.6			13.4			13.4	
Actuated g/C Ratio		0.70			0.70			0.17			0.17	
Clearance Time (s)		4.0			4.0							
Vehicle Extension (s)		5.0			5.0							
Lane Grp Cap (vph)		2273			1261			237			251	
v/s Ratio Prot												
v/s Ratio Perm		c0.38			0.29			0.06			c0.08	
v/c Ratio		0.55			0.42			0.34			0.45	
Uniform Delay, d1		6.0			5.3			29.4			30.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.0			1.0			1.8			2.7	
Delay (s)		7.0			6.3			31.1			32.7	
Level of Service		A			A			C			C	
Approach Delay (s)		7.0			6.3			31.1			32.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

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	22	360	6	3	985	27	2	0	3	5	0	25
Future Vol, veh/h	22	360	6	3	985	27	2	0	3	5	0	25
Conflicting Peds, #/hr	12	0	3	3	0	12	1	0	6	6	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	3	3	3	2	2	2	50	50	50	1	1	1
Mvmt Flow	25	404	7	3	1107	30	2	0	3	6	0	28

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	1149	0	0	414
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.145	-	-	4.13
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.2285	-	-	2.219
Pot Cap-1 Maneuver	601	-	-	1143
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	595	-	-	1140
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0	20	22.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	246	595	-	-	1140	-	-	243
HCM Lane V/C Ratio	0.023	0.042	-	-	0.003	-	-	0.139
HCM Control Delay (s)	20	11.3	0	-	8.2	0	-	22.2
HCM Lane LOS	C	B	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.5

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	35	1105	28	5	479	34	8	2	7	10	2	27
Future Vol, veh/h	35	1105	28	5	479	34	8	2	7	10	2	27
Conflicting Peds, #/hr	26	0	9	9	0	26	11	0	15	15	0	11
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	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	36	1139	29	5	494	35	8	2	7	10	2	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	555	0	0	1177	0	0	1783	1800	608	1206	1797	549
Stage 1	-	-	-	-	-	-	1235	1235	-	548	548	-
Stage 2	-	-	-	-	-	-	548	565	-	658	1249	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.315	6.515	6.915	7.315	6.515	6.215
Critical Hdwy Stg 1	-	-	-	-	-	-	6.515	5.515	-	6.115	5.515	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.115	5.515	-	6.515	5.515	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5095	4.0095	3.3095	3.5095	4.0095	3.3095
Pot Cap-1 Maneuver	1019	-	-	596	-	-	58	80	442	150	80	537
Stage 1	-	-	-	-	-	-	189	249	-	522	518	-
Stage 2	-	-	-	-	-	-	522	509	-	422	245	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	997	-	-	592	-	-	48	69	433	127	69	521
Mov Cap-2 Maneuver	-	-	-	-	-	-	48	69	-	127	69	-
Stage 1	-	-	-	-	-	-	168	222	-	458	500	-
Stage 2	-	-	-	-	-	-	482	492	-	364	218	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.6			0.1			62.2			22.6		
HCM LOS							F			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	80	997	-	-	592	-	-	244
HCM Lane V/C Ratio	0.219	0.036	-	-	0.009	-	-	0.165
HCM Control Delay (s)	62.2	8.7	0.4	-	11.1	0	-	22.6
HCM Lane LOS	F	A	A	-	B	A	-	C
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0	-	-	0.6

APPENDIX F
2037 EXISTING GEOMETRY WITHOUT DEVELOPMENT HCM REPORTS

HCM 6th Signalized Intersection Summary
 15: Paterson St. & East Washington Ave.

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑	↖	↖	↑↑↑	↖		↕		↖	↑	↖
Traffic Volume (veh/h)	31	1221	6	39	3181	35	13	35	29	74	46	54
Future Volume (veh/h)	31	1221	6	39	3181	35	13	35	29	74	46	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.98		0.96	0.98		0.96
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	1796	1796	1796	1870	1870	1870	1752	1752	1752	1841	1841	1841
Adj Flow Rate, veh/h	33	1313	6	42	3420	38	14	38	31	80	49	58
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	7	7	7	2	2	2	10	10	10	4	4	4
Cap, veh/h	85	3730	1126	352	3884	1171	60	103	72	251	229	186
Arrive On Green	0.76	0.76	0.76	0.76	0.76	0.76	0.13	0.12	0.12	0.13	0.12	0.12
Sat Flow, veh/h	48	4904	1480	416	5106	1539	145	825	578	1289	1841	1496
Grp Volume(v), veh/h	33	1313	6	42	3420	38	83	0	0	80	49	58
Grp Sat Flow(s),veh/h/ln	48	1635	1480	416	1702	1539	1548	0	0	1289	1841	1496
Q Serve(g_s), s	27.5	8.8	0.1	3.7	48.6	0.6	0.0	0.0	0.0	0.5	2.4	3.5
Cycle Q Clear(g_c), s	76.1	8.8	0.1	12.4	48.6	0.6	4.7	0.0	0.0	5.2	2.4	3.5
Prop In Lane	1.00		1.00	1.00		1.00	0.17		0.37	1.00		1.00
Lane Grp Cap(c), veh/h	85	3730	1126	352	3884	1171	250	0	0	251	229	186
V/C Ratio(X)	0.39	0.35	0.01	0.12	0.88	0.03	0.33	0.00	0.00	0.32	0.21	0.31
Avail Cap(c_a), veh/h	85	3730	1126	352	3884	1171	461	0	0	432	488	397
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.5	3.9	2.9	5.9	8.7	2.9	40.3	0.0	0.0	39.7	39.4	39.9
Incr Delay (d2), s/veh	12.2	0.2	0.0	0.7	3.2	0.1	0.8	0.0	0.0	0.7	0.5	0.9
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(95%),veh/ln	2.0	4.0	0.0	0.6	19.4	0.3	3.5	0.0	0.0	3.4	2.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.7	4.2	2.9	6.6	11.9	3.0	41.1	0.0	0.0	40.4	39.8	40.8
LnGrp LOS	E	A	A	A	B	A	D	A	A	D	D	D
Approach Vol, veh/h		1352			3500			83			187	
Approach Delay, s/veh		5.4			11.7			41.1			40.4	
Approach LOS		A			B			D			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		81.1		18.9		81.1		18.9				
Change Period (Y+Rc), s		5.0		6.5		5.0		6.5				
Max Green Setting (Gmax), s		62.0		26.5		62.0		26.5				
Max Q Clear Time (g_c+I1), s		78.1		7.2		50.6		6.7				
Green Ext Time (p_c), s		0.0		0.7		11.0		0.3				
Intersection Summary												
HCM 6th Ctrl Delay				11.6								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary
 15: Paterson St. & East Washington Ave.

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑	↖	↖	↑↑↑	↖		↕		↖	↑	↖
Traffic Volume (veh/h)	51	3019	27	32	1562	66	30	58	97	108	82	44
Future Volume (veh/h)	51	3019	27	32	1562	66	30	58	97	108	82	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.98		0.96	0.99		0.95
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	1885	1885	1885	1870	1870	1870	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	52	3081	28	33	1594	67	31	59	99	110	84	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	240	3573	1073	89	3545	1065	75	113	160	268	360	291
Arrive On Green	0.69	0.69	0.69	0.69	0.69	0.69	0.20	0.19	0.19	0.20	0.19	0.19
Sat Flow, veh/h	302	5147	1545	71	5106	1534	171	594	841	1221	1885	1525
Grp Volume(v), veh/h	52	3081	28	33	1594	67	189	0	0	110	84	45
Grp Sat Flow(s),veh/h/ln	302	1716	1545	71	1702	1534	1605	0	0	1221	1885	1525
Q Serve(g_s), s	9.2	45.6	0.6	23.8	13.9	1.4	3.7	0.0	0.0	1.9	3.8	2.5
Cycle Q Clear(g_c), s	23.1	45.6	0.6	69.4	13.9	1.4	10.5	0.0	0.0	12.3	3.8	2.5
Prop In Lane	1.00		1.00	1.00		1.00	0.16		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	240	3573	1073	89	3545	1065	364	0	0	268	360	291
V/C Ratio(X)	0.22	0.86	0.03	0.37	0.45	0.06	0.52	0.00	0.00	0.41	0.23	0.15
Avail Cap(c_a), veh/h	240	3573	1073	89	3545	1065	480	0	0	359	500	404
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.49	0.49	0.49	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.9	11.6	4.8	43.9	6.8	4.9	36.8	0.0	0.0	37.3	34.3	33.7
Incr Delay (d2), s/veh	1.0	1.5	0.0	2.6	0.1	0.0	1.1	0.0	0.0	1.0	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.2	18.6	0.3	1.6	7.5	0.7	7.7	0.0	0.0	4.6	3.2	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.0	13.2	4.8	46.5	6.9	4.9	38.0	0.0	0.0	38.3	34.6	34.0
LnGrp LOS	B	B	A	D	A	A	D	A	A	D	C	C
Approach Vol, veh/h		3161			1694			189				239
Approach Delay, s/veh		13.1			7.6			38.0				36.2
Approach LOS		B			A			D				D
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		74.4		25.6		74.4		25.6				
Change Period (Y+Rc), s		5.0		6.5		5.0		6.5				
Max Green Setting (Gmax), s		62.0		26.5		62.0		26.5				
Max Q Clear Time (g_c+I1), s		47.6		14.3		71.4		12.5				
Green Ext Time (p_c), s		13.2		0.8		0.0		0.6				
Intersection Summary												
HCM 6th Ctrl Delay				13.2								
HCM 6th LOS				B								

HCM 6th TWSC
2: Brearly St & East Washington Ave.

02/12/2019

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗			↗			↗
Traffic Vol, veh/h	11	1309	3	48	3233	23	0	0	40	0	0	22
Future Vol, veh/h	11	1309	3	48	3233	23	0	0	40	0	0	22
Conflicting Peds, #/hr	3	0	6	6	0	3	0	0	2	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	50	75	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	2	2	2	1	1	1	1	1	1
Mvmt Flow	12	1423	3	52	3514	25	0	0	43	0	0	24

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	3542	0	0	1432	0	0	-	-	720	-	-	1763
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.44	-	-	5.34	-	-	-	-	7.12	-	-	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.17	-	-	3.12	-	-	-	-	3.91	-	-	3.91
Pot Cap-1 Maneuver	18	-	-	241	-	-	0	0	320	0	0	63
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	18	-	-	240	-	-	-	-	318	-	-	63
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.2	0.4	18.1	93.6
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	318	18	-	-	240	-	-	63
HCM Lane V/C Ratio	0.137	0.664	-	-	0.217	-	-	0.38
HCM Control Delay (s)	18.1	385.4	-	-	24.1	-	-	93.6
HCM Lane LOS	C	F	-	-	C	-	-	F
HCM 95th %tile Q(veh)	0.5	1.8	-	-	0.8	-	-	1.4

HCM 6th TWSC
2: Brearly St & East Washington Ave.

02/12/2019

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑	↗			↗			↗
Traffic Vol, veh/h	34	3176	14	18	1654	9	0	0	67	0	0	6
Future Vol, veh/h	34	3176	14	18	1654	9	0	0	67	0	0	6
Conflicting Peds, #/hr	13	0	7	7	0	13	0	0	8	0	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	50	75	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	1	1	1
Mvmt Flow	35	3241	14	18	1688	9	0	0	68	0	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1710	0	0	3262	0	0	-	-	1636	-	-	864
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.32	-	-	5.34	-	-	-	-	7.12	-	-	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.11	-	-	3.12	-	-	-	-	3.91	-	-	3.91
Pot Cap-1 Maneuver	177	-	-	27	-	-	0	0	77	0	0	257
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	175	-	-	27	-	-	-	-	76	-	-	253
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	3	170.1	19.6
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	76	175	-	-	27	-	-	253
HCM Lane V/C Ratio	0.9	0.198	-	-	0.68	-	-	0.024
HCM Control Delay (s)	170.1	30.6	-	-	280.9	-	-	19.6
HCM Lane LOS	F	D	-	-	F	-	-	C
HCM 95th %tile Q(veh)	4.6	0.7	-	-	2.1	-	-	0.1

HCM 6th Signalized Intersection Summary
 17: Ingersoll St. & East Washington Ave.

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗		↘	↗		↕	
Traffic Volume (veh/h)	22	1277	50	51	3252	48	30	52	50	54	30	22
Future Volume (veh/h)	22	1277	50	51	3252	48	30	52	50	54	30	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	23	1344	53	54	3423	51	32	55	53	57	32	23
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	3417	1061	386	3780	1173	103	142	234	115	54	29
Arrive On Green	1.00	1.00	1.00	0.03	0.74	0.74	0.14	0.12	0.12	0.14	0.12	0.12
Sat Flow, veh/h	49	5106	1585	1781	5106	1585	465	1219	1585	517	462	253
Grp Volume(v), veh/h	23	1344	53	54	3423	51	87	0	53	112	0	0
Grp Sat Flow(s),veh/h/ln	49	1702	1585	1781	1702	1585	1684	0	1585	1232	0	0
Q Serve(g_s), s	21.2	0.0	0.0	0.9	52.8	0.9	0.0	0.0	2.9	5.2	0.0	0.0
Cycle Q Clear(g_c), s	66.9	0.0	0.0	0.9	52.8	0.9	4.4	0.0	2.9	9.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.37		1.00	0.51		0.21
Lane Grp Cap(c), veh/h	82	3417	1061	386	3780	1173	288	0	234	229	0	0
V/C Ratio(X)	0.28	0.39	0.05	0.14	0.91	0.04	0.30	0.00	0.23	0.49	0.00	0.00
Avail Cap(c_a), veh/h	82	3417	1061	509	3855	1197	318	0	263	256	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	28.7	0.0	0.0	4.1	10.2	3.5	40.5	0.0	37.6	43.1	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.1	0.0	0.1	4.2	0.1	0.6	0.0	0.5	1.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.0	0.0	0.0	0.5	22.2	0.4	3.5	0.0	2.1	4.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	0.1	0.0	4.1	14.4	3.6	41.1	0.0	38.1	44.7	0.0	0.0
LnGrp LOS	C	A	A	A	B	A	D	A	D	D	A	A
Approach Vol, veh/h		1420			3528			140				112
Approach Delay, s/veh		0.6			14.1			39.9				44.7
Approach LOS		A			B			D				D
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	7.1	71.4		18.2		78.5		18.2				
Change Period (Y+Rc), s	4.0	4.5		6.5		4.5		6.5				
Max Green Setting (Gmax), s	10.0	61.5		13.5		75.5		13.5				
Max Q Clear Time (g_c+I1), s	2.9	68.9		6.4		54.8		11.6				
Green Ext Time (p_c), s	0.0	0.0		0.3		19.2		0.1				

Intersection Summary

HCM 6th Ctrl Delay	11.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 17: Ingersoll St. & East Washington Ave.

02/13/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗		↑	↗		↕	
Traffic Volume (veh/h)	38	3119	87	41	1593	43	52	46	68	96	43	36
Future Volume (veh/h)	38	3119	87	41	1593	43	52	46	68	96	43	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	3283	92	43	1677	45	55	48	72	101	45	38
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	239	3355	1042	157	3702	1149	163	123	306	145	54	37
Arrive On Green	1.00	1.00	1.00	0.03	0.73	0.73	0.19	0.17	0.17	0.19	0.17	0.17
Sat Flow, veh/h	282	5106	1585	1781	5106	1585	655	743	1585	538	329	226
Grp Volume(v), veh/h	40	3283	92	43	1677	45	103	0	72	184	0	0
Grp Sat Flow(s),veh/h/ln	282	1702	1585	1781	1702	1585	1399	0	1585	1093	0	0
Q Serve(g_s), s	1.8	0.0	0.0	0.7	13.4	0.8	0.0	0.0	3.8	11.0	0.0	0.0
Cycle Q Clear(g_c), s	8.5	0.0	0.0	0.7	13.4	0.8	6.1	0.0	3.8	17.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.53		1.00	0.55		0.21
Lane Grp Cap(c), veh/h	239	3355	1042	157	3702	1149	321	0	306	263	0	0
V/C Ratio(X)	0.17	0.98	0.09	0.27	0.45	0.04	0.32	0.00	0.24	0.70	0.00	0.00
Avail Cap(c_a), veh/h	239	3355	1042	303	3702	1149	321	0	306	263	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.4	0.0	0.0	4.6	5.6	3.9	36.6	0.0	34.1	43.0	0.0	0.0
Incr Delay (d2), s/veh	1.5	11.3	0.2	0.3	0.1	0.0	0.6	0.0	0.4	7.9	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(95%),veh/ln	0.2	6.3	0.1	0.4	6.8	0.4	4.0	0.0	2.7	8.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.9	11.3	0.2	4.9	5.7	3.9	37.2	0.0	34.5	50.9	0.0	0.0
LnGrp LOS	A	B	A	A	A	A	D	A	C	D	A	A
Approach Vol, veh/h		3415			1765			175				184
Approach Delay, s/veh		10.9			5.7			36.1				50.9
Approach LOS		B			A			D				D
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.8	70.2		23.0		77.0		23.0				
Change Period (Y+Rc), s	4.0	4.5		6.5		4.5		6.5				
Max Green Setting (Gmax), s	11.0	57.5		16.5		72.5		16.5				
Max Q Clear Time (g_c+I1), s	2.7	10.5		8.1		15.4		19.1				
Green Ext Time (p_c), s	0.0	39.8		0.4		12.9		0.0				

Intersection Summary

HCM 6th Ctrl Delay	11.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	33	17	2	57	6	24	60	2	8	44	38
Future Vol, veh/h	10	33	17	2	57	6	24	60	2	8	44	38
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	4	4	4
Mvmt Flow	11	38	20	2	66	7	28	69	2	9	51	44
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	7.7	7.9	8.1	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	28%	17%	3%	9%
Vol Thru, %	70%	55%	88%	49%
Vol Right, %	2%	28%	9%	42%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	86	60	65	90
LT Vol	24	10	2	8
Through Vol	60	33	57	44
RT Vol	2	17	6	38
Lane Flow Rate	99	69	75	103
Geometry Grp	1	1	1	1
Degree of Util (X)	0.122	0.083	0.092	0.12
Departure Headway (Hd)	4.445	4.334	4.414	4.169
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	809	829	814	863
Service Time	2.458	2.349	2.428	2.181
HCM Lane V/C Ratio	0.122	0.083	0.092	0.119
HCM Control Delay	8.1	7.7	7.9	7.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.3	0.3	0.4

Intersection	
Intersection Delay, s/veh	10
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	81	179	40	7	36	23	8	81	9	22	106	14
Future Vol, veh/h	81	179	40	7	36	23	8	81	9	22	106	14
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	3	3	3
Mvmt Flow	87	192	43	8	39	25	9	87	10	24	114	15
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.9	8.4	9	9.4
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	27%	11%	15%
Vol Thru, %	83%	60%	55%	75%
Vol Right, %	9%	13%	35%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	98	300	66	142
LT Vol	8	81	7	22
Through Vol	81	179	36	106
RT Vol	9	40	23	14
Lane Flow Rate	105	323	71	153
Geometry Grp	1	1	1	1
Degree of Util (X)	0.147	0.414	0.094	0.212
Departure Headway (Hd)	5.013	4.619	4.78	4.991
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	710	777	744	715
Service Time	3.078	2.669	2.849	3.052
HCM Lane V/C Ratio	0.148	0.416	0.095	0.214
HCM Control Delay	9	10.9	8.4	9.4
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.5	2	0.3	0.8

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	26	8	1	35	7	10	24	22	7	25	19
Future Vol, veh/h	9	26	8	1	35	7	10	24	22	7	25	19
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	10	10	10	9	9	9	3	3	3	2	2	2
Mvmt Flow	12	35	11	1	47	9	13	32	29	9	33	25
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	7.7	7.6	7.5	7.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	18%	21%	2%	14%
Vol Thru, %	43%	60%	81%	49%
Vol Right, %	39%	19%	16%	37%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	56	43	43	51
LT Vol	10	9	1	7
Through Vol	24	26	35	25
RT Vol	22	8	7	19
Lane Flow Rate	75	57	57	68
Geometry Grp	1	1	1	1
Degree of Util (X)	0.083	0.068	0.068	0.075
Departure Headway (Hd)	4.002	4.29	4.25	3.994
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	883	825	833	885
Service Time	2.081	2.368	2.327	2.075
HCM Lane V/C Ratio	0.085	0.069	0.068	0.077
HCM Control Delay	7.5	7.7	7.6	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	0.2	0.2	0.2

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	23	168	19	10	48	9	14	35	32	13	15	5
Future Vol, veh/h	23	168	19	10	48	9	14	35	32	13	15	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	4	4	4	2	2	2	1	1	1	1	1	1
Mvmt Flow	27	200	23	12	57	11	17	42	38	15	18	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

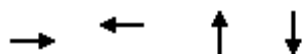
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.2	8	8.2	8.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	17%	11%	15%	39%
Vol Thru, %	43%	80%	72%	45%
Vol Right, %	40%	9%	13%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	81	210	67	33
LT Vol	14	23	10	13
Through Vol	35	168	48	15
RT Vol	32	19	9	5
Lane Flow Rate	96	250	80	39
Geometry Grp	1	1	1	1
Degree of Util (X)	0.121	0.302	0.099	0.052
Departure Headway (Hd)	4.51	4.343	4.47	4.768
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	796	830	802	751
Service Time	2.532	2.361	2.494	2.796
HCM Lane V/C Ratio	0.121	0.301	0.1	0.052
HCM Control Delay	8.2	9.2	8	8.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	1.3	0.3	0.2

Queues

20: Paterson St & Williamson St

02/12/2019



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	518	1268	175	71
v/c Ratio	0.49	0.56	0.70	0.24
Control Delay	8.5	8.1	47.1	16.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.5	8.1	47.1	16.6
Queue Length 50th (ft)	113	155	82	12
Queue Length 95th (ft)	181	205	#165	46
Internal Link Dist (ft)	756	583	253	907
Turn Bay Length (ft)				
Base Capacity (vph)	1051	2267	265	305
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.56	0.66	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

20: Paterson St & Williamson St

02/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	36	424	11	1	1123	30	138	21	0	18	7	39
Future Volume (vph)	36	424	11	1	1123	30	138	21	0	18	7	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frbp, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			1.00			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		1830			3521			1799			1541	
Flt Permitted		0.85			0.95			0.75			0.92	
Satd. Flow (perm)		1560			3363			1416			1442	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	40	466	12	1	1234	33	152	23	0	20	8	43
RTOR Reduction (vph)	0	1	0	0	2	0	0	0	0	0	35	0
Lane Group Flow (vph)	0	517	0	0	1266	0	0	175	0	0	36	0
Confl. Peds. (#/hr)	10		5	5		10	2		10	10		2
Confl. Bikes (#/hr)			4						3			2
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	1%	1%	1%	10%	10%	10%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4 3			4 3	
Permitted Phases	2			2			4 3			4 3		
Actuated Green, G (s)		53.9			53.9			18.1			18.1	
Effective Green, g (s)		53.9			53.9			15.1			15.1	
Actuated g/C Ratio		0.67			0.67			0.19			0.19	
Clearance Time (s)		4.0			4.0							
Vehicle Extension (s)		5.0			5.0							
Lane Grp Cap (vph)		1051			2265			267			272	
v/s Ratio Prot												
v/s Ratio Perm		0.33			0.38			0.12			0.03	
v/c Ratio		0.49			0.56			0.66			0.13	
Uniform Delay, d1		6.4			6.8			30.0			27.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.6			1.0			7.6			0.5	
Delay (s)		8.0			7.8			37.6			27.5	
Level of Service		A			A			D			C	
Approach Delay (s)		8.0			7.8			37.6			27.5	
Approach LOS		A			A			D			C	

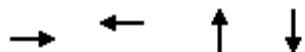
Intersection Summary

HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues

20: Paterson St & Williamson St

02/13/2019



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1429	610	97	159
v/c Ratio	0.64	0.49	0.44	0.60
Control Delay	8.8	7.8	34.7	34.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.8	7.8	34.7	34.4
Queue Length 50th (ft)	184	127	41	58
Queue Length 95th (ft)	257	205	85	117
Internal Link Dist (ft)	756	583	253	907
Turn Bay Length (ft)				
Base Capacity (vph)	2244	1246	254	304
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.64	0.49	0.38	0.52

Intersection Summary

HCM Signalized Intersection Capacity Analysis

20: Paterson St & Williamson St

02/13/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕↕			↕↕	
Traffic Volume (vph)	41	1256	75	10	542	34	62	23	8	67	31	55
Future Volume (vph)	41	1256	75	10	542	34	62	23	8	67	31	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			1.00			1.00			1.00	
Frbp, ped/bikes		1.00			0.99			0.99			0.98	
Flpb, ped/bikes		1.00			1.00			0.99			0.98	
Frt		0.99			0.99			0.99			0.95	
Flt Protected		1.00			1.00			0.97			0.98	
Satd. Flow (prot)		3524			1855			1771			1693	
Flt Permitted		0.92			0.97			0.73			0.86	
Satd. Flow (perm)		3252			1806			1338			1487	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	43	1308	78	10	565	35	65	24	8	70	32	57
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	26	0
Lane Group Flow (vph)	0	1424	0	0	608	0	0	93	0	0	133	0
Confl. Peds. (#/hr)	35		20	20		35	10		30	30		10
Confl. Bikes (#/hr)			6			3			2			1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4 3			4 3	
Permitted Phases	2			2			4 3			4 3		
Actuated Green, G (s)		55.1			55.1			16.9			16.9	
Effective Green, g (s)		55.1			55.1			13.9			13.9	
Actuated g/C Ratio		0.69			0.69			0.17			0.17	
Clearance Time (s)		4.0			4.0							
Vehicle Extension (s)		5.0			5.0							
Lane Grp Cap (vph)		2239			1243			232			258	
v/s Ratio Prot												
v/s Ratio Perm		c0.44			0.34			0.07			c0.09	
v/c Ratio		0.64			0.49			0.40			0.52	
Uniform Delay, d1		6.9			5.8			29.3			30.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.4			1.4			2.4			3.5	
Delay (s)		8.3			7.2			31.7			33.5	
Level of Service		A			A			C			C	
Approach Delay (s)		8.3			7.2			31.7			33.5	
Approach LOS		A			A			C			C	

Intersection Summary

HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	25	410	7	3	1123	31	2	0	3	6	0	29
Future Vol, veh/h	25	410	7	3	1123	31	2	0	3	6	0	29
Conflicting Peds, #/hr	12	0	3	3	0	12	1	0	6	6	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	3	3	3	2	2	2	50	50	50	1	1	1
Mvmt Flow	28	461	8	3	1262	35	2	0	3	7	0	33

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	1309	0	0	472
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.145	-	-	4.13
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.2285	-	-	2.219
Pot Cap-1 Maneuver	522	-	-	1088
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	517	-	-	1085
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	24	30.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	195	517	-	-	1085	-	-	182
HCM Lane V/C Ratio	0.029	0.054	-	-	0.003	-	-	0.216
HCM Control Delay (s)	24	12.4	0	-	8.3	0	-	30.2
HCM Lane LOS	C	B	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0	-	-	0.8

HCM 6th TWSC
22: Brearly St & Williamson St

02/13/2019

Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↔↔			↔↔			↔↔	
Traffic Vol, veh/h	40	1260	32	6	546	39	9	2	8	11	2	31
Future Vol, veh/h	40	1260	32	6	546	39	9	2	8	11	2	31
Conflicting Peds, #/hr	26	0	9	9	0	26	11	0	15	15	0	11
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	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	41	1299	33	6	563	40	9	2	8	11	2	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	629	0	0	1341	0	0	2030	2048	690	1369	2044	620
Stage 1	-	-	-	-	-	-	1407	1407	-	621	621	-
Stage 2	-	-	-	-	-	-	623	641	-	748	1423	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.315	6.515	6.915	7.315	6.515	6.215
Critical Hdwy Stg 1	-	-	-	-	-	-	6.515	5.515	-	6.115	5.515	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.115	5.515	-	6.515	5.515	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5095	4.0095	3.3095	3.5095	4.0095	3.3095
Pot Cap-1 Maneuver	957	-	-	516	-	-	38	56	390	115	56	489
Stage 1	-	-	-	-	-	-	148	206	-	476	480	-
Stage 2	-	-	-	-	-	-	475	471	-	373	202	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	936	-	-	512	-	-	29	44	382	90	44	474
Mov Cap-2 Maneuver	-	-	-	-	-	-	29	44	-	90	44	-
Stage 1	-	-	-	-	-	-	122	170	-	386	461	-
Stage 2	-	-	-	-	-	-	429	452	-	295	166	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			0.1			117.4			30		
HCM LOS							F			D		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	50	936	-	-	512	-	-	189
HCM Lane V/C Ratio	0.392	0.044	-	-	0.012	-	-	0.24
HCM Control Delay (s)	117.4	9	0.7	-	12.1	0	-	30
HCM Lane LOS	F	A	A	-	B	A	-	D
HCM 95th %tile Q(veh)	1.4	0.1	-	-	0	-	-	0.9

APPENDIX G
2037 EXISTING GEOMETRY WITH DEVELOPMENT HCM REPORTS

HCM 6th Signalized Intersection Summary
 15: Paterson St. & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗		↕		↘	↑	↗
Traffic Volume (veh/h)	31	1227	18	87	3181	35	21	56	36	74	88	54
Future Volume (veh/h)	31	1227	18	87	3181	35	21	56	36	74	88	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.99		0.96	0.99		0.96
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	1796	1796	1796	1870	1870	1870	1752	1752	1752	1841	1841	1841
Adj Flow Rate, veh/h	33	1319	19	94	3420	38	23	60	39	80	95	58
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	7	7	7	2	2	2	10	10	10	4	4	4
Cap, veh/h	83	3653	1102	338	3804	1147	68	121	69	244	258	210
Arrive On Green	0.75	0.75	0.75	0.75	0.75	0.75	0.15	0.14	0.14	0.15	0.14	0.14
Sat Flow, veh/h	48	4904	1480	409	5106	1539	182	867	493	1259	1841	1501
Grp Volume(v), veh/h	33	1319	19	94	3420	38	122	0	0	80	95	58
Grp Sat Flow(s),veh/h/ln	48	1635	1480	409	1702	1539	1542	0	0	1259	1841	1501
Q Serve(g_s), s	22.8	9.4	0.3	10.4	51.7	0.6	1.7	0.0	0.0	0.1	4.7	3.5
Cycle Q Clear(g_c), s	74.5	9.4	0.3	19.8	51.7	0.6	7.1	0.0	0.0	7.2	4.7	3.5
Prop In Lane	1.00		1.00	1.00		1.00	0.19		0.32	1.00		1.00
Lane Grp Cap(c), veh/h	83	3653	1102	338	3804	1147	274	0	0	244	258	210
V/C Ratio(X)	0.40	0.36	0.02	0.28	0.90	0.03	0.45	0.00	0.00	0.33	0.37	0.28
Avail Cap(c_a), veh/h	83	3653	1102	338	3804	1147	461	0	0	401	488	398
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.3	4.4	3.3	7.9	9.8	3.3	39.9	0.0	0.0	39.2	39.0	38.5
Incr Delay (d2), s/veh	13.0	0.3	0.0	2.0	3.9	0.1	1.1	0.0	0.0	0.8	0.9	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.0	4.4	0.2	1.8	21.4	0.3	5.1	0.0	0.0	3.4	3.9	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.3	4.7	3.3	9.9	13.7	3.4	41.0	0.0	0.0	40.0	39.9	39.2
LnGrp LOS	E	A	A	A	B	A	D	A	A	D	D	D
Approach Vol, veh/h		1371			3552			122			233	
Approach Delay, s/veh		6.0			13.5			41.0			39.7	
Approach LOS		A			B			D			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		79.5		20.5		79.5		20.5				
Change Period (Y+Rc), s		5.0		6.5		5.0		6.5				
Max Green Setting (Gmax), s		62.0		26.5		62.0		26.5				
Max Q Clear Time (g_c+I1), s		76.5		9.2		53.7		9.1				
Green Ext Time (p_c), s		0.0		0.9		8.0		0.4				
Intersection Summary												
HCM 6th Ctrl Delay				13.4								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary
 15: Paterson St. & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	3024	39	41	1562	66	47	98	126	108	121	44
Future Volume (veh/h)	51	3024	39	41	1562	66	47	98	126	108	121	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.99		0.96	0.99		0.96
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	1885	1885	1885	1870	1870	1870	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	52	3086	40	42	1594	67	48	100	129	110	123	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	227	3421	1026	83	3394	1019	87	144	165	244	415	337
Arrive On Green	0.66	0.66	0.66	0.66	0.66	0.66	0.23	0.22	0.22	0.23	0.22	0.22
Sat Flow, veh/h	302	5147	1544	70	5106	1533	203	654	747	1149	1885	1532
Grp Volume(v), veh/h	52	3086	40	42	1594	67	277	0	0	110	123	45
Grp Sat Flow(s),veh/h/ln	302	1716	1544	70	1702	1533	1604	0	0	1149	1885	1532
Q Serve(g_s), s	10.1	50.2	0.9	16.3	15.2	1.5	10.1	0.0	0.0	1.1	5.4	2.4
Cycle Q Clear(g_c), s	25.4	50.2	0.9	66.5	15.2	1.5	15.9	0.0	0.0	17.1	5.4	2.4
Prop In Lane	1.00		1.00	1.00		1.00	0.17		0.47	1.00		1.00
Lane Grp Cap(c), veh/h	227	3421	1026	83	3394	1019	412	0	0	244	415	337
V/C Ratio(X)	0.23	0.90	0.04	0.50	0.47	0.07	0.67	0.00	0.00	0.45	0.30	0.13
Avail Cap(c_a), veh/h	227	3421	1026	83	3394	1019	482	0	0	295	500	406
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	0.48	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.4	14.0	5.8	47.8	8.2	5.9	36.4	0.0	0.0	36.7	32.5	31.3
Incr Delay (d2), s/veh	1.1	2.2	0.0	4.8	0.1	0.0	2.9	0.0	0.0	1.3	0.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.3	21.3	0.5	2.1	8.4	0.8	10.7	0.0	0.0	4.7	4.6	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.5	16.3	5.8	52.6	8.3	5.9	39.3	0.0	0.0	38.0	32.9	31.5
LnGrp LOS	B	B	A	D	A	A	D	A	A	D	C	C
Approach Vol, veh/h		3178			1703			277				278
Approach Delay, s/veh		16.1			9.3			39.3				34.7
Approach LOS		B			A			D				C
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		71.5		28.5		71.5		28.5				
Change Period (Y+Rc), s		5.0		6.5		5.0		6.5				
Max Green Setting (Gmax), s		62.0		26.5		62.0		26.5				
Max Q Clear Time (g_c+I1), s		52.2		19.1		68.5		17.9				
Green Ext Time (p_c), s		9.2		0.7		0.0		0.8				
Intersection Summary												
HCM 6th Ctrl Delay				16.1								
HCM 6th LOS				B								

HCM 6th TWSC
2: Brearly St & East Washington Ave.

02/14/2019

Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑	↗			↗			↗
Traffic Vol, veh/h	11	1323	3	107	3282	23	0	0	49	0	0	22
Future Vol, veh/h	11	1323	3	107	3282	23	0	0	49	0	0	22
Conflicting Peds, #/hr	3	0	6	6	0	3	0	0	2	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	50	75	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	2	2	2	1	1	1	1	1	1
Mvmt Flow	12	1438	3	116	3567	25	0	0	53	0	0	24

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	3595	0	0	1447	0	0	-	-	727	-	-	1790
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.44	-	-	5.34	-	-	-	-	7.12	-	-	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.17	-	-	3.12	-	-	-	-	3.91	-	-	3.91
Pot Cap-1 Maneuver	16	-	-	237	-	-	0	0	316	0	0	61
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	16	-	-	236	-	-	-	-	314	-	-	61
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.7	1.1	18.8	97.9
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	314	16	-	-	236	-	-	61
HCM Lane V/C Ratio	0.17	0.747	-	-	0.493	-	-	0.392
HCM Control Delay (s)	18.8	\$ 454	-	-	34.2	-	-	97.9
HCM Lane LOS	C	F	-	-	D	-	-	F
HCM 95th %tile Q(veh)	0.6	1.9	-	-	2.5	-	-	1.5

HCM 6th TWSC
2: Brearly St & East Washington Ave.

02/14/2019

Intersection												
Int Delay, s/veh	10.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑	↗			↖			↗
Traffic Vol, veh/h	34	3235	14	29	1663	9	0	0	106	0	0	6
Future Vol, veh/h	34	3235	14	29	1663	9	0	0	106	0	0	6
Conflicting Peds, #/hr	13	0	7	7	0	13	0	0	8	0	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	50	75	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	1	1	1
Mvmt Flow	35	3301	14	30	1697	9	0	0	108	0	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1719	0	0	3322	0	0	-	-	1666	-	-	869
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.32	-	-	5.34	-	-	-	-	7.12	-	-	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.11	-	-	3.12	-	-	-	-	3.91	-	-	3.91
Pot Cap-1 Maneuver	175	-	-	~ 25	-	-	0	0	~ 74	0	0	255
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	173	-	-	~ 25	-	-	-	-	~ 73	-	-	251
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	8	\$ 373.9	19.7
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	73	173	-	-	~ 25	-	-	251
HCM Lane V/C Ratio	1.482	0.201	-	-	1.184	-	-	0.024
HCM Control Delay (s)	\$ 373.9	31	-	-	\$ 470.3	-	-	19.7
HCM Lane LOS	F	D	-	-	F	-	-	C
HCM 95th %tile Q(veh)	8.9	0.7	-	-	3.6	-	-	0.1

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

HCM 6th Signalized Intersection Summary
 17: Ingersoll St. & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑	↗		↑	↗		↖	↗
Traffic Volume (veh/h)	22	1301	50	51	3361	48	30	52	50	54	30	22
Future Volume (veh/h)	22	1301	50	51	3361	48	30	52	50	54	30	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	23	1369	53	54	3538	51	32	55	53	57	32	23
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	80	3452	1072	382	3815	1184	103	142	234	115	54	29
Arrive On Green	1.00	1.00	1.00	0.03	0.75	0.75	0.14	0.12	0.12	0.14	0.12	0.12
Sat Flow, veh/h	43	5106	1585	1781	5106	1585	465	1219	1585	517	462	253
Grp Volume(v), veh/h	23	1369	53	54	3538	51	87	0	53	112	0	0
Grp Sat Flow(s),veh/h/ln	43	1702	1585	1781	1702	1585	1684	0	1585	1232	0	0
Q Serve(g_s), s	17.7	0.0	0.0	0.9	57.0	0.8	0.0	0.0	2.9	5.2	0.0	0.0
Cycle Q Clear(g_c), s	67.6	0.0	0.0	0.9	57.0	0.8	4.4	0.0	2.9	9.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.37		1.00	0.51		0.21
Lane Grp Cap(c), veh/h	80	3452	1072	382	3815	1184	288	0	234	229	0	0
V/C Ratio(X)	0.29	0.40	0.05	0.14	0.93	0.04	0.30	0.00	0.23	0.49	0.00	0.00
Avail Cap(c_a), veh/h	80	3452	1072	505	3855	1197	318	0	263	256	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	30.9	0.0	0.0	3.9	10.4	3.3	40.5	0.0	37.6	43.1	0.0	0.0
Incr Delay (d2), s/veh	2.0	0.1	0.0	0.1	5.2	0.1	0.6	0.0	0.5	1.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.0	0.0	0.0	0.5	23.6	0.4	3.5	0.0	2.1	4.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.8	0.1	0.0	3.9	15.6	3.4	41.1	0.0	38.1	44.7	0.0	0.0
LnGrp LOS	C	A	A	A	B	A	D	A	D	D	A	A
Approach Vol, veh/h		1445			3643			140				112
Approach Delay, s/veh		0.6			15.3			39.9				44.7
Approach LOS		A			B			D				D
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	7.1	72.1		18.2		79.2		18.2				
Change Period (Y+Rc), s	4.0	4.5		6.5		4.5		6.5				
Max Green Setting (Gmax), s	10.0	61.5		13.5		75.5		13.5				
Max Q Clear Time (g_c+I1), s	2.9	69.6		6.4		59.0		11.6				
Green Ext Time (p_c), s	0.0	0.0		0.3		15.7		0.1				

Intersection Summary

HCM 6th Ctrl Delay	12.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 17: Ingersoll St. & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗		↑	↗		↕	
Traffic Volume (veh/h)	38	3217	87	41	1612	43	52	46	68	96	43	36
Future Volume (veh/h)	38	3217	87	41	1612	43	52	46	68	96	43	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	3386	92	43	1697	45	55	48	72	101	45	38
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	239	3406	1057	154	3753	1165	155	115	290	136	48	33
Arrive On Green	1.00	1.00	1.00	0.03	0.74	0.74	0.18	0.16	0.16	0.18	0.16	0.16
Sat Flow, veh/h	277	5106	1585	1781	5106	1585	642	741	1585	520	310	216
Grp Volume(v), veh/h	40	3386	92	43	1697	45	103	0	72	184	0	0
Grp Sat Flow(s),veh/h/ln	277	1702	1585	1781	1702	1585	1383	0	1585	1046	0	0
Q Serve(g_s), s	1.8	0.0	0.0	0.7	13.2	0.8	0.0	0.0	3.9	11.5	0.0	0.0
Cycle Q Clear(g_c), s	8.2	0.0	0.0	0.7	13.2	0.8	6.2	0.0	3.9	17.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.53		1.00	0.55		0.21
Lane Grp Cap(c), veh/h	239	3406	1057	154	3753	1165	304	0	290	244	0	0
V/C Ratio(X)	0.17	0.99	0.09	0.28	0.45	0.04	0.34	0.00	0.25	0.75	0.00	0.00
Avail Cap(c_a), veh/h	239	3406	1057	300	3753	1165	304	0	290	244	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.4	0.0	0.0	4.3	5.3	3.6	37.5	0.0	35.0	44.4	0.0	0.0
Incr Delay (d2), s/veh	1.5	14.1	0.2	0.4	0.1	0.0	0.7	0.0	0.4	12.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	7.9	0.1	0.4	6.5	0.4	4.0	0.0	2.8	9.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.9	14.1	0.2	4.7	5.3	3.6	38.2	0.0	35.4	56.9	0.0	0.0
LnGrp LOS	A	B	A	A	A	A	D	A	D	E	A	A
Approach Vol, veh/h		3518			1785			175			184	
Approach Delay, s/veh		13.6			5.3			37.0			56.9	
Approach LOS		B			A			D			E	
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.8	71.2		22.0		78.0		22.0				
Change Period (Y+Rc), s	4.0	4.5		6.5		4.5		6.5				
Max Green Setting (Gmax), s	11.0	58.5		15.5		73.5		15.5				
Max Q Clear Time (g_c+I1), s	2.7	10.2		8.2		15.2		19.7				
Green Ext Time (p_c), s	0.0	42.0		0.4		13.2		0.0				

Intersection Summary

HCM 6th Ctrl Delay	13.1
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	71	17	2	81	6	24	168	2	8	75	44
Future Vol, veh/h	20	71	17	2	81	6	24	168	2	8	75	44
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	4	4	4
Mvmt Flow	23	82	20	2	93	7	28	193	2	9	86	51
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	8.9	8.8	9.7	8.7
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	12%	19%	2%	6%
Vol Thru, %	87%	66%	91%	59%
Vol Right, %	1%	16%	7%	35%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	194	108	89	127
LT Vol	24	20	2	8
Through Vol	168	71	81	75
RT Vol	2	17	6	44
Lane Flow Rate	223	124	102	146
Geometry Grp	1	1	1	1
Degree of Util (X)	0.292	0.168	0.14	0.186
Departure Headway (Hd)	4.713	4.875	4.924	4.598
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	760	732	724	777
Service Time	2.759	2.929	2.981	2.648
HCM Lane V/C Ratio	0.293	0.169	0.141	0.188
HCM Control Delay	9.7	8.9	8.8	8.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.2	0.6	0.5	0.7

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	94	233	40	7	70	23	8	121	9	22	184	22
Future Vol, veh/h	94	233	40	7	70	23	8	121	9	22	184	22
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	3	3	3
Mvmt Flow	101	251	43	8	75	25	9	130	10	24	198	24
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	14.9	9.7	10.5	11.9
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	6%	26%	7%	10%
Vol Thru, %	88%	63%	70%	81%
Vol Right, %	7%	11%	23%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	367	100	228
LT Vol	8	94	7	22
Through Vol	121	233	70	184
RT Vol	9	40	23	22
Lane Flow Rate	148	395	108	245
Geometry Grp	1	1	1	1
Degree of Util (X)	0.234	0.57	0.166	0.377
Departure Headway (Hd)	5.685	5.198	5.567	5.536
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	629	695	642	650
Service Time	3.736	3.236	3.62	3.581
HCM Lane V/C Ratio	0.235	0.568	0.168	0.377
HCM Control Delay	10.5	14.9	9.7	11.9
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	0.9	3.6	0.6	1.8

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	33	26	1	51	13	99	24	22	10	25	19
Future Vol, veh/h	9	33	26	1	51	13	99	24	22	10	25	19
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	10	10	10	9	9	9	3	3	3	2	2	2
Mvmt Flow	12	44	35	1	68	17	132	32	29	13	33	25
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	8.2	8.3	9	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	68%	13%	2%	19%
Vol Thru, %	17%	49%	78%	46%
Vol Right, %	15%	38%	20%	35%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	145	68	65	54
LT Vol	99	9	1	10
Through Vol	24	33	51	25
RT Vol	22	26	13	19
Lane Flow Rate	193	91	87	72
Geometry Grp	1	1	1	1
Degree of Util (X)	0.242	0.115	0.112	0.088
Departure Headway (Hd)	4.497	4.583	4.656	4.4
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	800	782	770	815
Service Time	2.516	2.611	2.683	2.423
HCM Lane V/C Ratio	0.241	0.116	0.113	0.088
HCM Control Delay	9	8.2	8.3	7.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0.4	0.4	0.3

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	23	263	77	10	69	18	41	35	32	53	15	5
Future Vol, veh/h	23	263	77	10	69	18	41	35	32	53	15	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	4	4	4	2	2	2	1	1	1	1	1	1
Mvmt Flow	27	313	92	12	82	21	49	42	38	63	18	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

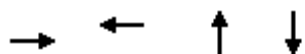
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13	8.9	9.5	9.4
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	38%	6%	10%	73%
Vol Thru, %	32%	72%	71%	21%
Vol Right, %	30%	21%	19%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	108	363	97	73
LT Vol	41	23	10	53
Through Vol	35	263	69	15
RT Vol	32	77	18	5
Lane Flow Rate	129	432	115	87
Geometry Grp	1	1	1	1
Degree of Util (X)	0.186	0.547	0.158	0.132
Departure Headway (Hd)	5.209	4.558	4.913	5.478
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	681	786	723	647
Service Time	3.298	2.617	2.993	3.573
HCM Lane V/C Ratio	0.189	0.55	0.159	0.134
HCM Control Delay	9.5	13	8.9	9.4
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.7	3.4	0.6	0.5

Queues

20: Paterson St & Williamson St

02/14/2019



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	602	1324	196	103
v/c Ratio	0.77	0.59	0.81	0.32
Control Delay	17.9	8.7	58.1	16.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	17.9	8.7	58.1	16.3
Queue Length 50th (ft)	179	165	94	17
Queue Length 95th (ft)	#361	220	#201	59
Internal Link Dist (ft)	756	583	253	907
Turn Bay Length (ft)				
Base Capacity (vph)	783	2235	248	324
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.77	0.59	0.79	0.32

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

20: Paterson St & Williamson St

02/14/2019

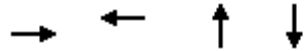


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	84	453	11	1	1134	70	138	40	0	23	14	57
Future Volume (vph)	84	453	11	1	1134	70	138	40	0	23	14	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frbp, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			1.00			0.92	
Flt Protected		0.99			1.00			0.96			0.99	
Satd. Flow (prot)		1824			3500			1808			1543	
Flt Permitted		0.64			0.95			0.71			0.93	
Satd. Flow (perm)		1173			3342			1326			1456	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	92	498	12	1	1246	77	152	44	0	25	15	63
RTOR Reduction (vph)	0	1	0	0	6	0	0	0	0	0	51	0
Lane Group Flow (vph)	0	601	0	0	1318	0	0	196	0	0	52	0
Confl. Peds. (#/hr)	10		5	5		10	2		10	10		2
Confl. Bikes (#/hr)			4						3			2
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	1%	1%	1%	10%	10%	10%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4 3			4 3	
Permitted Phases	2			2			4 3			4 3		
Actuated Green, G (s)		53.4			53.4			18.6			18.6	
Effective Green, g (s)		53.4			53.4			15.6			15.6	
Actuated g/C Ratio		0.67			0.67			0.19			0.19	
Clearance Time (s)		4.0			4.0							
Vehicle Extension (s)		5.0			5.0							
Lane Grp Cap (vph)		782			2230			258			283	
v/s Ratio Prot												
v/s Ratio Perm		c0.51			0.39			c0.15			0.04	
v/c Ratio		0.77			0.59			0.76			0.18	
Uniform Delay, d1		9.1			7.3			30.4			26.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		7.2			1.2			14.2			0.7	
Delay (s)		16.2			8.5			44.7			27.6	
Level of Service		B			A			D			C	
Approach Delay (s)		16.2			8.5			44.7			27.6	
Approach LOS		B			A			D			C	
Intersection Summary												
HCM 2000 Control Delay			14.6				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			80.0				Sum of lost time (s)		11.0			
Intersection Capacity Utilization			89.2%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

20: Paterson St & Williamson St

02/14/2019



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1466	645	105	242
v/c Ratio	0.69	0.53	0.46	0.82
Control Delay	10.4	8.8	35.0	49.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.4	8.8	35.0	49.9
Queue Length 50th (ft)	208	144	45	98
Queue Length 95th (ft)	281	223	93	#217
Internal Link Dist (ft)	756	583	253	907
Turn Bay Length (ft)				
Base Capacity (vph)	2111	1207	235	305
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.69	0.53	0.45	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

20: Paterson St & Williamson St

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕↕			↕↕	
Traffic Volume (vph)	63	1269	75	10	565	44	62	31	8	90	47	95
Future Volume (vph)	63	1269	75	10	565	44	62	31	8	90	47	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			1.00			1.00			1.00	
Frbp, ped/bikes		1.00			0.99			1.00			0.98	
Flpb, ped/bikes		1.00			1.00			0.99			0.99	
Frt		0.99			0.99			0.99			0.94	
Flt Protected		1.00			1.00			0.97			0.98	
Satd. Flow (prot)		3521			1849			1784			1685	
Flt Permitted		0.89			0.97			0.67			0.85	
Satd. Flow (perm)		3149			1800			1233			1466	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	66	1322	78	10	589	46	65	32	8	94	49	99
RTOR Reduction (vph)	0	5	0	0	3	0	0	4	0	0	31	0
Lane Group Flow (vph)	0	1461	0	0	642	0	0	101	0	0	211	0
Confl. Peds. (#/hr)	35		20	20		35	10		30	30		10
Confl. Bikes (#/hr)			6			3			2			1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4 3			4 3	
Permitted Phases	2			2			4 3			4 3		
Actuated Green, G (s)		53.5			53.5			18.5			18.5	
Effective Green, g (s)		53.5			53.5			15.5			15.5	
Actuated g/C Ratio		0.67			0.67			0.19			0.19	
Clearance Time (s)		4.0			4.0							
Vehicle Extension (s)		5.0			5.0							
Lane Grp Cap (vph)		2105			1203			238			284	
v/s Ratio Prot												
v/s Ratio Perm		c0.46			0.36			0.08			c0.14	
v/c Ratio		0.69			0.53			0.42			0.74	
Uniform Delay, d1		8.2			6.8			28.3			30.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.9			1.7			2.5			12.0	
Delay (s)		10.1			8.5			30.9			42.4	
Level of Service		B			A			C			D	
Approach Delay (s)		10.1			8.5			30.9			42.4	
Approach LOS		B			A			C			D	

Intersection Summary

HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	54	415	7	3	1163	91	2	0	3	13	0	39
Future Vol, veh/h	54	415	7	3	1163	91	2	0	3	13	0	39
Conflicting Peds, #/hr	12	0	3	3	0	12	1	0	6	6	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	3	3	3	2	2	2	50	50	50	1	1	1
Mvmt Flow	61	466	8	3	1307	102	2	0	3	15	0	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1421	0	0	477	0	0	1256	2022	479	1976	1975	718
Stage 1	-	-	-	-	-	-	595	595	-	1376	1376	-
Stage 2	-	-	-	-	-	-	661	1427	-	600	599	-
Critical Hdwy	4.145	-	-	4.13	-	-	8.05	7.25	6.95	7.315	6.515	6.915
Critical Hdwy Stg 1	-	-	-	-	-	-	6.85	6.25	-	6.515	5.515	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.25	6.25	-	6.115	5.515	-
Follow-up Hdwy	2.2285	-	-	2.219	-	-	3.975	4.475	3.775	3.5095	4.0095	3.3095
Pot Cap-1 Maneuver	473	-	-	1083	-	-	101	37	481	42	62	374
Stage 1	-	-	-	-	-	-	398	405	-	154	213	-
Stage 2	-	-	-	-	-	-	337	144	-	489	492	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	468	-	-	1080	-	-	76	30	477	35	50	370
Mov Cap-2 Maneuver	-	-	-	-	-	-	76	30	-	35	50	-
Stage 1	-	-	-	-	-	-	327	333	-	126	208	-
Stage 2	-	-	-	-	-	-	293	141	-	398	404	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.6			0.1			29.4			71		
HCM LOS							D			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	153	468	-	-	1080	-	-	109
HCM Lane V/C Ratio	0.037	0.13	-	-	0.003	-	-	0.536
HCM Control Delay (s)	29.4	13.8	0	-	8.3	0.1	-	71
HCM Lane LOS	D	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.1	0.4	-	-	0	-	-	2.5

Intersection												
Int Delay, s/veh	6.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	53	1282	32	6	556	53	9	2	8	45	2	55
Future Vol, veh/h	53	1282	32	6	556	53	9	2	8	45	2	55
Conflicting Peds, #/hr	26	0	9	9	0	26	11	0	15	15	0	11
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	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	55	1322	33	6	573	55	9	2	8	46	2	57

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	654	0	0	1364	0	0	2111	2124	702	1426	2113	638
Stage 1	-	-	-	-	-	-	1458	1458	-	639	639	-
Stage 2	-	-	-	-	-	-	653	666	-	787	1474	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.315	6.515	6.915	7.315	6.515	6.215
Critical Hdwy Stg 1	-	-	-	-	-	-	6.515	5.515	-	6.115	5.515	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.115	5.515	-	6.515	5.515	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5095	4.0095	3.3095	3.5095	4.0095	3.3095
Pot Cap-1 Maneuver	937	-	-	506	-	-	33	50	383	105	51	478
Stage 1	-	-	-	-	-	-	137	195	-	466	472	-
Stage 2	-	-	-	-	-	-	457	458	-	354	191	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	917	-	-	502	-	-	22	36	375	76	37	463
Mov Cap-2 Maneuver	-	-	-	-	-	-	22	36	-	76	37	-
Stage 1	-	-	-	-	-	-	102	146	-	344	453	-
Stage 2	-	-	-	-	-	-	388	439	-	254	143	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.3			0.1			168.1			93.8		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	39	917	-	-	502	-	-	133
HCM Lane V/C Ratio	0.502	0.06	-	-	0.012	-	-	0.791
HCM Control Delay (s)	168.1	9.2	1	-	12.3	0	-	93.8
HCM Lane LOS	F	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	1.8	0.2	-	-	0	-	-	4.8

HCM 6th TWSC
13: North Access & East Washington Ave.

02/14/2019

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↑↑↑		↑
Traffic Vol, veh/h	1331	6	0	3303	0	7
Future Vol, veh/h	1331	6	0	3303	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	75	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1401	6	0	3477	0	7

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	701
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	327
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	327
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach

	EB	WB	NB
HCM Control Delay, s	0	0	16.3
HCM LOS			C

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	327	-	-	-
HCM Lane V/C Ratio	0.023	-	-	-
HCM Control Delay (s)	16.3	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↑↑↑		↑
Traffic Vol, veh/h	3253	6	0	1669	0	29
Future Vol, veh/h	3253	6	0	1669	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	75	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3424	6	0	1757	0	31

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	1712
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	68
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	68
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	95.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	68	-	-	-
HCM Lane V/C Ratio	0.449	-	-	-
HCM Control Delay (s)	95.4	-	-	-
HCM Lane LOS	F	-	-	-
HCM 95th %tile Q(veh)	1.8	-	-	-

HCM 6th TWSC
24: Brearly St & East Access

02/14/2019

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	3	6	40	51	60
Future Vol, veh/h	10	3	6	40	51	60
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	3	6	42	54	63

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	140	86	117	0	-	0
Stage 1	86	-	-	-	-	-
Stage 2	54	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	853	973	1471	-	-	-
Stage 1	937	-	-	-	-	-
Stage 2	969	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	850	973	1471	-	-	-
Mov Cap-2 Maneuver	850	-	-	-	-	-
Stage 1	933	-	-	-	-	-
Stage 2	969	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1471	-	876	-	-
HCM Lane V/C Ratio	0.004	-	0.016	-	-
HCM Control Delay (s)	7.5	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 6th TWSC
24: Brearly St & East Access

02/14/2019

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	39	41	9	67	32	11
Future Vol, veh/h	39	41	9	67	32	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	41	43	9	71	34	12

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	129	40	46	0	0
Stage 1	40	-	-	-	-
Stage 2	89	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	865	1031	1562	-	-
Stage 1	982	-	-	-	-
Stage 2	934	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	860	1031	1562	-	-
Mov Cap-2 Maneuver	860	-	-	-	-
Stage 1	976	-	-	-	-
Stage 2	934	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1562	-	940	-	-
HCM Lane V/C Ratio	0.006	-	0.09	-	-
HCM Control Delay (s)	7.3	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	38	43	65	104	25	24
Future Vol, veh/h	38	43	65	104	25	24
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	45	68	109	26	25

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	177	0	-	0	248
Stage 1	-	-	-	-	123
Stage 2	-	-	-	-	125
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1399	-	-	-	740
Stage 1	-	-	-	-	902
Stage 2	-	-	-	-	901
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1399	-	-	-	719
Mov Cap-2 Maneuver	-	-	-	-	719
Stage 1	-	-	-	-	876
Stage 2	-	-	-	-	901

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1399	-	-	-	808
HCM Lane V/C Ratio	0.029	-	-	-	0.064
HCM Control Delay (s)	7.6	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	5.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	54	210	66	49	152	34
Future Vol, veh/h	54	210	66	49	152	34
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	221	69	52	160	36

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	121	0	-	0	430 95
Stage 1	-	-	-	-	95 -
Stage 2	-	-	-	-	335 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1467	-	-	-	582 962
Stage 1	-	-	-	-	929 -
Stage 2	-	-	-	-	725 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1467	-	-	-	556 962
Mov Cap-2 Maneuver	-	-	-	-	556 -
Stage 1	-	-	-	-	888 -
Stage 2	-	-	-	-	725 -

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1467	-	-	-	602
HCM Lane V/C Ratio	0.039	-	-	-	0.325
HCM Control Delay (s)	7.6	0	-	-	13.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.4

HCM 6th TWSC
 14: Paterson St. & West Access

02/14/2019

Intersection						
Int Delay, s/veh	3.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	37	76	117	103	90
Future Vol, veh/h	36	37	76	117	103	90
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	39	80	123	108	95

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	453	142	0	0	203
Stage 1	142	-	-	-	-
Stage 2	311	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	565	906	-	-	1369
Stage 1	885	-	-	-	-
Stage 2	743	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	518	906	-	-	1369
Mov Cap-2 Maneuver	518	-	-	-	-
Stage 1	812	-	-	-	-
Stage 2	743	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	4.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	662	1369
HCM Lane V/C Ratio	-	-	0.116	0.079
HCM Control Delay (s)	-	-	11.2	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0.3

HCM 6th TWSC
 14: Paterson St. & West Access

02/14/2019

Intersection						
Int Delay, s/veh	4.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	87	86	185	53	59	141
Future Vol, veh/h	87	86	185	53	59	141
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	92	91	195	56	62	148

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	495	223	0	0	251
Stage 1	223	-	-	-	-
Stage 2	272	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	534	817	-	-	1314
Stage 1	814	-	-	-	-
Stage 2	774	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	507	817	-	-	1314
Mov Cap-2 Maneuver	507	-	-	-	-
Stage 1	772	-	-	-	-
Stage 2	774	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	2.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	625	1314
HCM Lane V/C Ratio	-	-	0.291	0.047
HCM Control Delay (s)	-	-	13.1	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.1

HCM 6th Signalized Intersection Summary
 15: Paterson St. & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗	↘	↗		↘	↑	↗
Traffic Volume (veh/h)	31	1227	18	87	3181	35	21	56	36	74	88	54
Future Volume (veh/h)	31	1227	18	87	3181	35	21	56	36	74	88	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.99		0.97	0.99		0.97
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	1796	1796	1796	1870	1870	1870	1752	1752	1752	1841	1841	1841
Adj Flow Rate, veh/h	33	1319	19	94	3420	38	23	60	39	80	95	58
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	7	7	7	2	2	2	10	10	10	4	4	4
Cap, veh/h	106	3504	1057	321	3648	1099	227	166	108	231	314	257
Arrive On Green	0.71	0.71	0.71	1.00	1.00	1.00	0.18	0.17	0.17	0.18	0.17	0.17
Sat Flow, veh/h	48	4904	1479	409	5106	1538	1142	976	635	1260	1841	1508
Grp Volume(v), veh/h	33	1319	19	94	3420	38	23	0	99	80	95	58
Grp Sat Flow(s),veh/h/ln	48	1635	1479	409	1702	1538	1142	0	1611	1260	1841	1508
Q Serve(g_s), s	64.1	10.5	0.4	5.0	0.0	0.0	1.8	0.0	5.4	5.9	4.5	3.3
Cycle Q Clear(g_c), s	64.1	10.5	0.4	15.5	0.0	0.0	6.3	0.0	5.4	11.4	4.5	3.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.39	1.00		1.00
Lane Grp Cap(c), veh/h	106	3504	1057	321	3648	1099	227	0	275	231	314	257
V/C Ratio(X)	0.31	0.38	0.02	0.29	0.94	0.03	0.10	0.00	0.36	0.35	0.30	0.23
Avail Cap(c_a), veh/h	106	3504	1057	321	3648	1099	335	0	427	350	488	400
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.2	5.6	4.1	1.1	0.0	0.0	38.2	0.0	36.7	40.8	36.3	35.8
Incr Delay (d2), s/veh	7.0	0.3	0.0	2.3	6.1	0.1	0.2	0.0	0.8	0.9	0.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.3	5.4	0.2	0.4	3.7	0.0	0.9	0.0	4.0	3.4	3.8	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.3	5.9	4.2	3.4	6.1	0.1	38.3	0.0	37.5	41.7	36.8	36.2
LnGrp LOS	C	A	A	A	A	A	D	A	D	D	D	D
Approach Vol, veh/h		1371			3552			122				233
Approach Delay, s/veh		6.2			5.9			37.6				38.3
Approach LOS		A			A			D				D
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		76.5		23.5		76.5		23.5				
Change Period (Y+Rc), s		5.0		6.5		5.0		6.5				
Max Green Setting (Gmax), s		62.0		26.5		62.0		26.5				
Max Q Clear Time (g_c+I1), s		66.1		13.4		17.5		8.3				
Green Ext Time (p_c), s		0.0		0.8		39.6		0.4				
Intersection Summary												
HCM 6th Ctrl Delay				8.2								
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary
 15: Paterson St. & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑	↗	↖	↑		↖	↑	↗
Traffic Volume (veh/h)	51	3024	39	41	1562	66	47	98	126	108	121	44
Future Volume (veh/h)	51	3024	39	41	1562	66	47	98	126	108	121	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.99		0.97	0.99		0.96
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	1885	1885	1885	1870	1870	1870	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	52	3086	40	42	1594	67	48	100	129	110	123	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	216	3298	989	86	3272	982	316	179	231	227	460	375
Arrive On Green	0.85	0.85	0.85	0.64	0.64	0.64	0.25	0.24	0.24	0.25	0.24	0.24
Sat Flow, veh/h	302	5147	1543	70	5106	1532	1211	732	944	1149	1885	1536
Grp Volume(v), veh/h	52	3086	40	42	1594	67	48	0	229	110	123	45
Grp Sat Flow(s),veh/h/ln	302	1716	1543	70	1702	1532	1211	0	1676	1149	1885	1536
Q Serve(g_s), s	8.1	43.7	0.4	20.3	16.3	1.6	3.3	0.0	12.0	9.2	5.3	2.3
Cycle Q Clear(g_c), s	24.4	43.7	0.4	64.1	16.3	1.6	8.6	0.0	12.0	21.1	5.3	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.56	1.00		1.00
Lane Grp Cap(c), veh/h	216	3298	989	86	3272	982	316	0	409	227	460	375
V/C Ratio(X)	0.24	0.94	0.04	0.49	0.49	0.07	0.15	0.00	0.56	0.49	0.27	0.12
Avail Cap(c_a), veh/h	216	3298	989	86	3272	982	341	0	444	250	500	407
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.38	0.38	0.38	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.3	5.9	2.7	46.6	9.4	6.7	33.2	0.0	33.1	41.4	30.6	29.4
Incr Delay (d2), s/veh	1.0	2.8	0.0	4.2	0.1	0.0	0.2	0.0	1.3	1.6	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.8	6.9	0.2	2.0	9.1	0.9	1.8	0.0	8.7	4.9	4.4	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.3	8.6	2.7	50.8	9.5	6.8	33.4	0.0	34.4	43.0	30.9	29.6
LnGrp LOS	A	A	A	D	A	A	C	A	C	D	C	C
Approach Vol, veh/h		3178			1703			277			278	
Approach Delay, s/veh		8.6			10.4			34.2			35.5	
Approach LOS		A			B			C			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		69.1		30.9		69.1		30.9				
Change Period (Y+Rc), s		5.0		6.5		5.0		6.5				
Max Green Setting (Gmax), s		62.0		26.5		62.0		26.5				
Max Q Clear Time (g_c+I1), s		45.7		23.1		66.1		14.0				
Green Ext Time (p_c), s		14.8		0.4		0.0		1.0				
Intersection Summary												
HCM 6th Ctrl Delay				11.8								
HCM 6th LOS				B								

Queues

2: Brearly St & East Washington Ave.

02/14/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBR	SBR
Lane Group Flow (vph)	12	1438	3	116	3567	25	53	24
v/c Ratio	0.12	0.40	0.00	0.57	0.83	0.02	0.20	0.19
Control Delay	42.9	3.3	0.7	52.9	2.5	0.0	8.0	22.5
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	42.9	3.3	0.7	52.9	2.7	0.0	8.0	22.5
Queue Length 50th (ft)	7	73	0	80	4	0	0	1
Queue Length 95th (ft)	m20	93	m0	m86	m17	m0	24	26
Internal Link Dist (ft)		274			589			
Turn Bay Length (ft)	75		50	75		50		
Base Capacity (vph)	330	3560	1073	346	4290	1301	396	359
Starvation Cap Reductn	0	0	0	0	26	0	0	0
Spillback Cap Reductn	0	0	0	0	172	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.40	0.00	0.34	0.87	0.02	0.13	0.07

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

2: Brearly St & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗			↗			↗
Traffic Volume (vph)	11	1323	3	107	3282	23	0	0	49	0	0	22
Future Volume (vph)	11	1323	3	107	3282	23	0	0	49	0	0	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00			1.00			1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97			1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00			1.00			1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85			0.86			0.86
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00
Satd. Flow (prot)	1574	4524	1361	1652	4746	1438			1627			1627
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00
Satd. Flow (perm)	1574	4524	1361	1652	4746	1438			1627			1627
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	1438	3	116	3567	25	0	0	53	0	0	24
RTOR Reduction (vph)	0	0	1	0	0	1	0	0	46	0	0	21
Lane Group Flow (vph)	12	1438	2	116	3567	24	0	0	7	0	0	3
Confl. Peds. (#/hr)	3		6	6		3			2			3
Confl. Bikes (#/hr)									7			
Heavy Vehicles (%)	7%	7%	7%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm			Over			Over
Protected Phases	5	2		1	6				1			5
Permitted Phases			2			6						
Actuated Green, G (s)	4.2	78.7	78.7	12.3	86.8	86.8			12.3			4.2
Effective Green, g (s)	4.2	78.7	78.7	12.3	86.8	86.8			12.3			4.2
Actuated g/C Ratio	0.04	0.79	0.79	0.12	0.87	0.87			0.12			0.04
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0
Vehicle Extension (s)	3.0	5.0	5.0	3.0	5.0	5.0			3.0			3.0
Lane Grp Cap (vph)	66	3560	1071	203	4119	1248			200			68
v/s Ratio Prot	0.01	0.32		c0.07	c0.75				0.00			0.00
v/s Ratio Perm			0.00			0.02						
v/c Ratio	0.18	0.40	0.00	0.57	0.87	0.02			0.03			0.04
Uniform Delay, d1	46.2	3.3	2.3	41.4	3.5	0.9			38.6			46.0
Progression Factor	0.93	0.82	0.86	1.20	0.36	0.00			1.00			1.00
Incremental Delay, d2	1.3	0.1	0.0	1.5	1.0	0.0			0.1			0.3
Delay (s)	44.3	2.9	1.9	51.0	2.3	0.0			38.7			46.2
Level of Service	D	A	A	D	A	A			D			D
Approach Delay (s)		3.2			3.8			38.7			46.2	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	4.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues

2: Brearly St & East Washington Ave.

02/14/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBR	SBR
Lane Group Flow (vph)	35	3301	14	30	1697	9	108	6
v/c Ratio	0.27	0.86	0.01	0.17	0.40	0.01	0.56	0.04
Control Delay	40.9	4.8	0.9	37.3	1.8	0.8	43.8	0.5
Queue Delay	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	12.2	0.9	37.3	1.8	0.8	43.8	0.5
Queue Length 50th (ft)	23	94	0	18	65	0	53	0
Queue Length 95th (ft)	m27	169	m1	m36	96	m1	103	0
Internal Link Dist (ft)		270			589			
Turn Bay Length (ft)	75		50	75		50		
Base Capacity (vph)	350	3846	1153	346	4240	1254	359	373
Starvation Cap Reductn	0	24	0	0	0	0	0	0
Spillback Cap Reductn	0	541	0	0	0	0	1	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	1.00	0.01	0.09	0.40	0.01	0.30	0.02

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
2: Brearly St & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗			↗			↗	
Traffic Volume (vph)	34	3235	14	29	1663	9	0	0	106	0	0	6	
Future Volume (vph)	34	3235	14	29	1663	9	0	0	106	0	0	6	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12	
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.95			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Fr _t	1.00	1.00	0.85	1.00	1.00	0.85			0.86			0.86	
Fl _t Protected	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00	
Satd. Flow (prot)	1668	4793	1435	1652	4746	1403			1627			1627	
Fl _t Permitted	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00	
Satd. Flow (perm)	1668	4793	1435	1652	4746	1403			1627			1627	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
Adj. Flow (vph)	35	3301	14	30	1697	9	0	0	108	0	0	6	
RTOR Reduction (vph)	0	0	2	0	0	1	0	0	20	0	0	6	
Lane Group Flow (vph)	35	3301	12	30	1697	8	0	0	88	0	0	0	
Confl. Peds. (#/hr)	13		7	7		13			8			7	
Confl. Bikes (#/hr)			4										
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	1%	1%	1%	
Turn Type	Prot	NA	Perm	Prot	NA	Perm			Over			Over	
Protected Phases	5	2		1	6				1			5	
Permitted Phases			2			6							
Actuated Green, G (s)	5.3	80.3	80.3	10.7	85.7	85.7			10.7			5.3	
Effective Green, g (s)	5.3	80.3	80.3	10.7	85.7	85.7			10.7			5.3	
Actuated g/C Ratio	0.05	0.80	0.80	0.11	0.86	0.86			0.11			0.05	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0	
Vehicle Extension (s)	3.0	5.0	5.0	3.0	5.0	5.0			3.0			3.0	
Lane Grp Cap (vph)	88	3848	1152	176	4067	1202			174			86	
v/s Ratio Prot	0.02	c0.69		0.02	0.36				c0.05			0.00	
v/s Ratio Perm			0.01			0.01							
v/c Ratio	0.40	0.86	0.01	0.17	0.42	0.01			0.51			0.00	
Uniform Delay, d ₁	45.8	6.2	2.0	40.6	1.6	1.0			42.2			44.8	
Progression Factor	0.89	0.42	0.52	0.91	0.89	0.91			1.00			1.00	
Incremental Delay, d ₂	1.4	1.3	0.0	0.4	0.1	0.0			2.3			0.0	
Delay (s)	42.3	3.9	1.0	37.6	1.6	0.9			44.5			44.9	
Level of Service	D	A	A	D	A	A			D			D	
Approach Delay (s)		4.3			2.2			44.5			44.9		
Approach LOS		A			A			D			D		
Intersection Summary													
HCM 2000 Control Delay			4.5		HCM 2000 Level of Service				A				
HCM 2000 Volume to Capacity ratio			0.82										
Actuated Cycle Length (s)			100.0		Sum of lost time (s)				9.0				
Intersection Capacity Utilization			79.8%		ICU Level of Service				D				
Analysis Period (min)			15										

c Critical Lane Group

HCM 6th Signalized Intersection Summary
 17: Ingersoll St. & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗		↑	↗		↕	
Traffic Volume (veh/h)	22	1301	50	51	3361	48	30	52	50	54	30	22
Future Volume (veh/h)	22	1301	50	51	3361	48	30	52	50	54	30	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	23	1369	53	54	3538	51	32	55	53	57	32	23
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	80	3452	1072	338	3815	1184	103	142	234	115	54	29
Arrive On Green	0.68	0.68	0.68	0.03	0.75	0.75	0.14	0.12	0.12	0.14	0.12	0.12
Sat Flow, veh/h	43	5106	1585	1781	5106	1585	465	1219	1585	517	462	253
Grp Volume(v), veh/h	23	1369	53	54	3538	51	87	0	53	112	0	0
Grp Sat Flow(s),veh/h/ln	43	1702	1585	1781	1702	1585	1684	0	1585	1232	0	0
Q Serve(g_s), s	17.7	11.9	1.1	0.9	57.0	0.8	0.0	0.0	2.9	5.2	0.0	0.0
Cycle Q Clear(g_c), s	67.6	11.9	1.1	0.9	57.0	0.8	4.4	0.0	2.9	9.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.37		1.00	0.51		0.21
Lane Grp Cap(c), veh/h	80	3452	1072	338	3815	1184	288	0	234	229	0	0
V/C Ratio(X)	0.29	0.40	0.05	0.16	0.93	0.04	0.30	0.00	0.23	0.49	0.00	0.00
Avail Cap(c_a), veh/h	80	3452	1072	460	3855	1197	318	0	263	256	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.92	0.92	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	47.1	7.2	5.4	5.0	10.4	3.3	40.5	0.0	37.6	43.1	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.1	0.0	0.1	5.2	0.1	0.6	0.0	0.5	1.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.1	6.6	0.6	0.5	23.6	0.4	3.5	0.0	2.1	4.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.9	7.2	5.4	5.0	15.6	3.4	41.1	0.0	38.1	44.7	0.0	0.0
LnGrp LOS	D	A	A	A	B	A	D	A	D	D	A	A
Approach Vol, veh/h		1445			3643			140				112
Approach Delay, s/veh		7.8			15.3			39.9				44.7
Approach LOS		A			B			D				D
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	7.1	72.1		18.2		79.2		18.2				
Change Period (Y+Rc), s	4.0	4.5		6.5		4.5		6.5				
Max Green Setting (Gmax), s	10.0	61.5		13.5		75.5		13.5				
Max Q Clear Time (g_c+I1), s	2.9	69.6		6.4		59.0		11.6				
Green Ext Time (p_c), s	0.0	0.0		0.3		15.7		0.1				

Intersection Summary

HCM 6th Ctrl Delay	14.5
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 17: Ingersoll St. & East Washington Ave.

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗		↑	↗		↘	
Traffic Volume (veh/h)	38	3217	87	41	1612	43	52	46	68	96	43	36
Future Volume (veh/h)	38	3217	87	41	1612	43	52	46	68	96	43	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	3386	92	43	1697	45	55	48	72	101	45	38
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	239	3406	1057	154	3753	1165	155	115	290	136	48	33
Arrive On Green	1.00	1.00	1.00	0.03	0.74	0.74	0.18	0.16	0.16	0.18	0.16	0.16
Sat Flow, veh/h	277	5106	1585	1781	5106	1585	642	741	1585	520	310	216
Grp Volume(v), veh/h	40	3386	92	43	1697	45	103	0	72	184	0	0
Grp Sat Flow(s),veh/h/ln	277	1702	1585	1781	1702	1585	1383	0	1585	1046	0	0
Q Serve(g_s), s	1.8	0.0	0.0	0.7	13.2	0.8	0.0	0.0	3.9	11.5	0.0	0.0
Cycle Q Clear(g_c), s	8.2	0.0	0.0	0.7	13.2	0.8	6.2	0.0	3.9	17.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.53		1.00	0.55		0.21
Lane Grp Cap(c), veh/h	239	3406	1057	154	3753	1165	304	0	290	244	0	0
V/C Ratio(X)	0.17	0.99	0.09	0.28	0.45	0.04	0.34	0.00	0.25	0.75	0.00	0.00
Avail Cap(c_a), veh/h	239	3406	1057	300	3753	1165	304	0	290	244	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.41	0.41	0.41	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.4	0.0	0.0	4.3	5.3	3.6	37.5	0.0	35.0	44.4	0.0	0.0
Incr Delay (d2), s/veh	0.6	8.6	0.1	0.4	0.1	0.0	0.7	0.0	0.4	12.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.1	4.4	0.0	0.4	6.5	0.4	4.0	0.0	2.8	9.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.0	8.6	0.1	4.7	5.3	3.6	38.2	0.0	35.4	56.9	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D	A	D	E	A	A
Approach Vol, veh/h		3518			1785			175				184
Approach Delay, s/veh		8.3			5.3			37.0				56.9
Approach LOS		A			A			D				E
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.8	71.2		22.0		78.0		22.0				
Change Period (Y+Rc), s	4.0	4.5		6.5		4.5		6.5				
Max Green Setting (Gmax), s	11.0	58.5		15.5		73.5		15.5				
Max Q Clear Time (g_c+I1), s	2.7	10.2		8.2		15.2		19.7				
Green Ext Time (p_c), s	0.0	42.0		0.4		13.2		0.0				

Intersection Summary

HCM 6th Ctrl Delay	9.8
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	71	17	2	81	6	24	168	2	8	75	44
Future Vol, veh/h	20	71	17	2	81	6	24	168	2	8	75	44
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	4	4	4
Mvmt Flow	23	82	20	2	93	7	28	193	2	9	86	51
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	8.9	8.8	9.7	8.7
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	12%	19%	2%	6%
Vol Thru, %	87%	66%	91%	59%
Vol Right, %	1%	16%	7%	35%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	194	108	89	127
LT Vol	24	20	2	8
Through Vol	168	71	81	75
RT Vol	2	17	6	44
Lane Flow Rate	223	124	102	146
Geometry Grp	1	1	1	1
Degree of Util (X)	0.292	0.168	0.14	0.186
Departure Headway (Hd)	4.713	4.875	4.924	4.598
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	760	732	724	777
Service Time	2.759	2.929	2.981	2.648
HCM Lane V/C Ratio	0.293	0.169	0.141	0.188
HCM Control Delay	9.7	8.9	8.8	8.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.2	0.6	0.5	0.7

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	94	233	40	7	70	23	8	121	9	22	184	22
Future Vol, veh/h	94	233	40	7	70	23	8	121	9	22	184	22
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	3	3	3
Mvmt Flow	101	251	43	8	75	25	9	130	10	24	198	24
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	14.9	9.7	10.5	11.9
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	6%	26%	7%	10%
Vol Thru, %	88%	63%	70%	81%
Vol Right, %	7%	11%	23%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	367	100	228
LT Vol	8	94	7	22
Through Vol	121	233	70	184
RT Vol	9	40	23	22
Lane Flow Rate	148	395	108	245
Geometry Grp	1	1	1	1
Degree of Util (X)	0.234	0.57	0.166	0.377
Departure Headway (Hd)	5.685	5.198	5.567	5.536
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	629	695	642	650
Service Time	3.736	3.236	3.62	3.581
HCM Lane V/C Ratio	0.235	0.568	0.168	0.377
HCM Control Delay	10.5	14.9	9.7	11.9
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	0.9	3.6	0.6	1.8

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	33	26	1	51	13	99	24	22	10	25	19
Future Vol, veh/h	9	33	26	1	51	13	99	24	22	10	25	19
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	10	10	10	9	9	9	3	3	3	2	2	2
Mvmt Flow	12	44	35	1	68	17	132	32	29	13	33	25
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	8.2	8.3	9	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	68%	13%	2%	19%
Vol Thru, %	17%	49%	78%	46%
Vol Right, %	15%	38%	20%	35%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	145	68	65	54
LT Vol	99	9	1	10
Through Vol	24	33	51	25
RT Vol	22	26	13	19
Lane Flow Rate	193	91	87	72
Geometry Grp	1	1	1	1
Degree of Util (X)	0.242	0.115	0.112	0.088
Departure Headway (Hd)	4.497	4.583	4.656	4.4
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	800	782	770	815
Service Time	2.516	2.611	2.683	2.423
HCM Lane V/C Ratio	0.241	0.116	0.113	0.088
HCM Control Delay	9	8.2	8.3	7.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0.4	0.4	0.3

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	23	263	77	10	69	18	41	35	32	53	15	5
Future Vol, veh/h	23	263	77	10	69	18	41	35	32	53	15	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	4	4	4	2	2	2	1	1	1	1	1	1
Mvmt Flow	27	313	92	12	82	21	49	42	38	63	18	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

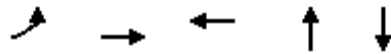
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13	8.9	9.5	9.4
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	38%	6%	10%	73%
Vol Thru, %	32%	72%	71%	21%
Vol Right, %	30%	21%	19%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	108	363	97	73
LT Vol	41	23	10	53
Through Vol	35	263	69	15
RT Vol	32	77	18	5
Lane Flow Rate	129	432	115	87
Geometry Grp	1	1	1	1
Degree of Util (X)	0.186	0.547	0.158	0.132
Departure Headway (Hd)	5.209	4.558	4.913	5.478
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	681	786	723	647
Service Time	3.298	2.617	2.993	3.573
HCM Lane V/C Ratio	0.189	0.55	0.159	0.134
HCM Control Delay	9.5	13	8.9	9.4
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.7	3.4	0.6	0.5

Queues

20: Paterson St & Williamson St

02/14/2019



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	92	510	1324	196	103
v/c Ratio	0.48	0.42	0.59	0.81	0.32
Control Delay	16.8	7.4	9.0	58.1	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	7.4	9.0	58.1	16.3
Queue Length 50th (ft)	20	102	145	94	17
Queue Length 95th (ft)	67	158	241	#201	59
Internal Link Dist (ft)		756	583	253	907
Turn Bay Length (ft)					
Base Capacity (vph)	193	1226	2235	248	324
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.48	0.42	0.59	0.79	0.32

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

20: Paterson St & Williamson St

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↔			↕			↕	
Traffic Volume (vph)	84	453	11	1	1134	70	138	40	0	23	14	57
Future Volume (vph)	84	453	11	1	1134	70	138	40	0	23	14	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			0.95			1.00			1.00	
Frbp, ped/bikes	1.00	1.00			1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			0.99			1.00			0.92	
Flt Protected	0.95	1.00			1.00			0.96			0.99	
Satd. Flow (prot)	1748	1837			3500			1808			1543	
Flt Permitted	0.16	1.00			0.95			0.71			0.93	
Satd. Flow (perm)	290	1837			3342			1326			1456	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	92	498	12	1	1246	77	152	44	0	25	15	63
RTOR Reduction (vph)	0	1	0	0	6	0	0	0	0	0	51	0
Lane Group Flow (vph)	92	509	0	0	1318	0	0	196	0	0	52	0
Confl. Peds. (#/hr)	10		5	5		10	2		10	10		2
Confl. Bikes (#/hr)			4						3			2
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	1%	1%	1%	10%	10%	10%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4 3			4 3	
Permitted Phases	2			2			4 3			4 3		
Actuated Green, G (s)	53.4	53.4			53.4			18.6			18.6	
Effective Green, g (s)	53.4	53.4			53.4			15.6			15.6	
Actuated g/C Ratio	0.67	0.67			0.67			0.19			0.19	
Clearance Time (s)	4.0	4.0			4.0							
Vehicle Extension (s)	5.0	5.0			5.0							
Lane Grp Cap (vph)	193	1226			2230			258			283	
v/s Ratio Prot		0.28										
v/s Ratio Perm	0.32				c0.39			c0.15			0.04	
v/c Ratio	0.48	0.42			0.59			0.76			0.18	
Uniform Delay, d1	6.5	6.1			7.3			30.4			26.9	
Progression Factor	1.00	1.00			1.06			1.00			1.00	
Incremental Delay, d2	8.2	1.0			1.1			14.2			0.7	
Delay (s)	14.7	7.2			8.8			44.7			27.6	
Level of Service	B	A			A			D			C	
Approach Delay (s)		8.3			8.8			44.7			27.6	
Approach LOS		A			A			D			C	

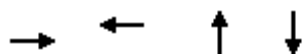
Intersection Summary

HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues

20: Paterson St & Williamson St

02/14/2019



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1466	645	105	242
v/c Ratio	0.69	0.53	0.46	0.82
Control Delay	10.4	14.2	35.0	49.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.4	14.2	35.0	49.9
Queue Length 50th (ft)	208	253	45	98
Queue Length 95th (ft)	281	384	93	#217
Internal Link Dist (ft)	756	583	253	907
Turn Bay Length (ft)				
Base Capacity (vph)	2111	1207	235	305
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.69	0.53	0.45	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

20: Paterson St & Williamson St

02/14/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕↕			↕↕	
Traffic Volume (vph)	63	1269	75	10	565	44	62	31	8	90	47	95
Future Volume (vph)	63	1269	75	10	565	44	62	31	8	90	47	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			1.00			1.00			1.00	
Frbp, ped/bikes		1.00			0.99			1.00			0.98	
Flpb, ped/bikes		1.00			1.00			0.99			0.99	
Frt		0.99			0.99			0.99			0.94	
Flt Protected		1.00			1.00			0.97			0.98	
Satd. Flow (prot)		3521			1849			1784			1685	
Flt Permitted		0.89			0.97			0.67			0.85	
Satd. Flow (perm)		3149			1800			1233			1466	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	66	1322	78	10	589	46	65	32	8	94	49	99
RTOR Reduction (vph)	0	5	0	0	3	0	0	4	0	0	31	0
Lane Group Flow (vph)	0	1461	0	0	642	0	0	101	0	0	211	0
Confl. Peds. (#/hr)	35		20	20		35	10		30	30		10
Confl. Bikes (#/hr)			6			3			2			1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4 3			4 3	
Permitted Phases	2			2			4 3			4 3		
Actuated Green, G (s)		53.5			53.5			18.5			18.5	
Effective Green, g (s)		53.5			53.5			15.5			15.5	
Actuated g/C Ratio		0.67			0.67			0.19			0.19	
Clearance Time (s)		4.0			4.0							
Vehicle Extension (s)		5.0			5.0							
Lane Grp Cap (vph)		2105			1203			238			284	
v/s Ratio Prot												
v/s Ratio Perm		c0.46			0.36			0.08			c0.14	
v/c Ratio		0.69			0.53			0.42			0.74	
Uniform Delay, d1		8.2			6.8			28.3			30.4	
Progression Factor		1.00			1.79			1.00			1.00	
Incremental Delay, d2		1.9			1.5			2.5			12.0	
Delay (s)		10.1			13.7			30.9			42.4	
Level of Service		B			B			C			D	
Approach Delay (s)		10.1			13.7			30.9			42.4	
Approach LOS		B			B			C			D	
Intersection Summary												
HCM 2000 Control Delay			15.1				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			80.0				Sum of lost time (s)		11.0			
Intersection Capacity Utilization			88.7%				ICU Level of Service				E	
Analysis Period (min)			15									
c	Critical Lane Group											

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	54	415	7	3	1163	91	2	0	3	13	0	39
Future Vol, veh/h	54	415	7	3	1163	91	2	0	3	13	0	39
Conflicting Peds, #/hr	12	0	3	3	0	12	1	0	6	6	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	25	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	3	3	3	2	2	2	50	50	50	1	1	1
Mvmt Flow	61	466	8	3	1307	102	2	0	3	15	0	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1421	0	0	477	0	0	1256	2022	479	1976	1975	718
Stage 1	-	-	-	-	-	-	595	595	-	1376	1376	-
Stage 2	-	-	-	-	-	-	661	1427	-	600	599	-
Critical Hdwy	4.145	-	-	4.13	-	-	8.05	7.25	6.95	7.315	6.515	6.915
Critical Hdwy Stg 1	-	-	-	-	-	-	6.85	6.25	-	6.515	5.515	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.25	6.25	-	6.115	5.515	-
Follow-up Hdwy	2.2285	-	-	2.219	-	-	3.975	4.475	3.775	3.5095	4.0095	3.3095
Pot Cap-1 Maneuver	473	-	-	1083	-	-	101	37	481	42	62	374
Stage 1	-	-	-	-	-	-	398	405	-	154	213	-
Stage 2	-	-	-	-	-	-	337	144	-	489	492	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	468	-	-	1080	-	-	79	31	477	37	53	370
Mov Cap-2 Maneuver	-	-	-	-	-	-	79	31	-	37	53	-
Stage 1	-	-	-	-	-	-	345	352	-	133	208	-
Stage 2	-	-	-	-	-	-	293	141	-	420	427	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.6			0.1			28.6			65.9		
HCM LOS							D			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	158	468	-	-	1080	-	-	114
HCM Lane V/C Ratio	0.036	0.13	-	-	0.003	-	-	0.513
HCM Control Delay (s)	28.6	13.8	-	-	8.3	0.1	-	65.9
HCM Lane LOS	D	B	-	-	A	A	-	F
HCM 95th %tile Q(veh)	0.1	0.4	-	-	0	-	-	2.4

Intersection												
Int Delay, s/veh	6.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↔			↕↔			↕↔			↕↔	
Traffic Vol, veh/h	53	1282	32	6	556	53	9	2	8	45	2	55
Future Vol, veh/h	53	1282	32	6	556	53	9	2	8	45	2	55
Conflicting Peds, #/hr	26	0	9	9	0	26	11	0	15	15	0	11
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	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	55	1322	33	6	573	55	9	2	8	46	2	57

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	654	0	0	1364	0	0	2111	2124	702	1426	2113	638
Stage 1	-	-	-	-	-	-	1458	1458	-	639	639	-
Stage 2	-	-	-	-	-	-	653	666	-	787	1474	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.315	6.515	6.915	7.315	6.515	6.215
Critical Hdwy Stg 1	-	-	-	-	-	-	6.515	5.515	-	6.115	5.515	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.115	5.515	-	6.515	5.515	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5095	4.0095	3.3095	3.5095	4.0095	3.3095
Pot Cap-1 Maneuver	937	-	-	506	-	-	33	50	383	105	51	478
Stage 1	-	-	-	-	-	-	137	195	-	466	472	-
Stage 2	-	-	-	-	-	-	457	458	-	354	191	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	917	-	-	502	-	-	22	36	375	76	37	463
Mov Cap-2 Maneuver	-	-	-	-	-	-	22	36	-	76	37	-
Stage 1	-	-	-	-	-	-	102	146	-	344	453	-
Stage 2	-	-	-	-	-	-	388	439	-	254	143	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.3			0.1			168.1			93.8		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	39	917	-	-	502	-	-	133
HCM Lane V/C Ratio	0.502	0.06	-	-	0.012	-	-	0.791
HCM Control Delay (s)	168.1	9.2	1	-	12.3	0	-	93.8
HCM Lane LOS	F	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	1.8	0.2	-	-	0	-	-	4.8

HCM 6th TWSC
 13: North Access & East Washington Ave.

02/14/2019

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↑↑↑		↑
Traffic Vol, veh/h	1331	6	0	3303	0	7
Future Vol, veh/h	1331	6	0	3303	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	75	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1401	6	0	3477	0	7

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	-	-	-	701
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	0	327
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	327
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	16.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	327	-	-	-
HCM Lane V/C Ratio	0.023	-	-	-
HCM Control Delay (s)	16.3	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↑↑↑		↑
Traffic Vol, veh/h	3253	6	0	1669	0	29
Future Vol, veh/h	3253	6	0	1669	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	75	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3424	6	0	1757	0	31

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	1712
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	68
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	68
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	95.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	68	-	-	-
HCM Lane V/C Ratio	0.449	-	-	-
HCM Control Delay (s)	95.4	-	-	-
HCM Lane LOS	F	-	-	-
HCM 95th %tile Q(veh)	1.8	-	-	-

HCM 6th TWSC
 24: Brearly St & East Access

02/14/2019

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	3	6	40	51	60
Future Vol, veh/h	10	3	6	40	51	60
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	3	6	42	54	63

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	140	86	117	0	0
Stage 1	86	-	-	-	-
Stage 2	54	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	853	973	1471	-	-
Stage 1	937	-	-	-	-
Stage 2	969	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	850	973	1471	-	-
Mov Cap-2 Maneuver	850	-	-	-	-
Stage 1	933	-	-	-	-
Stage 2	969	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1471	-	876	-	-
HCM Lane V/C Ratio	0.004	-	0.016	-	-
HCM Control Delay (s)	7.5	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 6th TWSC
24: Brearly St & East Access

02/14/2019

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	39	41	9	67	32	11
Future Vol, veh/h	39	41	9	67	32	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	41	43	9	71	34	12

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	129	40	46	0	0
Stage 1	40	-	-	-	-
Stage 2	89	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	865	1031	1562	-	-
Stage 1	982	-	-	-	-
Stage 2	934	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	860	1031	1562	-	-
Mov Cap-2 Maneuver	860	-	-	-	-
Stage 1	976	-	-	-	-
Stage 2	934	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1562	-	940	-	-
HCM Lane V/C Ratio	0.006	-	0.09	-	-
HCM Control Delay (s)	7.3	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	38	43	65	104	25	24
Future Vol, veh/h	38	43	65	104	25	24
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	45	68	109	26	25

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	177	0	-	0	248
Stage 1	-	-	-	-	123
Stage 2	-	-	-	-	125
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1399	-	-	-	740
Stage 1	-	-	-	-	902
Stage 2	-	-	-	-	901
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1399	-	-	-	719
Mov Cap-2 Maneuver	-	-	-	-	719
Stage 1	-	-	-	-	876
Stage 2	-	-	-	-	901

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1399	-	-	-	808
HCM Lane V/C Ratio	0.029	-	-	-	0.064
HCM Control Delay (s)	7.6	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

HCM 6th TWSC
18: Main St & South Access

02/14/2019

Intersection						
Int Delay, s/veh	5.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	54	210	66	49	152	34
Future Vol, veh/h	54	210	66	49	152	34
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	221	69	52	160	36

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	121	0	-	0	430 95
Stage 1	-	-	-	-	95 -
Stage 2	-	-	-	-	335 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1467	-	-	-	582 962
Stage 1	-	-	-	-	929 -
Stage 2	-	-	-	-	725 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1467	-	-	-	556 962
Mov Cap-2 Maneuver	-	-	-	-	556 -
Stage 1	-	-	-	-	888 -
Stage 2	-	-	-	-	725 -

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1467	-	-	-	602
HCM Lane V/C Ratio	0.039	-	-	-	0.325
HCM Control Delay (s)	7.6	0	-	-	13.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.4

HCM 6th TWSC
14: Paterson St. & West Access

02/14/2019

Intersection						
Int Delay, s/veh	3.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	37	76	117	103	90
Future Vol, veh/h	36	37	76	117	103	90
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	39	80	123	108	95

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	453	142	0	0	203
Stage 1	142	-	-	-	-
Stage 2	311	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	565	906	-	-	1369
Stage 1	885	-	-	-	-
Stage 2	743	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	518	906	-	-	1369
Mov Cap-2 Maneuver	518	-	-	-	-
Stage 1	812	-	-	-	-
Stage 2	743	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	4.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	662	1369
HCM Lane V/C Ratio	-	-	0.116	0.079
HCM Control Delay (s)	-	-	11.2	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0.3

HCM 6th TWSC
14: Paterson St. & West Access

02/14/2019

Intersection						
Int Delay, s/veh	4.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	87	86	185	53	59	141
Future Vol, veh/h	87	86	185	53	59	141
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	92	91	195	56	62	148

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	495	223	0	0	251
Stage 1	223	-	-	-	-
Stage 2	272	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	534	817	-	-	1314
Stage 1	814	-	-	-	-
Stage 2	774	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	507	817	-	-	1314
Mov Cap-2 Maneuver	507	-	-	-	-
Stage 1	772	-	-	-	-
Stage 2	774	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	2.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	625	1314
HCM Lane V/C Ratio	-	-	0.291	0.047
HCM Control Delay (s)	-	-	13.1	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.1

APPENDIX I
TRAFFIC OPERATIONS SUMMARY TABLES

AM PEAK HOUR

Paterson St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	11						9.1
		NBT	31	40.7	D	0.29	75		
		NBR	25						
Eastbound	EBL	EBL	27	34.3	C	0.28	40	Intersection LOS	
		EBT	1071	4.0	A	0.31	85		
		EBR	5	2.9	A	0.00	25		
Southbound	SBL	SBL	65	39.7	D	0.27	75	A	
		SBT	40	39.7	D	0.19	45		
		SBR	47	40.5	D	0.27	55		
Westbound	WBL	WBL	34	5.7	A	0.09	25	Max Movement V/C	
		WBT	279	8.5	A	0.77	355		
		WBR	31	3.0	A	0.03	25		
Operations: HCM 6									

Breary St / E Washington Ave

Control	Two Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Max Delay (s)
Northbound	NBL	NBL							>150
		NBT							
		NBR	35	16.1	C	0.11	25		
Eastbound	EBL	EBL	10	>150	F	0.38	30	Intersection LOS	
		EBT	1148						
		EBR	3						
Southbound	SBL	SBL						F	
		SBT							
		SBR	19	57.3	F	0.23	25		
Westbound	WBL	WBL	42	19.5	C	0.16	25	Max Movement V/C	
		WBT	2938						
		WBR	20						
Operations: HCM 6									

Ingersoll St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	26	42.2	D	0.28	80	6.7	
		NBT	46	42.2	D	0.28	50		
		NBR	44	42.6	D	0.28	50		
Eastbound	EBL	EBL	19	9.6	A	0.18	25	Intersection LOS	
		EBT	1120	0.2	A	0.32	25		
		EBR	44	0.1	A	0.04	25		
Southbound	SBL	SBL	47	45.2	D	0.45	105	A	
		SBT	26						
		SBR	19						
Westbound	WBL	WBL	45	2.8	A	0.10	25	Max Movement V/C	
		WBT	2853	6.7	A	0.75	292		
		WBR	42	2.3	A	0.04	25		
Operations: HCM 6									

Paterson St / Main St

Control	All Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	21						7.7
		NBT	33	7.9	A	0.11	25		
		NBR	2						
Eastbound	EBL	EBL	9					Intersection LOS	
		EBT	29	7.6	A	0.07	25		
		EBR	15						
Southbound	SBL	SBL	7					A	
		SBT	39	7.6	A	0.10	25		
		SBR	33						
Westbound	WBL	WBL	2					Max Movement V/C	
		WBT	50	7.7	A	0.08	25		
		WBR	5						
Operations: HCM 6									

Breary St / Main St

Control	All Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	9						7.5
		NBT	21	7.4	A	0.07	25		
		NBR	19						
Eastbound	EBL	EBL	8					Intersection LOS	
		EBT	23	7.6	A	0.06	25		
		EBR	7						
Southbound	SBL	SBL	6					A	
		SBT	22	7.3	A	0.07	25		
		SBR	17						
Westbound	WBL	WBL	1					Max Movement V/C	
		WBT	31	7.6	A	0.06	25		
		WBR	6						
Operations: HCM 6									

Paterson St / Williamson St

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	12						10.0
		NBT	15	34.8	C	0.58	130		
		NBR	0						
Eastbound	EBL	EBL	32					Intersection LOS	
		EBT	372	6.9	A	0.41	150		
		EBR	10						
Southbound	SBL	SBL	16					A	
		SBT	6	27.8	C	0.12	45		
		SBR	34						
Westbound	WBL	WBL	1	6.9	A	0.49	170	Max Movement V/C	
		WBT	985	6.9	A	0.49	170		
		WBR	26	6.9	A	0.49	170		
Operations: HCM 2000									

Breary St / Williamson St

Control	Two Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Max Delay (s)
Northbound	NBL	NBL	0						22.2
		NBT	0	20.0	C	0.02	25		
		NBR	3						
Eastbound	EBL	EBL	22					Intersection LOS	
		EBT	390	11.3	B	0.04	25		
		EBR	6						
Southbound	SBL	SBL	5					C	
		SBT	0	22.2	C	0.14	25		
		SBR	25						
Westbound	WBL	WBL	3	8.2	A	0.00	25	Max Movement V/C	
		WBT	985	8.2	A	0.00	25		
		WBR	27	8.2	A	0.00	25		
Operations: HCM 6									

PM PEAK HOUR

Paterson St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	25						11.1
		NBT	51	36.6	D	0.49	170		
		NBR	85						
Eastbound	EBL	EBL	45	10.1	B	0.18	25	Intersection LOS	
		EBT	2948	8.9	A	0.74	355		
		EBR	24	4.3	A	0.02	25		
Southbound	SBL	SBL	95	38.3	D	0.36	100	B	
		SBT	72	35.6	D	0.22	70		
		SBR	39	35.1	D	0.15	40		
Westbound	WBL	WBL	29	31.6	C	0.28	35	Max Movement V/C	
		WBT	1370	6.2	A	0.39	150		
		WBR	58	4.5	A	0.03	25		
Operations: HCM 6									

Breary St / E Washington Ave

Control	Two Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Max Delay (s)
Northbound	NBL	NBL							125.0
		NBT							
		NBR	99	77.7	F	0.57	70		
Eastbound	EBL	EBL	30	23.7	C	0.14	25	Intersection LOS	
		EBT	2796						
		EBR	12						
Southbound	SBL	SBL						F	
		SBT							
		SBR	5	17.4	C	0.02	25		
Westbound	WBL	WBL	16	125.0	F	0.38	35	Max Movement V/C	
		WBT	1451						
		WBR	8						
Operations: HCM 6									

Ingersoll St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	46	37.2	D	0.28	90	6.1	
		NBT	40						
		NBR	60	37.3	D	0.25	65		
Eastbound	EBL	EBL	33	1.0	A	0.12	25	Intersection LOS	
		EBT	2736	2.9	A	0.85	40		
		EBR	76	0.1	A	0.08	25		
Southbound	SBL	SBL	84					A	
		SBT	38	44.4	D	0.59	180		
		SBR	32						
Westbound	WBL	WBL	36	4.5	A	0.22	25	Max Movement V/C	
		WBT	1397	5.4	A	0.39	140		
		WBR	38	3.6	A	0.03	25		
Operations: HCM 6									

Paterson St / Main St

Control	All Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	7						9.3
		NBT	71	8.6	A	0.13	25		
		NBR	8						
Eastbound	EBL	EBL	71					Intersection LOS	
		EBT	157	10.0	A	0.36	40		
		EBR	35						
Southbound	SBL	SBL	19					A	
		SBT	93	9.0	A	0.18	25		
		SBR	12						
Westbound	WBL	WBL	6					Max Movement V/C	
		WBT	32	8.1	A	0.08	25		
		WBR	20						
Operations: HCM 6									

Breary St / Main St

Control	All Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	12						8.4
		NBT	31	7.9	A	0.10	25		
		NBR	28						
Eastbound	EBL	EBL	20					Intersection LOS	
		EBT	147	8.8	A	0.28	30		
		EBR	17						
Southbound	SBL	SBL	14					A	
		SBT	13	7.9	A	0.05	25		
		SBR	4						
Westbound	WBL	WBL	9					Max Movement V/C	
		WBT	42	7.8	A	0.09	25		
		WBR	8						
Operations: HCM 6									

Paterson St / Williamson St

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Northbound	NBL	NBL	54						9.6
		NBT	20	31.1	C	0.34	75		
		NBR	7						
Eastbound	EBL	EBL	35	7.0	A	0.55	205	Intersection LOS	
		EBT	1102	7.0	A	0.55	205		
		EBR	66	7.0	A	0.55	205		
Southbound	SBL	SBL	59					A	
		SBT	27	32.7	C	0.45	105		
		SBR	48						
Westbound	WBL	WBL	9					Max Movement V/C	
		WBT	475	6.3	A	0.42	170		
		WBR	30						
Operations: HCM 2000									

AM PEAK HOUR

Paterson St / E Washington Ave

Control		Signal Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	13							11.6
	NBT	35	41.1	D	0.33	90			
	NBR	25							
Eastbound	EBL	31	56.7	E	0.39	50		B	
	EBT	1221	4.2	A	0.35	100			
	EBR	6	2.9	A	0.01	25			
Southbound	SBL	17	40.4	D	0.32	85		0.88	
	SBT	45	39.8	D	0.21	50			
	SBR	54	40.8	D	0.31	60			
Westbound	WBL	39	6.6	A	0.12	25		0.88	
	WBT	3181	11.9	B	0.68	445			
	WBR	35	3.0	A	0.03	25			
Operations: HCM 6									

Breary St / E Washington Ave

Control		Two Way Stop Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Max Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	30							>150
	NBT	52	41.1	D	0.30	90			
	NBR	40	18.1	C	0.14	25			
Eastbound	EBL	11	>150	F	0.66	45		F	
	EBT	1309							
	EBR	3							
Southbound	SBL	8						0.66	
	SBT	22	93.6	F	0.38	35			
	SBR	48	24.1	C	0.22	25			
Westbound	WBL	48	24.1	C	0.22	25		0.66	
	WBT	3233							
	WBR	23							
Operations: HCM 6									

Ingersoll St / E Washington Ave

Control		Signal Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	30							11.7
	NBT	52	41.1	D	0.30	90			
	NBR	50	38.1	D	0.23	55			
Eastbound	EBL	22	30.5	C	0.28	25		B	
	EBT	1277	0.1	A	0.39	25			
	EBR	50	0.0	A	0.05	25			
Southbound	SBL	54	44.7	D	0.49	125		0.91	
	SBT	30							
	SBR	22							
Westbound	WBL	51	4.1	A	0.14	25		0.91	
	WBT	3252	14.4	B	0.91	555			
	WBR	48	3.6	A	0.04	25			
Operations: HCM 6									

Paterson St / Main St

Control		All Way Stop Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	24							7.9
	NBT	60	8.1	A	0.12	25			
	NBR	2							
Eastbound	EBL	10						A	
	EBT	33	7.7	A	0.08	25			
	EBR	17							
Southbound	SBL	8						0.12	
	SBT	44	7.8	A	0.12	25			
	SBR	38							
Westbound	WBL	2						0.12	
	WBT	6	7.9	A	0.09	25			
	WBR	6							
Operations: HCM 6									

Breary St / Main St

Control		All Way Stop Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	10							7.5
	NBT	24	7.5	A	0.09	25			
	NBR	22							
Eastbound	EBL	9						A	
	EBT	28	7.7	A	0.07	25			
	EBR	8							
Southbound	SBL	7						0.09	
	SBT	25	7.4	A	0.08	25			
	SBR	19							
Westbound	WBL	8						0.09	
	WBT	35	7.6	A	0.07	25			
	WBR	7							
Operations: HCM 6									

Paterson St / Williamson St

Control		Signal Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	158							11.1
	NBT	21	37.6	D	0.66	165			
	NBR	0							
Eastbound	EBL	36						B	
	EBT	423	8.0	A	0.49	185			
	EBR	11							
Southbound	SBL	18						0.66	
	SBT	7	27.5	C	0.13	50			
	SBR	39							
Westbound	WBL	1	7.8	A	0.56	205		0.66	
	WBT	1123	7.8	A	0.56	205			
	WBR	30	7.8	A	0.56	205			
Operations: HCM 2000									

Breary St / Williamson St

Control		Two Way Stop Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Max Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	108							30.2
	NBT	0	24.0	C	0.03	25			
	NBR	3							
Eastbound	EBL	25						D	
	EBT	410	12.4	B	0.05	25			
	EBR	7							
Southbound	SBL	6						0.22	
	SBT	0	30.2	D	0.22	25			
	SBR	29							
Westbound	WBL	3	8.3	A	0.00	25		0.22	
	WBT	1123	8.3	A	0.00	25			
	WBR	31	8.3	A	0.00	25			
Operations: HCM 6									

PM PEAK HOUR

Paterson St / E Washington Ave

Control		Signal Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	30							13.2
	NBT	58	38.0	D	0.52	195			
	NBR	97							
Eastbound	EBL	51	13.0	B	0.22	30		B	
	EBT	2019	13.2	B	0.86	445			
	EBR	27	4.8	A	0.03	25			
Southbound	SBL	108	38.3	D	0.41	115		0.86	
	SBT	82	34.6	C	0.23	80			
	SBR	44	34.0	C	0.15	45			
Westbound	WBL	32	48.6	D	0.37	40		0.86	
	WBT	1562	6.9	A	0.45	190			
	WBR	66	4.9	A	0.06	25			
Operations: HCM 6									

Breary St / E Washington Ave

Control		Two Way Stop Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Max Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	30							>150
	NBT	52	41.1	D	0.30	90			
	NBR	67	>150	F	0.90	115			
Eastbound	EBL	34	30.6	D	0.20	25		F	
	EBT	3176							
	EBR	14							
Southbound	SBL	8						0.90	
	SBT	6	19.6	C	0.02	25			
	SBR	18	>150	F	0.68	55			
Westbound	WBL	18	>150	F	0.68	55		0.90	
	WBT	1654							
	WBR	9							
Operations: HCM 6									

Ingersoll St / E Washington Ave

Control		Signal Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	52	37.2	D	0.32	100		11.3	
	NBT	46							
	NBR	68	34.5	C	0.24	70			
Eastbound	EBL	38	1.9	A	0.17	25		B	
	EBT	3119	11.3	B	0.98	160			
	EBR	67	0.2	A	0.09	25			
Southbound	SBL	96						0.98	
	SBT	43	50.9	D	0.70	215			
	SBR	36							
Westbound	WBL	41	4.9	A	0.27	25		0.98	
	WBT	1593	5.7	A	0.45	170			
	WBR	43	3.9	A	0.04	25			
Operations: HCM 6									

Paterson St / Main St

Control		All Way Stop Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	8							10.0
	NBT	61	9.0	A	0.15	25			
	NBR	9							
Eastbound	EBL	81						A	
	EBT	179	10.9	B	0.42	50			
	EBR	40							
Southbound	SBL	22						0.42	
	SBT	106	9.4	A	0.21	25			
	SBR	14							
Westbound	WBL	7						0.42	
	WBT	36	8.4	A	0.10	25			
	WBR	23							
Operations: HCM 6									

Breary St / Main St

Control		All Way Stop Control		Volume	Delay (s)	LOS	V/C	95th Queue (ft)	Intersection Delay (s)
Approach	Movement	Volume	Delay (s)						
Northbound	NBL	14							8.7
	NBT	35	8.2	A	0.12	25			
	NBR	32							
Eastbound	EBL	23						A	
	EBT	168	9.2	A	0.30	35			
	EBR	19							
Southbound	SBL	13						0.30	
	SBT	15	8.1	A	0.05	25			

AM PEAK HOUR

Paterson St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	Signal	NBL	52	37.9	D	0.12	25		8.2
		NBL	52	37.9	D	0.12	25		
Eastbound	Signal	EBL	31	20.3	C	0.31	25		A
		EBL	31	20.3	C	0.31	25		
Southbound	Signal	SBL	74	41.7	B	0.55	25		0.94
		SBL	74	41.7	B	0.55	25		
Westbound	Signal	WBL	38	23.9	A	0.24	25		0.02
		WBL	38	23.9	A	0.24	25		
Operations: HCM 5									

E Washington Ave Access

Control	Two-Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Max Delay (s)
Northbound	Two-Way Stop Control	NBL							16.3
		NBL							
Eastbound	Two-Way Stop Control	EBL	7	16.5	C	0.35	25		C
		EBL	7	16.5	C	0.35	25		
Southbound	Two-Way Stop Control	SBL							0.02
		SBL							
Westbound	Two-Way Stop Control	WBL	200						HCM 5
		WBL	200						
Operations: HCM 5									

Brenary St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	Signal	NBL	21	41.1	D	0.30	25		4.2
		NBL	21	41.1	D	0.30	25		
Eastbound	Signal	EBL	22	48.9	D	0.29	25		A
		EBL	22	48.9	D	0.29	25		
Southbound	Signal	SBL	34	44.7	D	0.40	25		0.87
		SBL	34	44.7	D	0.40	25		
Westbound	Signal	WBL	20	23.0	A	0.22	25		0.02
		WBL	20	23.0	A	0.22	25		
Operations: HCM 5									

Ingersoll St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	Signal	NBL	32	41.1	D	0.30	25		14.5
		NBL	32	41.1	D	0.30	25		
Eastbound	Signal	EBL	22	48.9	D	0.29	25		A
		EBL	22	48.9	D	0.29	25		
Southbound	Signal	SBL	34	44.7	D	0.40	25		0.93
		SBL	34	44.7	D	0.40	25		
Westbound	Signal	WBL	20	23.0	A	0.22	25		HCM 5
		WBL	20	23.0	A	0.22	25		
Operations: HCM 5									

ARCHIPELAGO VILLAGE

Paterson St Access

Control	Two-Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Max Delay (s)
Northbound	Two-Way Stop Control	NBL							11.2
		NBL							
Eastbound	Two-Way Stop Control	EBL							B
		EBL							
Southbound	Two-Way Stop Control	SBL	103	7.9	A	0.08	25		0.12
		SBL	103	7.9	A	0.08	25		
Westbound	Two-Way Stop Control	WBL	35	11.2	B	0.12	25		HCM 5
		WBL	35	11.2	B	0.12	25		
Operations: HCM 5									

Main St Access

Control	Two-Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Max Delay (s)
Northbound	Two-Way Stop Control	NBL							9.8
		NBL							
Eastbound	Two-Way Stop Control	EBL	36	7.6	A	0.03	25		A
		EBL	36	7.6	A	0.03	25		
Southbound	Two-Way Stop Control	SBL	29	9.8	A	0.06	25		0.06
		SBL	29	9.8	A	0.06	25		
Westbound	Two-Way Stop Control	WBL	104						HCM 5
		WBL	104						
Operations: HCM 5									

Brenary St Access

Control	Two-Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Max Delay (s)
Northbound	Two-Way Stop Control	NBL	8	7.5	A	0.03	25		9.2
		NBL	8	7.5	A	0.03	25		
Eastbound	Two-Way Stop Control	EBL	34	9.2	A	0.02	25		A
		EBL	34	9.2	A	0.02	25		
Southbound	Two-Way Stop Control	SBL	31						0.02
		SBL	31						
Westbound	Two-Way Stop Control	WBL							HCM 5
		WBL							
Operations: HCM 5									

Brenary St / Main St

Control	All-Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	All-Way Stop Control	NBL	20	9.0	A	0.24	25		8.5
		NBL	20	9.0	A	0.24	25		
Eastbound	All-Way Stop Control	EBL	8	8.0	A	0.10	25		A
		EBL	8	8.0	A	0.10	25		
Southbound	All-Way Stop Control	SBL	20	7.8	A	0.09	25		0.24
		SBL	20	7.8	A	0.09	25		
Westbound	All-Way Stop Control	WBL	11	8.3	A	0.11	25		HCM 5
		WBL	11	8.3	A	0.11	25		
Operations: HCM 5									

Paterson St / Main St

Control	All-Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	All-Way Stop Control	NBL	188	9.7	A	0.29	25		9.1
		NBL	188	9.7	A	0.29	25		
Eastbound	All-Way Stop Control	EBL	20	8.9	A	0.17	25		A
		EBL	20	8.9	A	0.17	25		
Southbound	All-Way Stop Control	SBL	75	8.7	A	0.19	25		0.29
		SBL	75	8.7	A	0.19	25		
Westbound	All-Way Stop Control	WBL	81	8.8	A	0.14	25		HCM 5
		WBL	81	8.8	A	0.14	25		
Operations: HCM 5									

Paterson St / Williamson St

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	Signal	NBL	138	44.7	D	0.76	200		12.7
		NBL	138	44.7	D	0.76	200		
Eastbound	Signal	EBL	64	14.7	B	0.48	70		B
		EBL	64	14.7	B	0.48	70		
Southbound	Signal	SBL	23	27.6	C	0.40	160		0.76
		SBL	23	27.6	C	0.40	160		
Westbound	Signal	WBL	13	8.8	A	0.59	245		HCM 2000
		WBL	13	8.8	A	0.59	245		
Operations: HCM 2000									

Brenary St / Williamson St

Control	Two-Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Max Delay (s)
Northbound	Two-Way Stop Control	NBL	2	28.4	D	0.04	25		65.9
		NBL	2	28.4	D	0.04	25		
Eastbound	Two-Way Stop Control	EBL	21	13.8	B	0.13	25		F
		EBL	21	13.8	B	0.13	25		
Southbound	Two-Way Stop Control	SBL	13	65.8	F	0.51	60		0.51
		SBL	13	65.8	F	0.51	60		
Westbound	Two-Way Stop Control	WBL	11	8.3	A	0.03	25		HCM 5
		WBL	11	8.3	A	0.03	25		
Operations: HCM 5									

PM PEAK HOUR

Paterson St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	Signal	NBL	47	33.4	C	0.15	45		11.8
		NBL	47	33.4	C	0.15	45		
Eastbound	Signal	EBL	21	9.3	A	0.24	25		B
		EBL	21	9.3	A	0.24	25		
Southbound	Signal	SBL	138	43.2	D	0.49	125		0.94
		SBL	138	43.2	D	0.49	125		
Westbound	Signal	WBL	41	30.8	C	0.27	110		0.45
		WBL	41	30.8	C	0.27	110		
Operations: HCM 5									

E Washington Ave Access

Control	Two-Way Stop Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Max Delay (s)
Northbound	Two-Way Stop Control	NBL							95.4
		NBL							
Eastbound	Two-Way Stop Control	EBL	23	25.4	F	0.45	45		F
		EBL	23	25.4	F	0.45	45		
Southbound	Two-Way Stop Control	SBL	6						0.45
		SBL	6						
Westbound	Two-Way Stop Control	WBL	166						HCM 5
		WBL	166						
Operations: HCM 5									

Brenary St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	Signal	NBL	21	44.3	D	0.51	100		4.5
		NBL	21	44.3	D	0.51	100		
Eastbound	Signal	EBL	20	42.5	D	0.49	25		A
		EBL	20	42.5	D	0.49	25		
Southbound	Signal	SBL	34	44.7	D	0.30	25		0.86
		SBL	34	44.7	D	0.30	25		
Westbound	Signal	WBL	10	11.8	A	0.11	25		0.09
		WBL	10	11.8	A	0.11	25		
Operations: HCM 5									

Ingersoll St / E Washington Ave

Control	Signal Control	Approach	Movement	Volume	Delay (s)	LOS	V/C	SPP Queue (ft)	Intersection Delay (s)
Northbound	Signal	NBL	32	38.2	D	0.34	100		9.8
		NBL	32	38.2	D	0.34	100		
Eastbound	Signal	EBL	22	48.9	D	0.25	25		A
		EBL	22	48.9	D	0.25	25		
Southbound	Signal	SBL	34	44.7	D	0.37	25		0.99
		SBL	34	44.7	D	0.37	25		
Westbound	Signal	WBL	10	11.2	A	0.10	100		HCM 5