140 Allstate Parkway, Suite 210
Markham, ON L3R 5Y8
Canada
ghd.com

Our ref: 12644763

August 6, 2026

Amanda Wyszynski, BATech, MES (PI), MCIP, RPP
Senior Development Planner
Development Planning
Integrated Planning & Public Works
City of Waterloo
amanda.wyszynski@waterloo.ca

Susanna Reid, MCIP, RPP
Senior Planner
Regional Development Services
Region of Waterloo

Subject: **Response Letter to Transportation Impact Study**
Proposed Redevelopment
170-180 Columbia Street West
City of Waterloo, Region of waterloo

Dear Amanda and Susanna,

GHD Limited (GHD) is pleased to submit our responses to traffic-related comments received from the City of Waterloo and from the Region of Waterloo regarding the Transportation Impact Study (TIS), dated April 23, 2025, and Response Letter dated January 22, 2026.

The City comments from Development Planning are dated April 20, 2026. The Region comments from Regional Development Services are dated March 18, 2026.

Based on the City and Region's TIS comments, additional analysis was conducted and built from the information contained in the 2025 TIS and the current site plan. This analysis is presented below first (**Sections 1-7**) and followed by our responses to the specific comments (**Section 8**).

1. SITE PLAN

Based on the current site plan (provided in **Appendix A**), the proposed redevelopment consists of 5 residential towers with 1,907 apartments (2,889 bedrooms), 1,004 m^2 (10,806.96 ft^2) of ground floor retail uses, and 1,963 m^2 (21,129.54 ft^2) of office uses. The plan consists of 409 parking spaces. The building details of residential units and retail / office BFAs are summarized in **Table 1**.

Table 1 Subject development

Site Tower	Residential (Units)	Retail BFA		Office BFA	
		(m^2)	(ft^2)	(m^2)	(ft^2)
Tower 1 (Phase 1)	439	463	4,983.69	-	-
Tower 2 (Phase 2)	379	-	-	42	452.08
Tower 3 (Phase 3)	443	277	2,981.60	-	-

Tower 4 (Phase 4)	268	264	2,841.67	1,791	19,278.15
Tower 5 (Phase 5)	378	-	-	130	1,399.31
Total	**1,907**	**1,004**	**10,806.96**	**1,963**	**21,129.54**

2. ESTIMATED DEVELOPMENT SITE VEHICLE TRIP GENERATION

As commented by the Region, subject site vehicular trips were estimated based on the trip rates of Multifamily Housing (High-Rise, LUC #222, Dense Multi-Use Urban, Close to Rail Transit) for condo apartments, trip rates of Strip Retail Plaza (LUC #822) for retail uses, and trip rates of General Office (LUC #710, Dense Multi-Use Urban) for office uses. The rates are provided by Trip Generation, 12th Edition, published by the Institute of Transportation Engineers (ITE).

ITE Trip Generation provides two different methods to estimate the site trips: either using average rates or using the fitted curve equations (provided in **Appendix B**).

Based on the ITE Process for Selecting Average Rate or Equation in Trip Generation Manual Data, the estimated site trips are summarized in **Table 2**.

Table 2 Development site vehicle trip generation

Land Use (ITE Land Use Code, LUC)	Units or ft²	Vehicle Trip Parameter	Peak Hour					
			Weekday AM			Weekday PM		
			In	Out	Total	In	Out	Total
Multifamily Housing (High-Rise, LUC 222, Dense Multi-Use Urban, Close to Rail Transit)	1,907 units	Average Rate	**46**	**374**	**420**	**250**	**112**	**362**
		Fitted Curve	38	311	349	189	85	274
Strip Retail Plaza (LUC 822)	10,806.96 ft²	Average Rate	**23**	**19**	**42**	34	34	68
		Fitted Curve	-	-	-	**40**	**41**	**81**
General Office (LUC 710, Dense Multi-Use Urban)	12,129.54 ft²	Average Rate	15	3	18	3	15	18
		Fitted Curve	**35**	**5**	**40**	**4**	**21**	**25**
Total Trips			**104**	**398**	**502**	**294**	**174**	**468**

Based on the ITE's trip rates, the subject development will generate a total of 502 two-way automobile trips during AM peak hour and 468 two-way automobile trips during PM peak hour.

However, as mentioned in **Section 1**, the current site plan provides 409 parking spaces for the subject redevelopment. It is noted that the ITE generated site total vehicle trips are higher than the number of vehicles able to park at the site. To address this, we

examined the parking demand of the development and compared to the parking supply of 409 spaces.

3. ESTIMATED DEVELOPMENT SITE PARKING GENERATION

Based on the parking rates of Multifamily Housing (High-Rise, LUC #222, Dense Multi-Use Urban, Close to Rail Transit) for condo apartments, parking rates of Strip Retail Plaza (LUC #822) for retail uses, and parking rates of General Office (LUC #710, Dense Multi-Use Urban) for office uses (provided by Parking Generation, 6th Edition, published by the ITE), the parking demand of the subject development will be a total of 1,509 to 2,138 spaces during weekday, summarized in **Table 3** based on methodologies for weighted average, fitted curve and 85th percentile.

The ITE parking demand sheets are provided in **Appendix B**.

Table 3 Development site parking demand

Land Use (ITE Land Use Code, LUC)	Units or ft^2	Parking Demand Parameter	Parking Demand Weekday
Multifamily Housing (High-Rise, LUC 222, Dense Multi-Use Urban, Close to Rail Transit)	1,907 units	Weighted Average	**1430**
		Fitted Curve	1567
		85th Percentile	2021
Strip Retail Plaza (LUC 822)	10,806.96 ft^2	Weighted Average	**27**
		Fitted Curve	-
		85th Percentile	33
General Office (LUC 710, Dense Multi-Use Urban)	21,129.54 ft^2	Weighted Average	**33**
		Fitted Curve	61
		85th Percentile	41
Total Parking Demand		**Weighted Average**	**1490**
		Fitted Curve	1628
		85th Percentile	2095

Based on the ITE parking demand rates, **Table 3** shows the total parking demands of 1,490 to 2,095 spaces are calculated for the subject site.

The site plan provides 409 parking spaces for the development, which is 27.45% (409/1490) to 19.52% (409/2095) of the estimated ITE parking demand. This means that the Trip Generation determined in Table 2 can be reduced to between 20 and 27%, proportional to the available parking spaces. This makes sense in that all parked vehicles

do not leave (or enter) the development during the same peak hour. In the next section (Section 4) it is assumed that the rate is higher than estimated 20-27% of ITE trip generation to demonstrate the resilience of the traffic capacity of the site traffic at the study intersections.

4. DEVELOPMENT SITE VEHICLE TRIP GENERATION

To be conservative, this study applies 45% of the estimated ITE automobile trip generation in **Table 2** (previously 35% in the April 2025 TIS) since the vehicular traffic is related to the number of vehicles able to park at the site.

Therefore, the subject development is expected to generate a total of 47 inbound and 179 outbound automobile trips during AM peak hour, and 132 inbound and 79 outbound automobile trips during PM peak hour. **Table 4** summaries the new vehicle trips and compares the difference to the April 2025 TIS.

Table 4 Development site vehicle trip generation

Total Trips	Weekday AM			Weekday PM		
	In	Out	Total	In	Out	Total
Total Trips (current site plan)	**47**	**179**	**226**	**132**	**79**	**211**
Total Trips (April 2025 TIS)	51	162	213	156	101	257
Difference	-4	+17	+13	-24	-22	-46

Using the same trip distributions, **Figure 1** shows the estimated site-generated traffic during the weekday AM and PM peak hours.

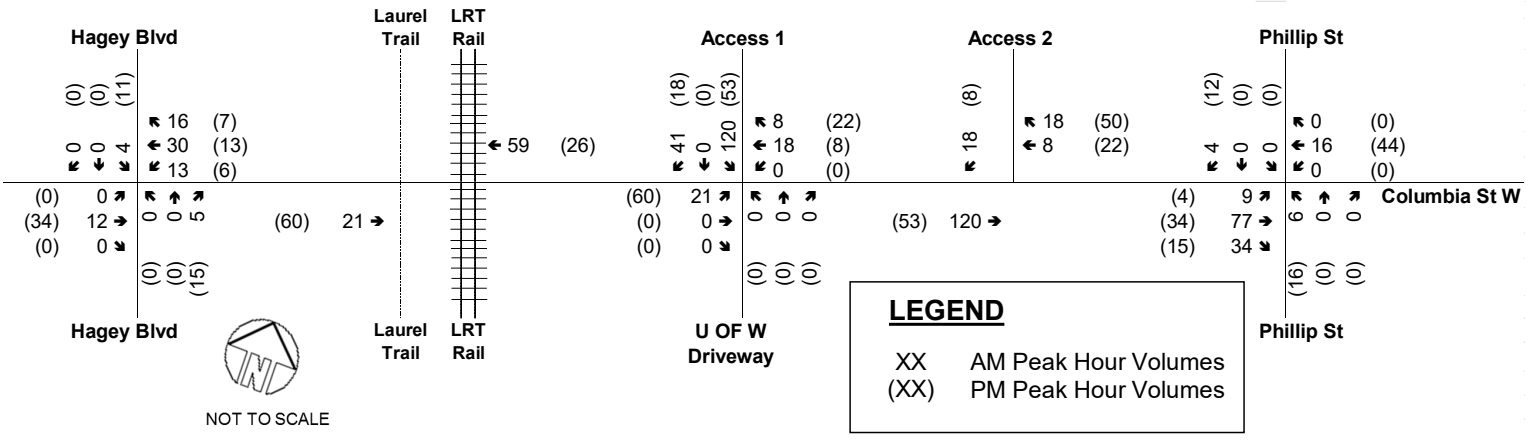


Figure 1 Site trips

Figure 2 shows the total (2032) traffic during the weekday AM and PM peak hours.

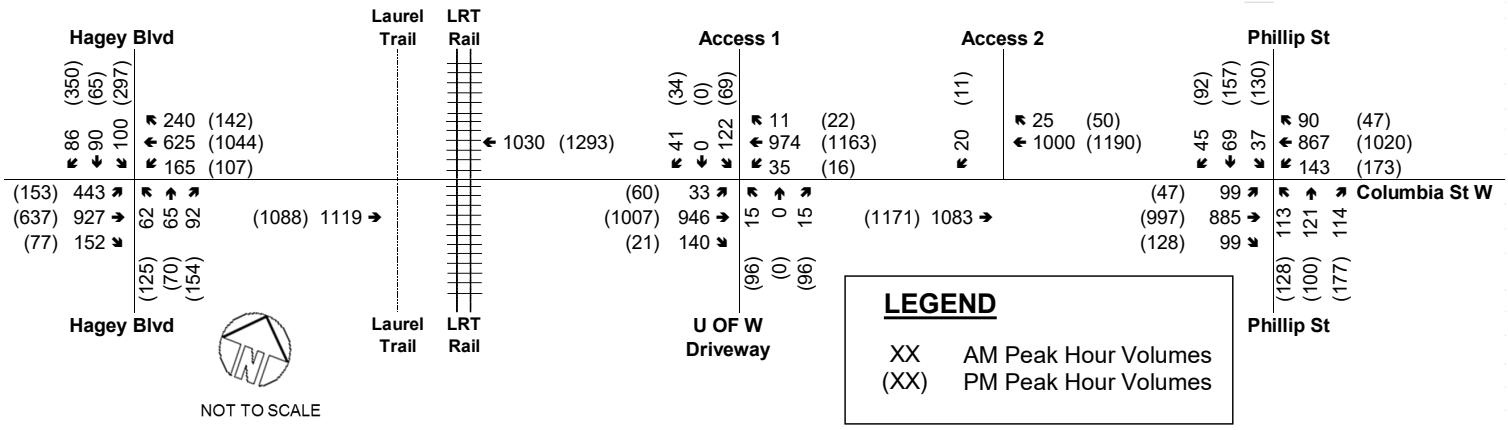


Figure 2 Total (2032) traffic volumes

5. TOTAL (2032) TRAFFIC CONDITIONS

The City transportation Staff recommend that right-in/right-out only driveway be considered for Access 2. **Figure 3** shows the future lane configurations and traffic controls of the study intersections including the proposed site accesses.

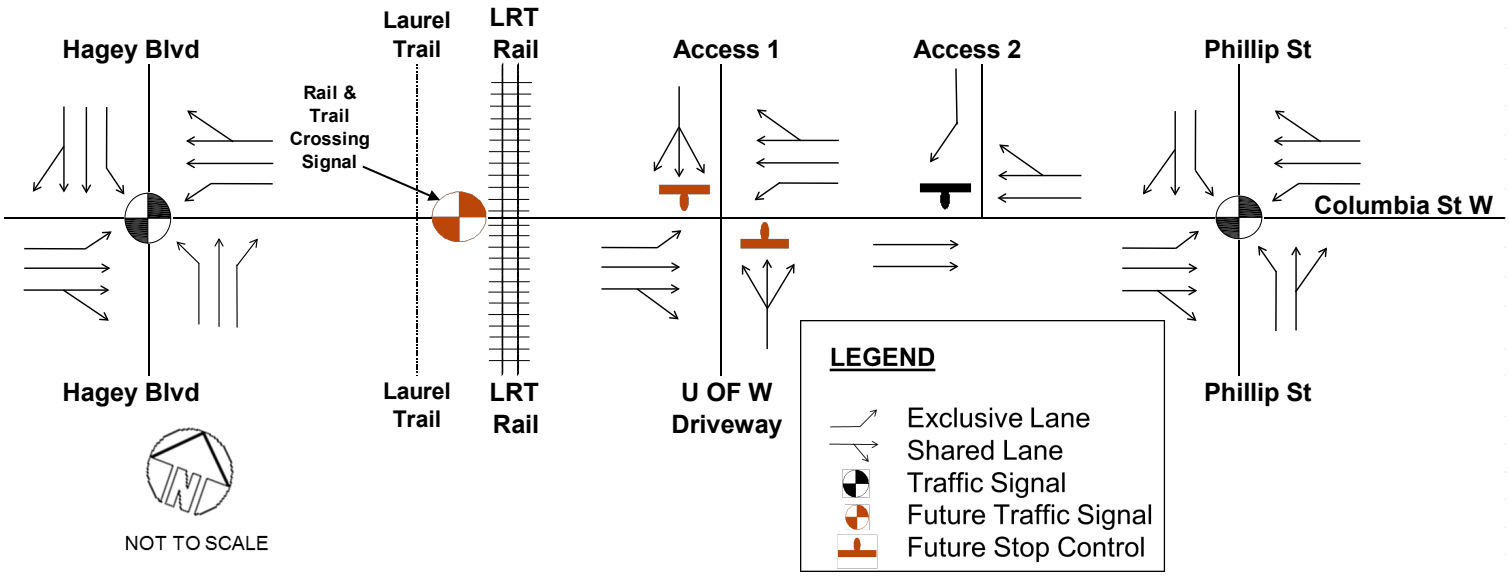


Figure 3 Future lane configurations and traffic controls

The future total 2032 traffic volumes (**Figure 2**) were subjected to intersection capacity analyses based on future lane configurations (**Figure 3**) to assess the future total traffic conditions.

Table 5 summarizes the results of the intersection capacity analysis under the 2032 total traffic conditions. **Appendix C** contains total 2032 intersection capacity analysis reports.

Table 5 Total 2032 traffic conditions

Intersection	Control Type	AM Peak Hour			PM Peak Hour		
		Overall v/c (LOS) Delay in Seconds	Critical/ Key Movements v/c(LOS) Delay in Seconds	95th %ile Queues (m)	Overall v/c (LOS) Delay in Seconds	Critical/ Key Movements v/c(LOS) Delay in Seconds	95th %ile Queues (m)
Hagey Blvd. & Columbia St	Signalized (Existing Signal Timings, Cycle Lengths AM & PM 110 s)	0.7 (C) 30	EBL = 0.78 (C) 32 EBTR = 0.62 (B) 19 WBL = 0.56 (C) 24 WBTR = 0.78 (D) 38 NBL = 0.39 (D) 43 NBT = 0.24 (D) 42 NBR = 0.09 (D) 41 SBL = 0.49 (D) 42 SBTR = 0.25 (D) 40	EBL = 105 m EBTR = 110 m WBL = 20 m WBTR = 110 m NBL = 25 m NBT = 25 m NBR = 5 m SBL = 35 m SBTR = 20 m	0.8 (C) 32	EBL = 0.67 (C) 26 EBTR = 0.46 (B) 20 WBL = 0.31 (B) 15 WBTR = 0.79 (C) 29 NBL = 0.58 (D) 40 NBT = 0.21 (D) 39 NBR = 0.14 (D) 38 SBL = 0.87 (E) 58 SBTR = 0.93dr (D) 42	EBL = 45 m EBTR = 70 m WBL = 20 m WBTR = 150 m NBL = 35 m NBT = 25 m NBR = 20 m SBL = 80 m SBTR = 40 m
	Signalized (Optimized Signal Timings, Cycle Length PM 110 s)				0.8 (C) 32	EBL = 0.68 (C) 28 EBTR = 0.48 (C) 21 WBL = 0.32 (B) 16 WBTR = 0.82 (C) 32 NBL = 0.52 (D) 37 NBT = 0.22 (D) 40 NBR = 0.14 (D) 39 SBL = 0.81 (D) 48 SBTR = 0.85dr (D) 41	EBL = 50 m EBTR = 80 m WBL = 20 m WBTR = 170 m NBL = 30 m NBT = 25 m NBR = 20 m SBL = 70 m SBTR = 35 m
Phillip ST & Columbia St	Signalized (Existing Signal Timings, Cycle Lengths AM 100 s & PM 110 s)	0.73 (C) 32	EBL = 0.51 (C) 21 EBTR = 0.88 (D) 38 WBL = 0.68 (C) 27 WBTR = 0.76 (C) 28 NBL = 0.36 (C) 23 NBTR = 0.54 (C) 34 SBL = 0.14 (C) 26 SBTR = 0.26 (C) 30	EBL = 20 m EBTR = 130 m WBL = 35 m WBTR = 105 m NBL = 30 m NBTR = 60 m SBL = 15 m SBTR = 30 m	0.82 (C) 35	EBL = 0.26 (B) 18 EBTR = 0.88 (D) 37 WBL = 0.8 (D) 40 WBTR = 0.71 (C) 24 NBL = 0.64 (D) 41 NBTR = 0.74 (D) 52 SBL = 0.67 (D) 44 SBTR = 0.66 (D) 46	EBL = 10 m EBTR = 155 m WBL = 55 m WBTR = 115 m NBL = 35 m NBTR = 85 m SBL = 40 m SBTR = 75 m
	Signalized (Optimized Signal Timings, Cycle Lengths AM & PM 110 s)	0.69 (C) 29	EBL = 0.43 (B) 18 EBTR = 0.76 (C) 29 WBL = 0.69 (C) 26 WBTR = 0.72 (C) 27 NBL = 0.39 (C) 27 NBTR = 0.59 (D) 40 SBL = 0.16 (C) 31 SBTR = 0.29 (D) 36	EBL = 20 m EBTR = 115 m WBL = 30 m WBTR = 105 m NBL = 35 m NBTR = 65 m SBL = 15 m SBTR = 35 m	0.82 (C) 34	EBL = 0.26 (B) 17 EBTR = 0.85 (C) 33 WBL = 0.86 (D) 48 WBTR = 0.71 (C) 24 NBL = 0.64 (D) 41 NBTR = 0.74 (D) 52 SBL = 0.67 (D) 44 SBTR = 0.66 (D) 46	EBL = 10 m EBTR = 140 m WBL = 55 m WBTR = 115 m NBL = 35 m NBTR = 85 m SBL = 40 m SBTR = 75 m
LRT Rail / Laurel Trail & Columbia St	Signalized (with Laurel Trail Signal Timings)	0.33 (C) 22	EBT = 0.62 (C) 22 WBT = 0.57 (C) 21 NBT = () 0 SBT = () 0	EBT = 115 m WBT = 105 m NBT = 0 m SBT = 0 m	0.39 (B) 18	EBT = 0.56 (B) 17 WBT = 0.67 (B) 19 NBT = () 0 SBT = () 0	EBT = 95 m WBT = 120 m NBT = 0 m SBT = 0 m
U OF W Driveway/ Access 1 & Columbia St	Unsignalized	SBTLR 0.41 (C) 20	EBL = 0.04 () 10 EBT = 0.37 () 0 EBTR = 0.27 () 0 WBL = 0.06 () 11 WBT = 0.38 () 0 WBTR = 0.2 () 0 NBTLR = 0.07 (B) 14 SBTLR = 0.41 (C) 20	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBTLR = 5 m SBTLR = 15 m	NBTLR 0.49 (C) 23	EBL = 0.11 () 12 EBT = 0.39 () 0 EBTR = 0.21 () 0 WBL = 0.03 () 11 WBT = 0.46 () 0 WBTR = 0.24 () 0 NBTLR = 0.49 (C) 23 SBTLR = 0.31 (C) 20	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBTLR = 20 m SBTLR = 10 m
Columbia St & Access 2	Unsignalized	SBR 0.03 (A) 10	EBT = 0.32 () 0 EBT = 0.32 () 0 WBT = 0.39 () 0 WBTR = 0.21 () 0 SBR = 0.03 (A) 10	EBT = 0 m EBT = 0 m WBT = 0 m WBTR = 0 m SBR = 5 m	SBR 0.01 (A) 10	EBT = 0.34 () 0 EBT = 0.34 () 0 WBT = 0.47 () 0 WBTR = 0.26 () 0 SBR = 0.01 (A) 10	EBT = 0 m EBT = 0 m WBT = 0 m WBTR = 0 m SBR = 5 m

6. SUMMARY OF TOTAL (2032) TRAFFIC CONDITIONS

As indicated in **Table 5**, the traffic generated by the proposed redevelopment along with non-site related traffic growth can be accommodated by the abutting street system with the stop control at the Access 1 intersection and right-in/right-out only for Access 2 intersection.

There is no road improvements triggered as a result of the subject site development.

Comparison with the January 2025 TIS, there is no material differences for the capacity analyses. The findings, conclusions and recommendations of 2025 TIS are still valid.

7. PARKING REVIEW

As indicated in Bill 185, the Ontario government prohibits municipalities from establishing or enforcing minimum vehicular parking requirements within Major Transit Station Areas (MTSAs) and Protected Major Transit Station Areas.

The subject site is located in The Research & Technology Station Area. Therefore, the subject site is not required to provide a minimum number of vehicle parking spaces other than parking facilities for bicycles.

Review of City's Parking By-Law Requirements

Vehicle Parking

Based on our review of the current City of Waterloo Zoning By-law parking requirements (Zoning By-law No. 2018-050 dated March 23, 2026), the subject site is located at Station Area Mix-Use (SAMU), and no minimum number of vehicle parking spaces are required for residential / non-residential / visitor parking.

As commented by the City and to estimate the retail and office vehicle parking requirements, this study uses the previous City's Zoning By-law No. 2018-050 dated January 23, 2025 (Section 7.10.7, provided in **Appendix D**) for Residential Mixed-Use Zone (RMU, Parking Area A on Schedule A1).

Table 6 summarizes the City's vehicular parking requirements for retail and office uses.

Table 6 City's vehicle parking requirement

Land Use	BFA	By-Law Requirement	
		Parking Rate	Parking Spaces
Retail	1,004 m^2	1.5 space / 100 m^2	15
Office	1,963 m^2	1.5 space / 100 m^2	30
Total			**45**

It should be noted that the proposed retail uses are expected to be predominately used by the development's residents and visitors. The visitors of the site apartments are expected to use / share the retail and office parking spaces.

Bicycle Parking

Based on Section 6.6.2 of the current City Zoning By-law No. 2018-050 dated March 23, 2026, provided in **Appendix D**), the site required bicycle parking spaces are estimate and summarized in **Tables 7 and 8** for residential and commercial non-residential uses, respectively.

Table 7 City's bicycle parking requirement - Residential

Site Tower	Units	Type A Bicycle Parking		Type B Bicycle Parking		Total Spaces
		Parking Rate	Spaces	Parking Rate	Spaces	
Tower 1	439	0.30 space / unit	131.7	0.30 space / unit	131.7	264
Tower 2	379		113.7		113.7	228
Tower 3	443		132.9		132.9	266
Tower 4	268		80.4		80.4	161
Tower 5	378		113.4		113.4	227
Total	**1,907**		**573**		**573**	**1146**

Table 8 City's bicycle parking requirement – Commercial Non-Residential

Site Tower	BFA (m^2)	Bicycle Parking	
		Parking Rate	Spaces
Tower 1	463	0.80 space / 100 m^2	4
Tower 2	42		1
Tower 3	277		3
Tower 4	2055		17
Tower 5	130		2
Total	**2,967**		**27**

As indicated in City' By-law requirements for the site non-residential commercial uses, the minimum required bicycle parking is 27 spaces, of which 50% are Type A, 14 Type A bicycle spaces.

Therefore, the subject site should provide a total of 1,173 (1146+27) bicycle parking spaces to meet the City By-law requirements.

8. RESPONSES TO CITY AND REGION COMMENTS

Specific comments from the City and Region regarding the TIS submission are consolidated below, with responses from GHD are shown below each comment in *italic.*

City of Waterloo Comments (April 20, 2026)

PART G - TRANSPORTATION SERVICES COMMENTS

74. The subject site is located in The Research & Technology Station Area. As per Bill 185, the subject site is not required to provide parking other than parking facilities for bicycles.

    City Staff recommend providing parking to meet the needs of the site without reliance on the municipal right-of-way. The parking review provided in the Transportation Impact Study (TIS) indicates a higher demand for parking than the rate being provided.

    Response:

    *As discussed in Section 7, the subject site is required to provided 45 parking spaces (**Table 6**) for retail and office uses. It should be noted that the proposed retail uses are expected to be predominately used by the development's residents and visitors. The visitors of the site apartments are expected to use / share the retail and office parking spaces.*

    *Based on the City Zoning By-law parking requirements, the subject site is required to provide a total of 1,173 bicycle parking spaces (**Tables 7 and 8**) for the residential apartment, retail and office uses.*

75. The signal at the site driveway (access 1) at Columbia Street should be re-evaluated now that the signal has been removed.

    Staff recommend that a new turning movement count be conducted to better understand how this change has impacted the site driveway. Table 6 provided in the TIS states that south-bound left/right/through lane and north-bound right/left/through lane – is this analysis still valid?

    Response:

    No updated traffic count was undertaken at Access 1 to account for the traffic change due to the removal of the signal. The traffic analysis is an estimation based on capacity constraints. Under STOP control, the northbound and southbound left turns will decrease due to Columbia Street through movement volumes and gaps that the signal would have provided.

    *However, as indicated in **Table 5**, the SYNCHRO analysis under STOP control at Access 1 indicated good Levels of service 'C' or better with v/c ratios of 0.49 or less at all*

movements. With respect to queuing, the analysis results indicate 20m or less queues during the AM and PM peaks, which can be accommodated at all movements.

76. Table 7 – Queues and available spacing (AM peak hour – 95th percentile) identifies that there is insufficient storage for westbound through traffic queueing at the LRT rail crossing. This is an existing condition and remains under background and total traffic conditions.

    Table 8 (PM peak hour – 95th percentile) shows that the westbound through will block site access 1 as mentioned above. In the PM peak, eastbound through/right movement at Phillip Street will queue past Access 2 under background and total traffic conditions.

    Response:

    Noted. There is also no traffic operational and queuing concerns from Region Transportation staff (Region of Waterloo March 18, 2026 comment #6). The eastbound queues at Phillip Street in the PM peak hour may extend beyond Access 2. However, Access 2 is not blocked by this queuing as it is a right-in / right-out access.

77. If access 2 remains a vehicular access, transportation Staff recommend that right-in/right-out only driveway be considered for Access 2.

    Response:

    The updated site trip assignment and capacity analysis considers Access 2 as a right-in/right-out only driveway at Columbia Street. No traffic operational concerns with the right-in/right-out, LOS A and v/c ratios of 0.47 or less.

General Comments

78. Upon further review of the Potential Priority Connection identified on Schedule J3 of the Official Plan, Staff suggest that this be an active transportation connection and emergency access for fire services. The 9 metre allowance provided on the east side of 170 Columbia Street is sufficient to accommodate this connection.

    Further discussion is required regarding this being a private connection with a public access easement or if this connection shall be conveyed to the City.

    Response:

    Noted. The site plan shows fire, loading and garbage truck activities using Access 2.

79. Why did the bicycle parking supply decrease from the original submission?

    Staff recommend providing adequate bicycle parking to meet the needs of the site. There is a total of 1968 units proposed and a combined total of 1659 parking spaces (both vehicle and bicycle parking). This means some units will not have access to either vehicle

parking or bicycle parking. What about parking for visitors or employees of the office spaces proposed on-site?

Response:

The current site plan shows a decrease to 1907 units. ***Tables 7 and 8*** *show that the subject site is required to provide a total of 1,173 bicycle parking spaces for the residential apartment, retail and office uses based on the current site plan and City By-law parking requirements.*

As shown in ***Table 6****, the subject site is required to provided 45 parking spaces for retail and office uses based on the City Zoning By-law parking requirements. It should be noted that the proposed retail uses are expected to be predominately used by the development's residents and visitors. The visitors of the site apartments are expected to use / share the retail and office parking spaces.*

Region of Waterloo Comments (March 18, 2026)

Transportation Impact Study

125. Regional staff have reviewed the 'Response Letter to Transportation Impact Study Proposed Redevelopment 170-180 Columbia Street West City of Waterloo, Region of Waterloo' (GHD, January 22, 2026) provided by the in response to comments offered by the Region and the City of Waterloo in October 2025. Specifically, to the Region's transportation interests, this response addresses our August 2025 comment regarding our non-support for a signalized intersection at Columbia Street West / Access 2.

    Response:

    Noted. The updated traffic analysis assumes a STOP-controlled, right-in/right-out at Columbia Street / Access 2.

126. Trip Generation / Distribution.

    Trip generation was done in an unsatisfactory manner because the consultant used "General Urban/Suburban" setting. The setting is closer to "Dense Multi-Use Urban", but more importantly, the trip generation rate used by the consultant was only supported by three studies in ITE and users are advised to use with caution. Use of Dense Multi-Use Urban results in more realistic trip rates supported by more studies.

    - ITE enables an assessment of person-trips, which would then enable a comparison to vehicle-trips to determine a rough mode share. Using the rates recommended above, AM peak hour exiting person-trips are estimated as 1,251-1,287, and exiting vehicle-trips as 404-496. Auto occupancy during the peak hour is typically about 1.1, meaning that exiting person-trips by vehicles would be about 444-546. The vehicle mode share range is about 34%-44%.

- The consultant estimated a vehicle trip rate of 35% based on a comparison of ITE trip generation to ITE parking, and the ratio of proposed parking to ITE estimated parking. While this ended up in a similar rate to the assessment above, it's unclear if the consultant's methodology is justifiable. On the other hand, the range resulting from the work in the above bullet is generated entirely from ITE trip generation.

In conclusion, I recommend the consultant review a conservative upper limit of 45% vehicle trips out in the AM peak hour to determine whether vehicle transportation recommendations are acceptable. A similar exercise should be done to determine AM peak hour vehicle-trips in and PM peak hour vehicle-trips in/out.

Response:

It is not reasonable to expect more vehicles to exit (or enter) the development site than there are parking spaces (and vehicles) during the peak hour. Not all residents with vehicles in their provided spaces leave (or arrive) within the same peak hour. Therefore, the AM and PM peak hour vehicle trip generation is expected to be less in number than the number of available parking spaces. Refer to ***Section 4, Table 4*** *above for the details of the trip generation. The subject development is expected to generate a total of 47 inbound and 179 outbound automobile trips during AM peak hour, and 132 inbound and 79 outbound automobile trips during PM peak hour, as shown in* ***Table 4****. Trip generation is also related to the number of parking spaces, as the vehicles enter and exit the development.*

127. Active Transportation Accommodation.

The north side sidewalk on Columbia Street leading to the signalized crossing of the Laurel Trail is substandard width and unlikely to be a comfortable walking environment for the many students likely to be going to UW. To encourage students to use the Laurel Trail signalized crossing, the City should consider how to improve this walking facility. If frontage improvements are appropriate, the City might consider using this tool to secure the investment from the developer. While a similar comment applies to the sidewalk leading to the Phillip Street signalized intersection, there may be less opportunity to address this.

Response:

Noted.

We trust the enclosed is sufficient for your review / acceptance, however please do not hesitate to contact the undersigned should you require any additional clarifications.

Sincerely,

GHD



Hong Shen, M.Eng., P.Eng.
Senior Project Engineer
hong.shen@ghd.com

Roland Roovers, P.Eng.
Senior Manager, Transportation Planning
roland.roovers@ghd.com

HS/RR

Attach. Appendices A-D

Appendix A

Site Plan

Check for overlapping text, dashes before printing.

PRINTED ON 30% POST-CONSUMER RECYCLED CONTENT PAPER



CONTEXT PLAN-NTS
SCALE: N.T.S.

True North
Project North
90.15°

SITE PLAN LEGEND

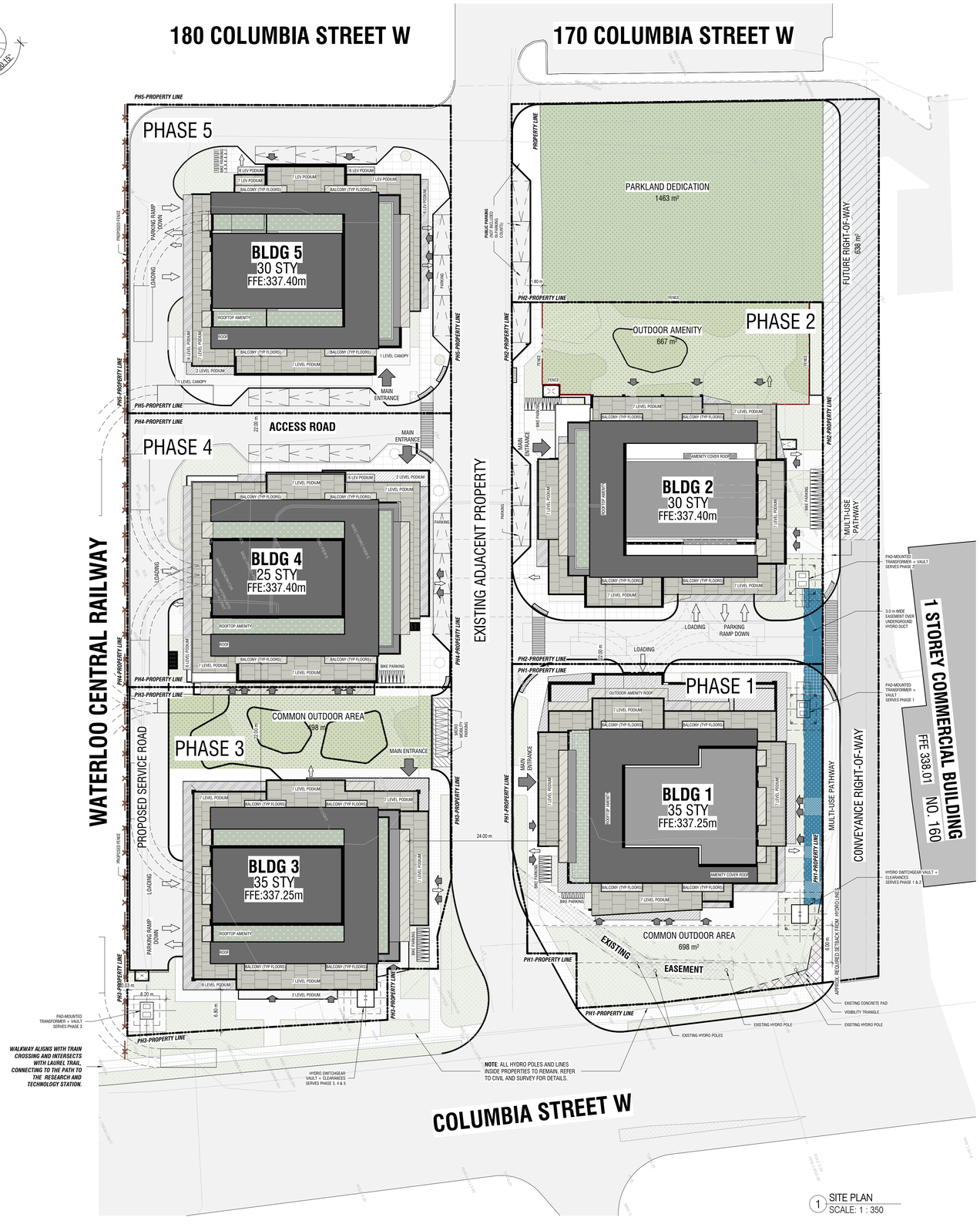
- PROPERTY LINE
- ROOF OUTLINE
- MAIN / SECONDARY ENTRANCE DOORS
- ACCESS TO LOADING/PARKING RAMP
- EMERGENCY EXIT
- PROPOSED LANDSCAPING BY FERRIS + ASSOCIATES
- XXX.XXm — PROPOSED GRADING ELEVATION-SEE GRADING PLAN PROVIDED BY WALTERFEDY
- XXX.XXm — EXISTING GRADING ELEVATION-SEE TOPOGRAPHIC SURVEY PREPARED BY IBW SURVEYORS
- X.X % — PROPOSED SLOPE-SEE GRADING PLAN PROVIDED BY WALTERFEDY
- PROPOSED SLOPE-SEE GRADING PLAN PROVIDED BY WALTERFEDY
- PROPOSED UNIT PAVING(PATTERN 1)
- PROPOSED UNIT PAVING(PATTERN 2)
- ROOF EXTENT
- ROOFTOP AMENITY LANDSCAPED AREA
- ROOF FOR TOWER
- LEVEL 7 PODIUM
- LEVEL 6 PODIUM
- LEVEL 2 PODIUM/CANOPY FOR LEVEL 1
- BALCONY EXTENT
- MPH ROOF

AVERAGE GRADES

PH3:	337.25m
PH1-2-4-5:	337.40m

TOWER STOREYS

PH1:	35
PH2:	30
PH3:	35
PH4:	25
PH5:	30



1 SITE PLAN
SCALE: 1 : 350

aaa architects
SUITE 1018-130 QUEENS QUAY EAST, TORONTO ON, M5A 0P6
TEL: (647)948 4889 FAX: (647)948 4889

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SEAL:

DRAWING ISSUE/REVISION SCHEDULE

ISSUE #	DESCRIPTION	ISSUE DATE
1	ISSUED FOR COORDINATION	2026-07-07

THE CITY OF Waterloo

CLIENT:
IN8 Developments

PROJECT:
NEW MIXED USE DEVELOPMENT

170-180 COLUMBIA STREET WEST, WATERLOO

DRAWING:
SITE PLAN - 170 AND 180 COLUMBIA

SCALE VERIFICATION:
1 CM
1 INCH
THIS DRAWING IS TO BE PRINTED AT 100% ON ARCH E

DRAWN BY:	CHECKED BY:
D.A/H.A/F.P/P.R	A.A.
DESIGNED BY:	APPROVED BY:
A.A.	A.A.
SCALE:	PROJECT No:
As indicated	

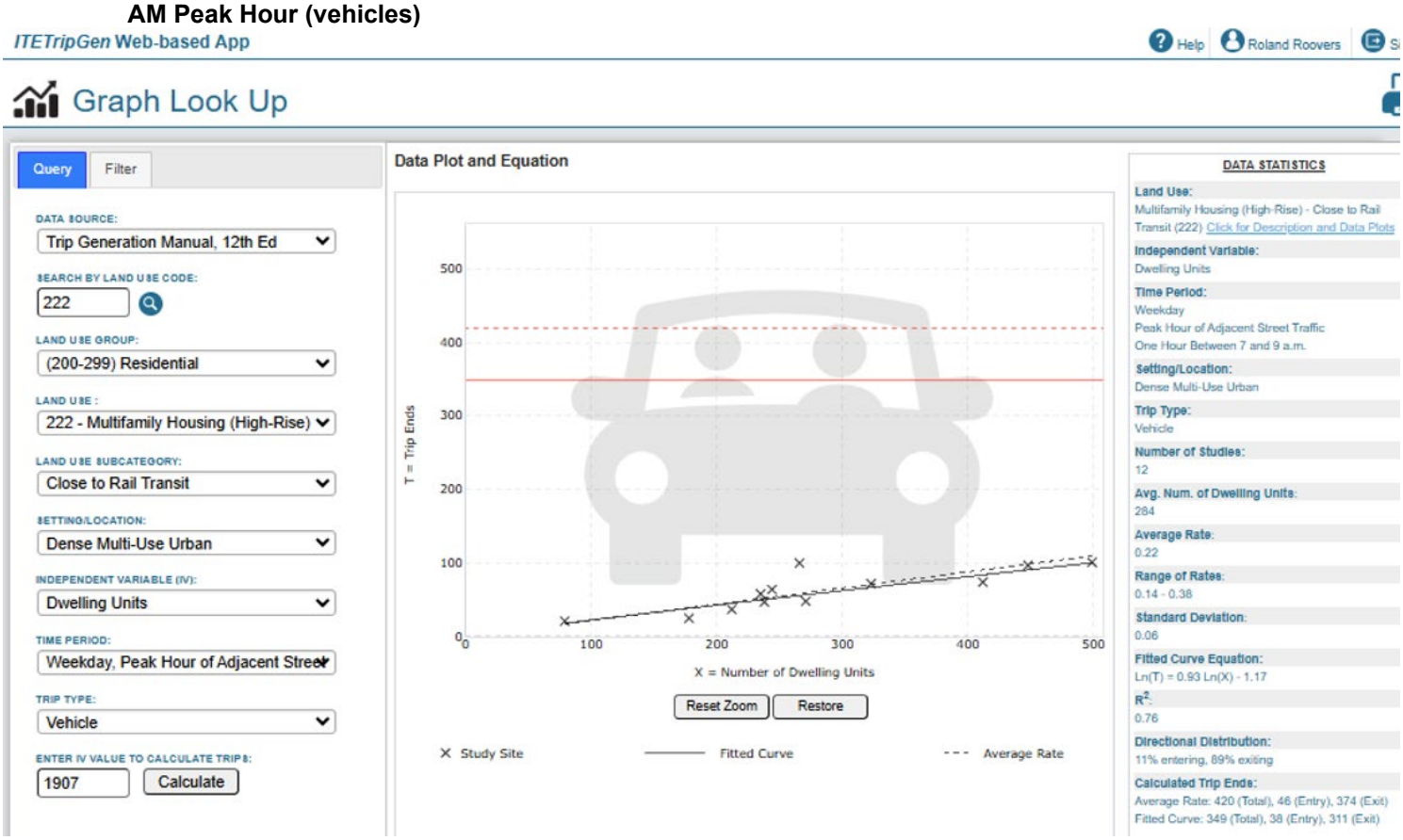
DRAWING NO.:
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Appendix B

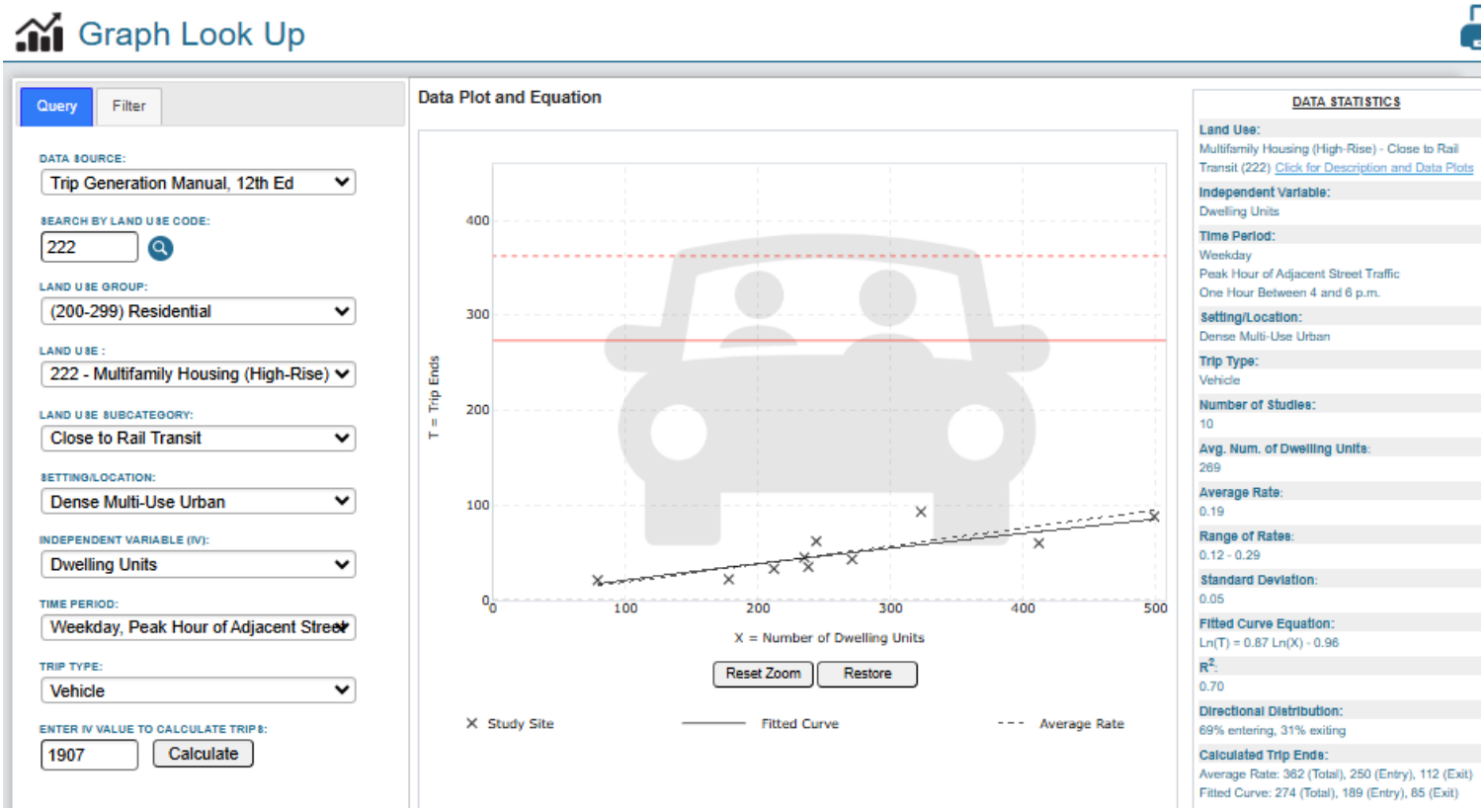
ITE Trip and Parking Generation

ITE Multifamily Housing-High-Rise (LUC #222, Dense Multi-Use Urban, Close to Rail Transit): 1907 Units

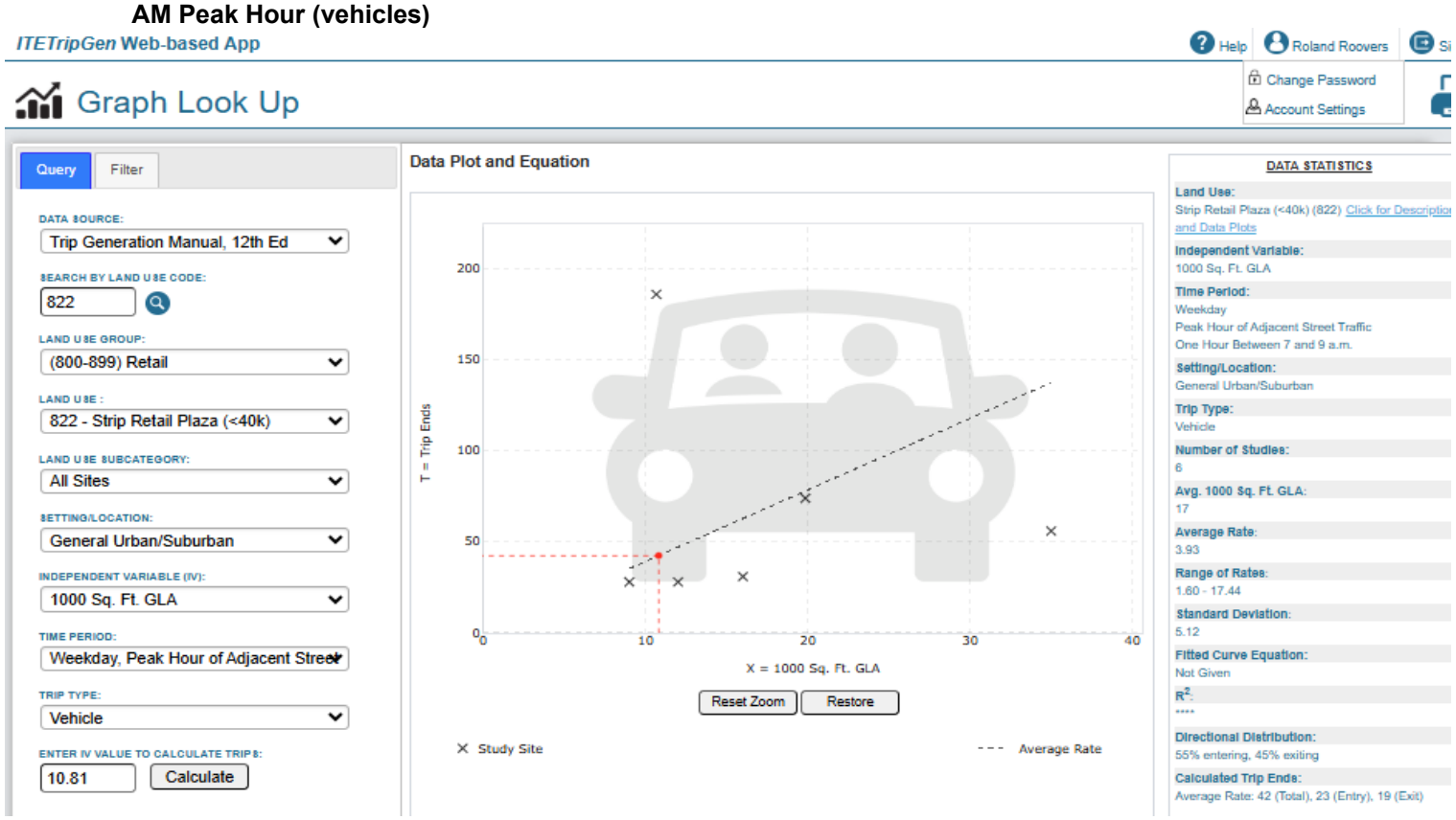
AM Peak Hour (vehicles)



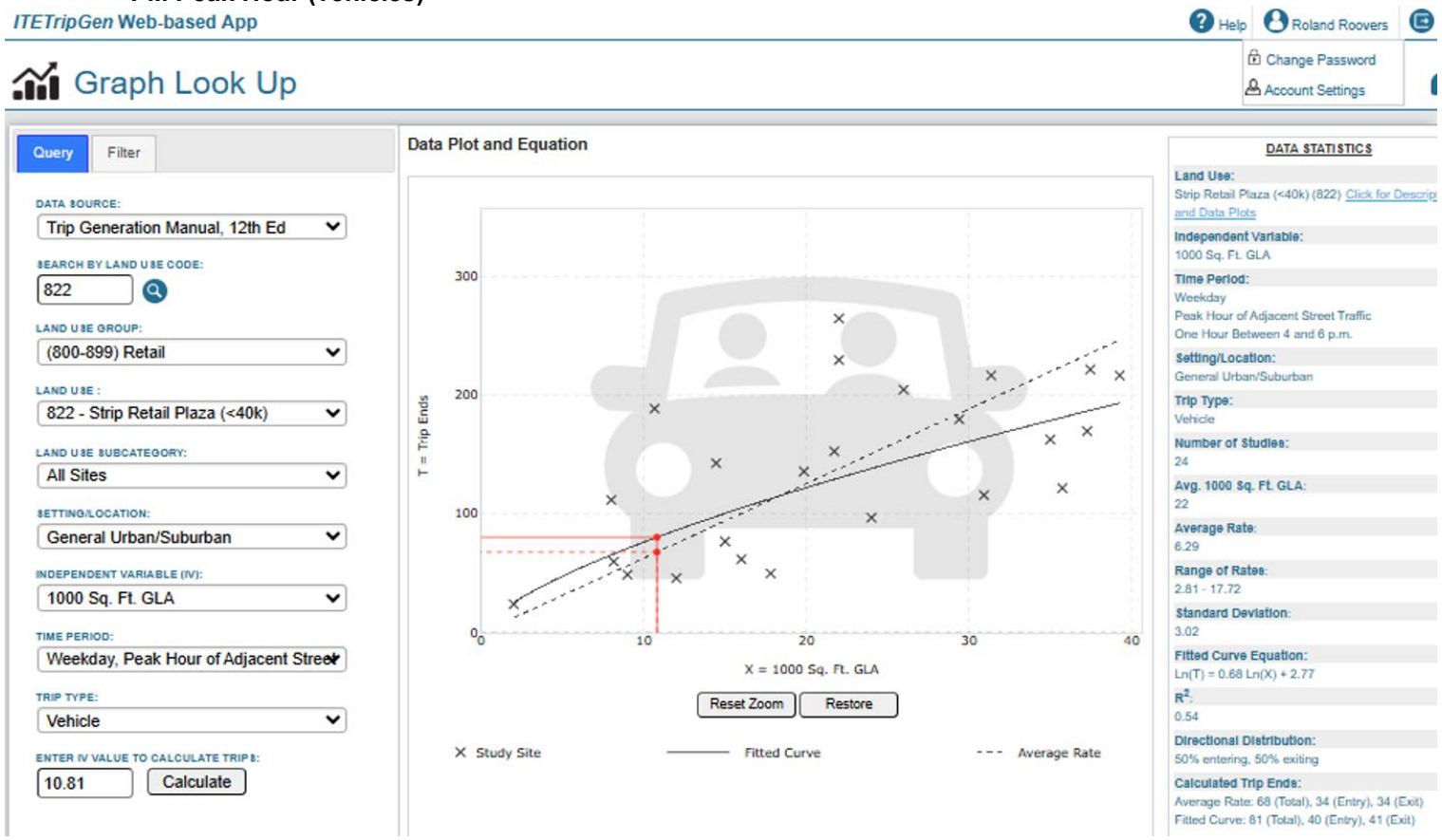
PM Peak Hour (vehicles)



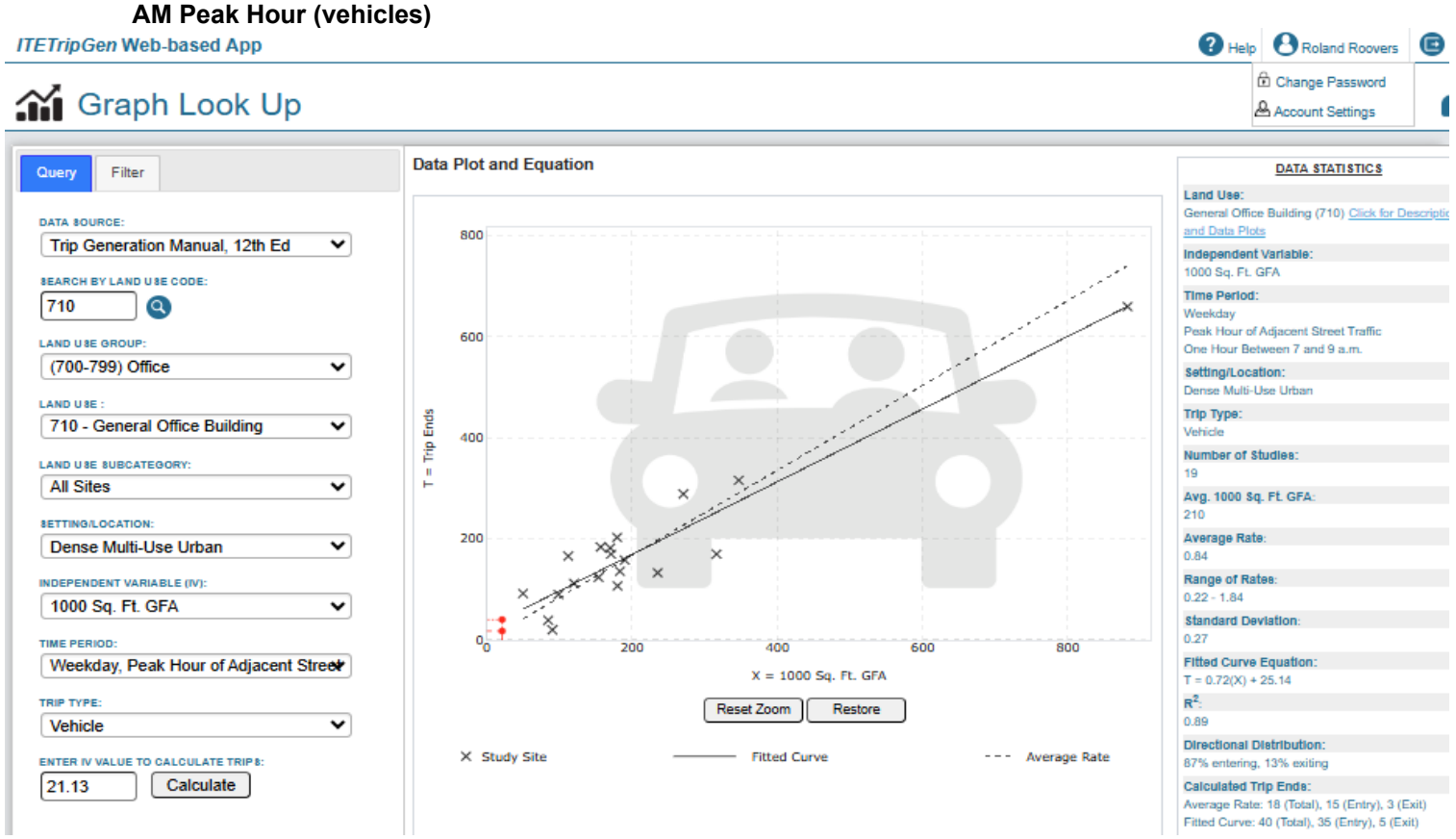
Trip Generation 12644763, ITE Retail Plaza < 40K (LUC 822): 10,806.96 ft²
AM Peak Hour (vehicles)



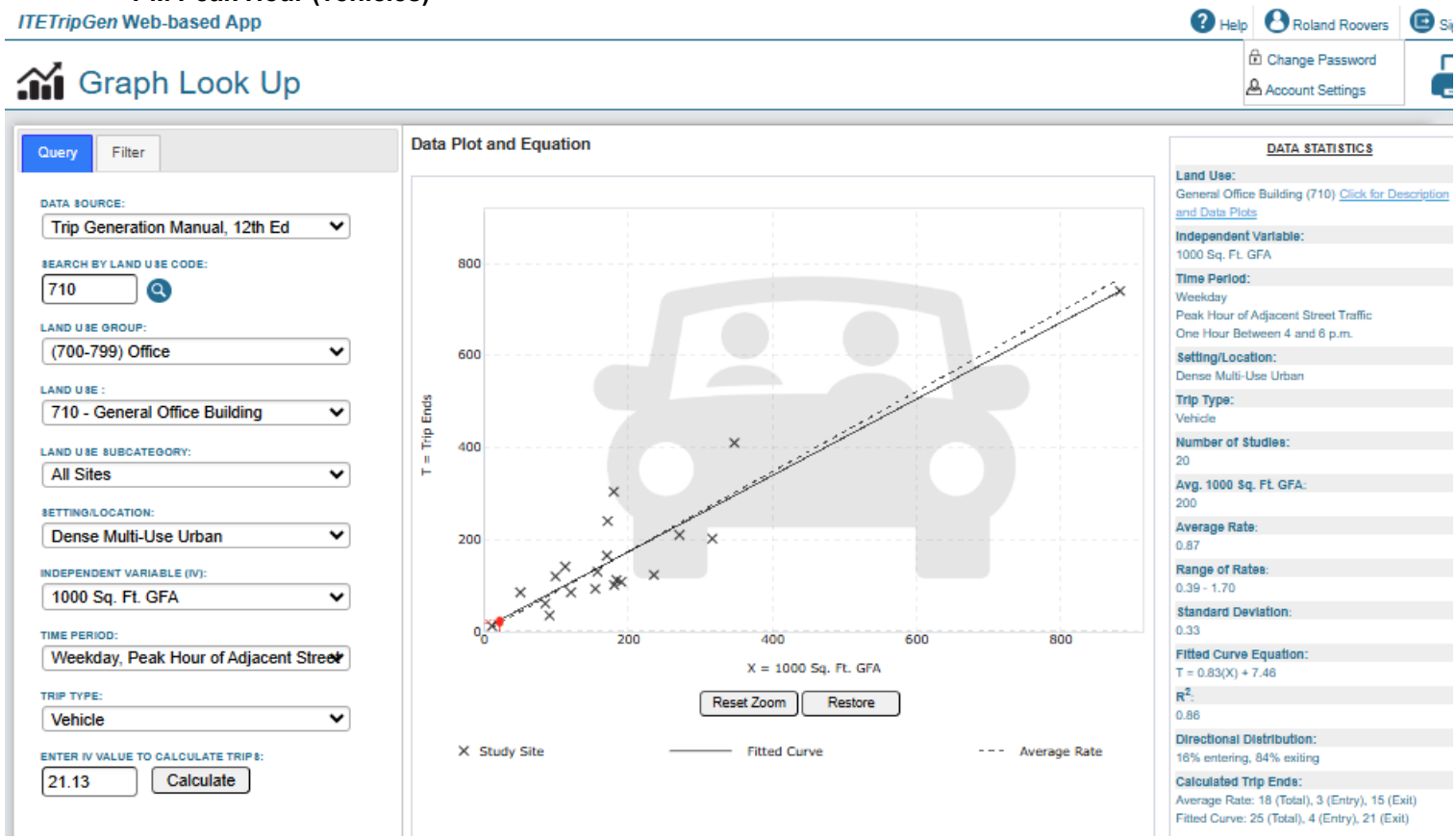
PM Peak Hour (vehicles)



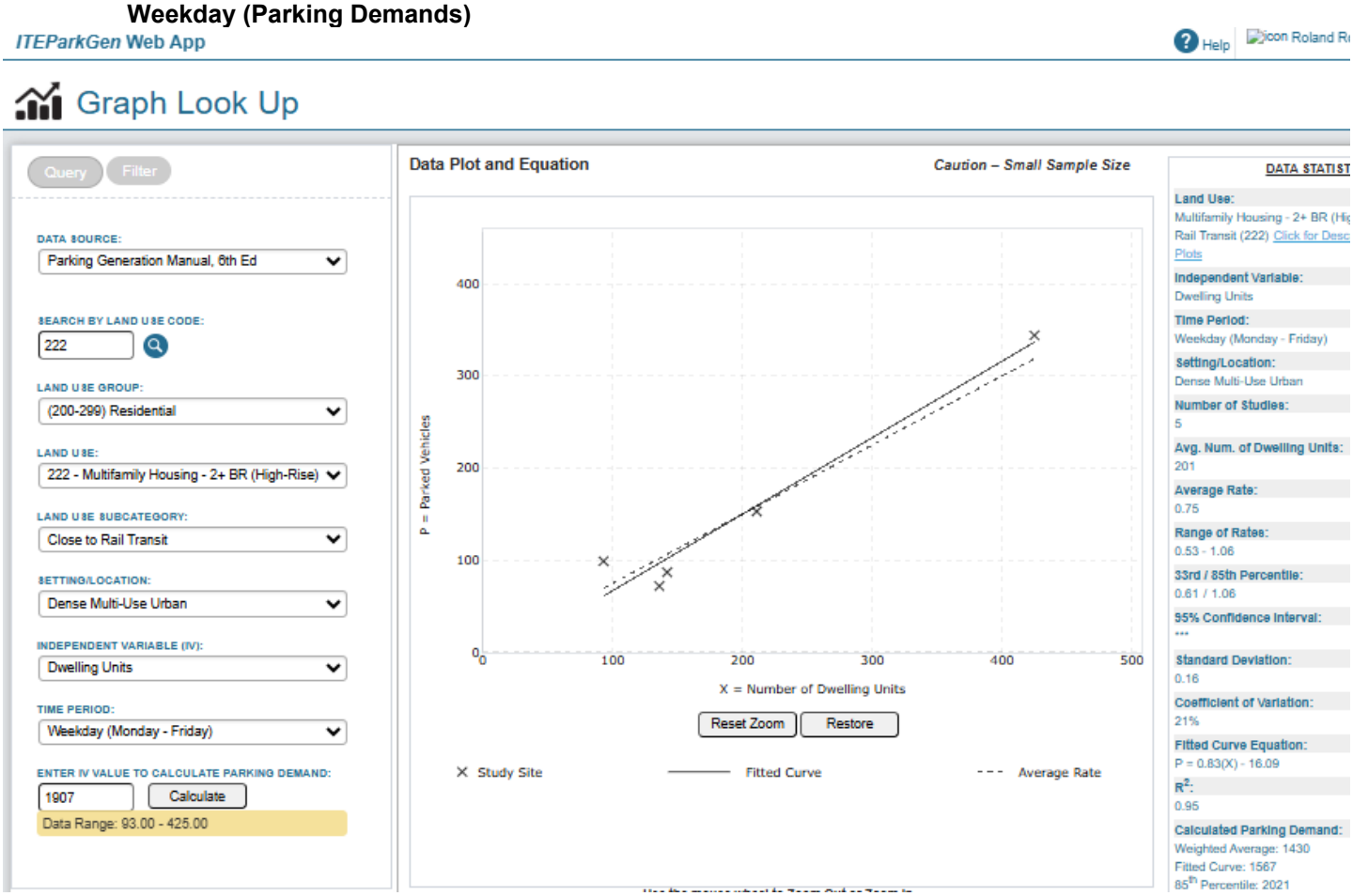
Trip Generation 12644763, ITE General Office (LUC 710, Dense Multi-Use Urban): 12,129.54 ft²
AM Peak Hour (vehicles)



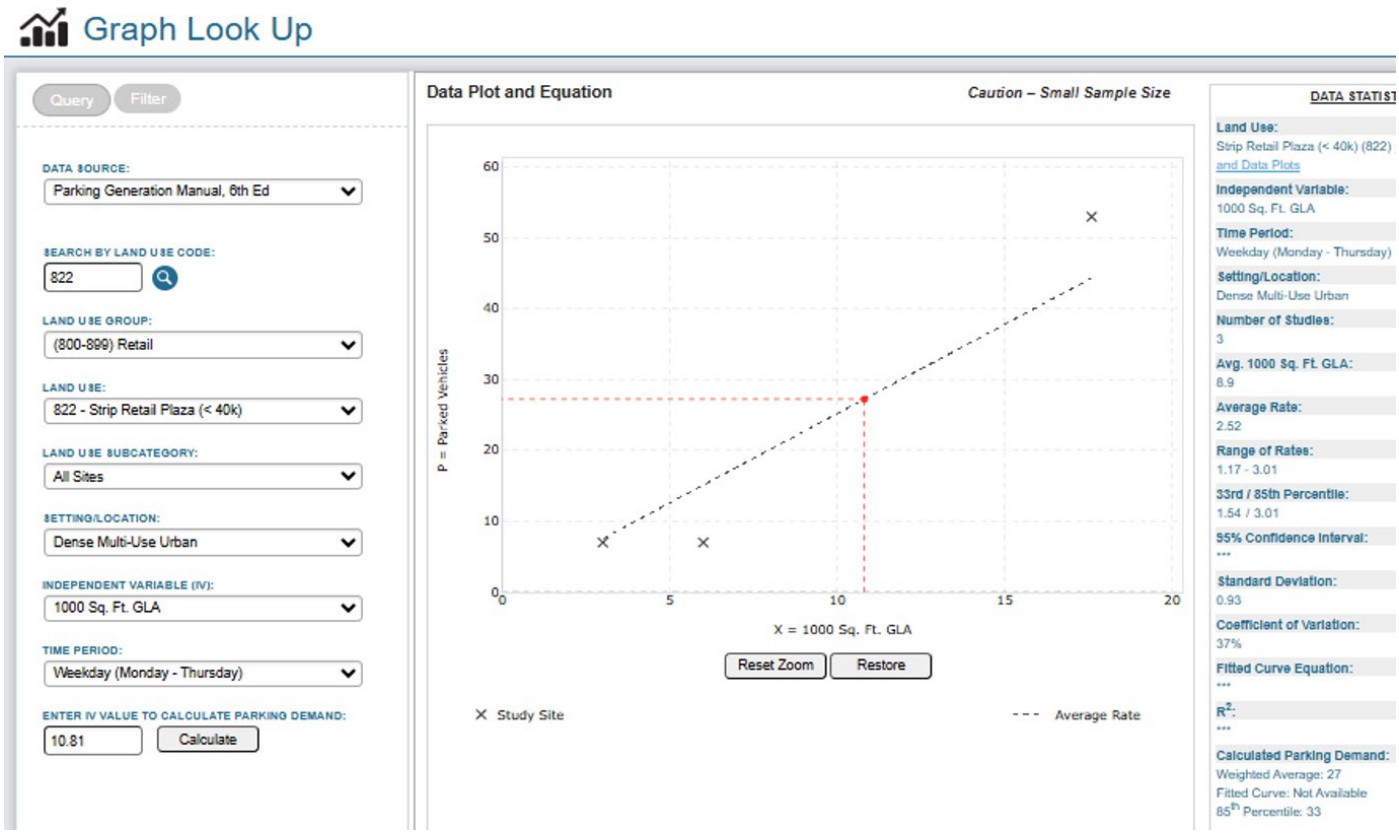
PM Peak Hour (vehicles)



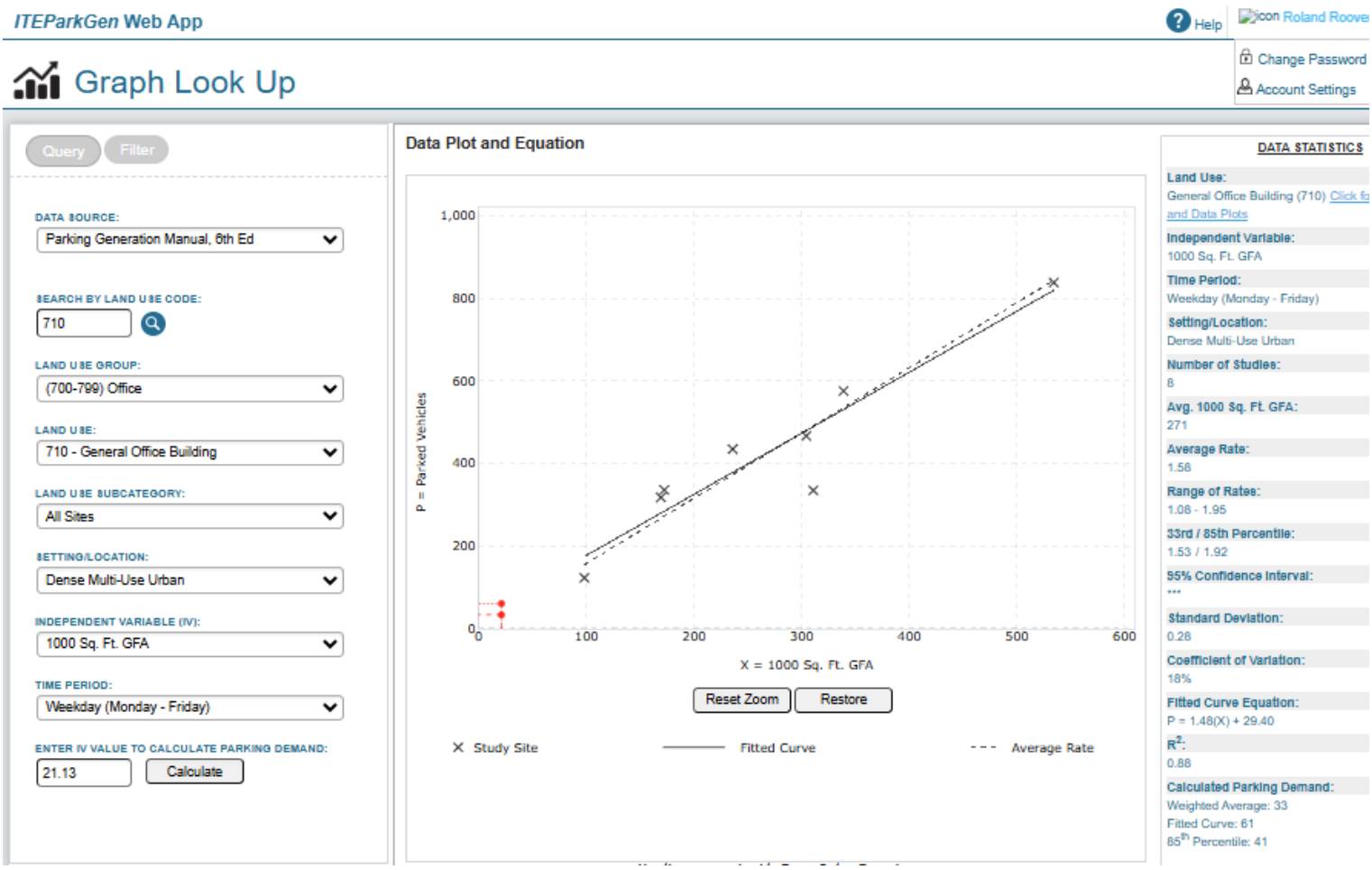
ITE Multifamily Housing-High-Rise (LUC #222, Dense Multi-Use Urban, Close to Rail Transit): 1907 Units Weekday (Parking Demands)



Trip Generation 12644763, ITE Retail Plaza < 40K (LUC 822, Dense Multi-Use Urban): 10,806.96 ft² Weekday (Parking Demands)

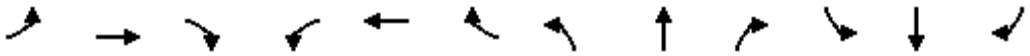


Trip Generation 12644763, ITE General Office (LUC 710, Dense Multi-Use Urban): 12,129.54 ft² Weekday (Parking Demands)



Appendix C

Synchro Report: Total 2032 Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1900	1750	1775	1775	1775
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	0.0		0.0	0.0		75.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	2.4			2.4			2.4			2.4		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.99	0.99		0.99	0.98		0.83		0.72	0.75	0.89	
Frt		0.979			0.958				0.850		0.927	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3140	0	1635	3057	0	1345	1824	1388	1544	2630	0
Flt Permitted	0.122			0.265			0.641			0.632		
Satd. Flow (perm)	212	3140	0	452	3057	0	755	1824	993	767	2630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			56				160		86	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		128.4			296.0			74.1			110.1	
Travel Time (s)		7.7			17.8			5.3			7.9	

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	443	927	165	625	62	65	92	100	90
Future Volume (vph)	443	927	165	625	62	65	92	100	90
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	5	2	1	6	3	8		7	4
Permitted Phases	2		6		8		8	4	
Detector Phase	5	2	1	6	3	8	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	33.6	5.0	33.6	7.0	12.0	12.0	7.0	12.0
Minimum Split (s)	9.0	40.7	9.0	40.7	11.0	30.1	30.1	11.0	30.1
Total Split (s)	27.0	54.9	14.0	41.9	11.0	30.1	30.1	11.0	30.1
Total Split (%)	24.5%	49.9%	12.7%	38.1%	10.0%	27.4%	27.4%	10.0%	27.4%
Yellow Time (s)	3.0	3.7	3.0	3.7	3.0	3.3	3.3	3.0	3.3
All-Red Time (s)	1.0	3.4	1.0	3.4	1.0	3.8	3.8	1.0	3.8
Lost Time Adjust (s)	0.0	-3.1	0.0	-3.1	0.0	-3.1	-3.1	0.0	-3.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 81 (74%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Splits and Phases: 1: Hagey Blvd. & Columbia St

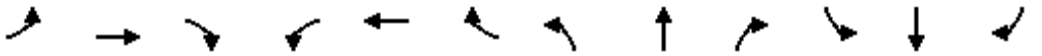




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	443	1079	165	865	62	65	92	100	176
v/c Ratio	0.77	0.62	0.53	0.78	0.32	0.25	0.33	0.46	0.35
Control Delay	32.8	18.6	17.8	35.5	38.2	45.0	3.4	41.9	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	18.6	17.8	35.5	38.2	45.0	3.4	41.9	24.2
Queue Length 50th (m)	64.3	73.9	10.9	81.0	10.7	12.7	0.0	17.6	9.2
Queue Length 95th (m)	#105.1	109.2	19.0	107.0	21.7	25.2	0.8	31.9	19.4
Internal Link Dist (m)		104.4		272.0		50.1			86.1
Turn Bay Length (m)	30.0		30.0						
Base Capacity (vph)	573	1749	326	1113	195	432	357	217	695
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.62	0.51	0.78	0.32	0.15	0.26	0.46	0.25

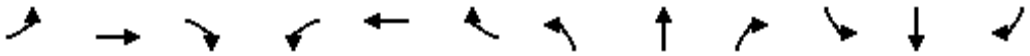
Intersection Summary

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



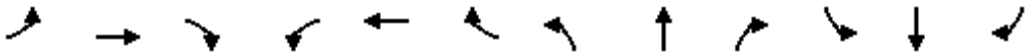
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	443	927	152	165	625	240	62	65	92	100	90	86
Future Volume (vph)	443	927	152	165	625	240	62	65	92	100	90	86
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1900	1750	1775	1775	1775
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.71	1.00	0.89	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.89	1.00	1.00	0.85	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1666	3140		1631	3058		1203	1824	992	1314	2626	
Flt Permitted	0.12	1.00		0.26	1.00		0.64	1.00	1.00	0.63	1.00	
Satd. Flow (perm)	215	3140		455	3058		811	1824	992	874	2626	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	443	927	152	165	625	240	62	65	92	100	90	86
RTOR Reduction (vph)	0	10	0	0	37	0	0	0	79	0	72	0
Lane Group Flow (vph)	443	1069	0	165	828	0	62	65	13	100	104	0
Confl. Peds. (#/hr)	57		44	44		57	151		193	193		151
Confl. Bikes (#/hr)			8			1			2			7
Heavy Vehicles (%)	0%	2%	10%	2%	2%	4%	24%	3%	6%	8%	2%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	71.3	57.1		45.1	34.9		18.8	13.0	13.0	22.2	14.7	
Effective Green, g (s)	71.3	60.2		45.1	38.0		18.8	16.1	16.1	22.2	17.8	
Actuated g/C Ratio	0.65	0.55		0.41	0.35		0.17	0.15	0.15	0.20	0.16	
Clearance Time (s)	4.0	7.1		4.0	7.1		4.0	7.1	7.1	4.0	7.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		5.0	3.0	3.0	5.0	3.0	
Lane Grp Cap (vph)	566	1718		295	1056		159	266	145	206	424	
v/s Ratio Prot	c0.23	0.34		0.05	c0.27		0.02	0.04		c0.03	0.04	
v/s Ratio Perm	0.28			0.18			0.05		0.01	c0.06		
v/c Ratio	0.78	0.62		0.56	0.78		0.39	0.24	0.09	0.49	0.25	
Uniform Delay, d1	25.2	17.1		21.3	32.3		39.9	41.6	40.6	37.9	40.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.0	1.7		2.3	5.8		3.3	0.5	0.3	3.7	0.3	
Delay (s)	32.2	18.8		23.6	38.2		43.2	42.0	40.9	41.7	40.5	
Level of Service	C	B		C	D		D	D	D	D	D	
Approach Delay (s)		22.7			35.8			41.9			41.0	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1900	1900	1775	1775	1900	1900	1900	1000	1900	1000
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981			0.998			0.932			0.966	
Flt Protected	0.950			0.950				0.976			0.964	
Satd. Flow (prot)	1668	3216	0	1500	3202	0	0	1709	0	0	1750	0
Flt Permitted	0.950			0.950				0.976			0.964	
Satd. Flow (perm)	1668	3216	0	1500	3202	0	0	1709	0	0	1750	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		92.3			51.1			108.3			66.6	
Travel Time (s)		5.5			3.1			9.7			6.0	

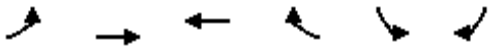
Intersection Summary	
Area Type:	Other



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	946	140	35	974	11	15	0	15	122	0	41
Future Volume (Veh/h)	33	946	140	35	974	11	15	0	15	122	0	41
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	33	946	140	35	974	11	15	0	15	122	0	41
Pedestrians		5			9			88			60	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			1			7			5	
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (m)		92			186							
pX, platoon unblocked	0.76			0.77			0.88	0.88	0.77	0.88	0.88	0.76
vC, conflicting volume	1045			1174			1773	2285	640	1672	2350	558
vC1, stage 1 conf vol							1170	1170		1110	1110	
vC2, stage 2 conf vol							603	1115		563	1240	
vCu, unblocked vol	444			635			437	1019	0	322	1093	0
tC, single (s)	4.1			4.5			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			94			95	100	98	65	100	95
cM capacity (veh/h)	820			601			297	268	777	345	241	791

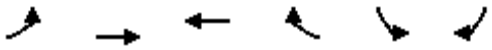
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	33	631	455	35	649	336	30	163
Volume Left	33	0	0	35	0	0	15	122
Volume Right	0	0	140	0	0	11	15	41
cSH	820	1700	1700	601	1700	1700	429	402
Volume to Capacity	0.04	0.37	0.27	0.06	0.38	0.20	0.07	0.41
Queue Length 95th (m)	1.0	0.0	0.0	1.4	0.0	0.0	1.7	14.6
Control Delay (s)	9.6	0.0	0.0	11.4	0.0	0.0	14.0	19.9
Lane LOS	A			B			B	C
Approach Delay (s)	0.3			0.4			14.0	19.9
Approach LOS							B	C

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	54.2%	ICU Level of Service		A
Analysis Period (min)	15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1775	1775	1775	1775	1550	1550
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	30.0			0.0	0.0	0.0
Storage Lanes	0			0	0	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.996			0.865
Flt Protected						
Satd. Flow (prot)	0	3270	3167	0	0	1326
Flt Permitted						
Satd. Flow (perm)	0	3270	3167	0	0	1326
Link Speed (k/h)		60	60		40	
Link Distance (m)		51.1	135.2		76.4	
Travel Time (s)		3.1	8.1		6.9	

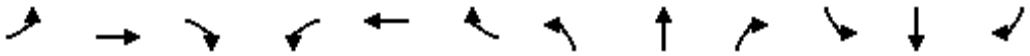
Intersection Summary	
Area Type:	Other



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1083	1000	25	0	20
Future Volume (Veh/h)	0	1083	1000	25	0	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1083	1000	25	0	20
Pedestrians		1			63	
Lane Width (m)		3.5			3.5	
Walking Speed (m/s)		1.2			1.2	
Percent Blockage		0			5	
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		143	135			
pX, platoon unblocked	0.74				0.85	0.74
vC, conflicting volume	1088				1617	576
vC1, stage 1 conf vol					1076	
vC2, stage 2 conf vol					542	
vCu, unblocked vol	433				237	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	97
cM capacity (veh/h)	804				526	771

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	542	542	667	358	20
Volume Left	0	0	0	0	0
Volume Right	0	0	0	25	20
cSH	1700	1700	1700	1700	771
Volume to Capacity	0.32	0.32	0.39	0.21	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.6
Control Delay (s)	0.0	0.0	0.0	0.0	9.8
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.8
Approach LOS					A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	115.0		0.0	45.0		0.0	120.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.4			2.4			2.4			2.4		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.97		0.96	0.99		0.91	0.95		0.94	0.95	
Frt		0.985			0.986			0.927			0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1486	2787	0	1390	2864	0	1316	1191	0	1501	1273	0
Flt Permitted	0.191			0.120			0.571			0.558		
Satd. Flow (perm)	291	2787	0	169	2864	0	721	1191	0	826	1273	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			14			47			32	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		135.2			155.7			112.8			157.9	
Travel Time (s)		8.1			9.3			8.1			11.4	

Intersection Summary	
Area Type:	CBD

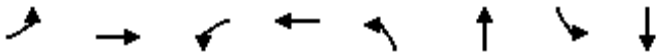
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	99	885	143	867	113	121	37	69
Future Volume (vph)	99	885	143	867	113	121	37	69
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	5.0	36.0	5.0	36.0	5.0	24.0	5.0	24.0
Minimum Split (s)	9.0	42.0	9.0	42.0	9.0	30.0	9.0	30.0
Total Split (s)	11.0	44.0	15.0	48.0	11.0	32.0	9.0	30.0
Total Split (%)	11.0%	44.0%	15.0%	48.0%	11.0%	32.0%	9.0%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	0.0	-2.0	0.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 30 (30%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 4: Phillip ST & Columbia St

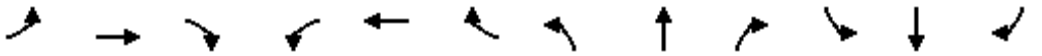




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	99	984	143	957	113	235	37	114
v/c Ratio	0.45	0.85	0.67	0.72	0.38	0.58	0.13	0.32
Control Delay	18.1	35.3	31.2	25.9	26.3	30.5	21.8	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	35.3	31.2	25.9	26.3	30.5	21.8	24.2
Queue Length 50th (m)	8.8	89.4	13.1	78.5	14.9	31.9	4.6	12.6
Queue Length 95th (m)	16.5	#128.0	#33.6	103.2	27.7	58.2	11.1	27.6
Internal Link Dist (m)		111.2		131.7		88.8		133.9
Turn Bay Length (m)	115.0		45.0		120.0		35.0	
Base Capacity (vph)	223	1155	227	1331	300	408	289	354
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.85	0.63	0.72	0.38	0.58	0.13	0.32

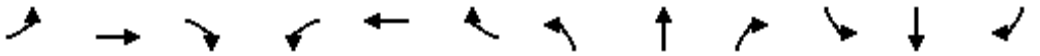
Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	885	99	143	867	90	113	121	114	37	69	45
Future Volume (vph)	99	885	99	143	867	90	113	121	114	37	69	45
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.95	1.00		0.96	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.93		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1481	2787		1386	2864		1256	1191		1448	1273	
Flt Permitted	0.19	1.00		0.12	1.00		0.57	1.00		0.56	1.00	
Satd. Flow (perm)	297	2787		176	2864		754	1191		850	1273	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	885	99	143	867	90	113	121	114	37	69	45
RTOR Reduction (vph)	0	8	0	0	8	0	0	32	0	0	23	0
Lane Group Flow (vph)	99	976	0	143	949	0	113	203	0	37	91	0
Confl. Peds. (#/hr)	81		169	169		81	88		77	77		88
Confl. Bikes (#/hr)			1			9			4			8
Heavy Vehicles (%)	1%	3%	7%	8%	2%	2%	14%	1%	16%	0%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	43.2	37.6		51.4	41.8		36.6	29.6		28.6	25.6	
Effective Green, g (s)	43.2	39.6		51.4	43.8		36.6	31.6		28.6	27.6	
Actuated g/C Ratio	0.43	0.40		0.51	0.44		0.37	0.32		0.29	0.28	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	194	1103		209	1254		311	376		261	351	
v/s Ratio Prot	0.03	c0.35		c0.07	0.33		c0.03	c0.17		0.00	0.07	
v/s Ratio Perm	0.19			0.29			0.11			0.04		
v/c Ratio	0.51	0.88		0.68	0.76		0.36	0.54		0.14	0.26	
Uniform Delay, d1	18.5	28.1		17.7	23.6		22.2	28.2		26.2	28.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	10.4		8.9	4.3		0.7	5.5		0.3	1.8	
Delay (s)	20.7	38.5		26.6	27.9		22.9	33.7		26.4	30.0	
Level of Service	C	D		C	C		C	C		C	C	
Approach Delay (s)		36.9			27.7			30.2			29.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



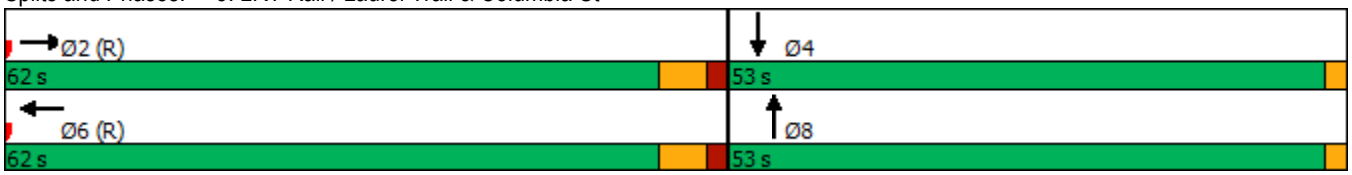
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt												
Flt Protected												
Satd. Flow (prot)	0	3570	0	0	3570	0	0	1879	0	0	1879	0
Flt Permitted												
Satd. Flow (perm)	0	3570	0	0	3570	0	0	1879	0	0	1879	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		296.0			92.3			105.4			113.8	
Travel Time (s)		17.8			5.5			9.5			10.2	

Intersection Summary	
Area Type:	Other

Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	1119	1030		
Future Volume (vph)	1119	1030		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	12.0	12.0	12.0	12.0
Minimum Split (s)	18.0	18.0	37.0	37.0
Total Split (s)	62.0	62.0	53.0	53.0
Total Split (%)	53.9%	53.9%	46%	46%
Yellow Time (s)	4.0	4.0	2.0	2.0
All-Red Time (s)	2.0	2.0	0.0	0.0
Lost Time Adjust (s)	-2.0	-2.0		
Total Lost Time (s)	4.0	4.0		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	Max	Max	Max	Max

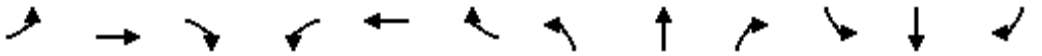
Intersection Summary
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Pretimed

Splits and Phases: 5: LRT Rail / Laurel Trail & Columbia St



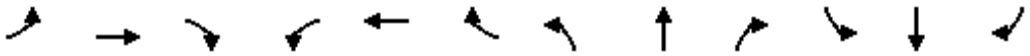
Lane Group	EBT	WBT
Lane Group Flow (vph)	1119	1030
v/c Ratio	0.62	0.57
Control Delay	22.5	21.4
Queue Delay	0.0	0.0
Total Delay	22.5	21.4
Queue Length 50th (m)	92.4	82.1
Queue Length 95th (m)	113.6	101.6
Internal Link Dist (m)	272.0	68.3
Turn Bay Length (m)		
Base Capacity (vph)	1800	1800
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.62	0.57

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑			↑	
Traffic Volume (vph)	0	1119	0	0	1030	0	0	0	0	0	0	0
Future Volume (vph)	0	1119	0	0	1030	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			0.95							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3570			3570							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3570			3570							
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1119	0	0	1030	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1119	0	0	1030	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6			8			4	
Permitted Phases												
Actuated Green, G (s)		56.0			56.0							
Effective Green, g (s)		58.0			58.0							
Actuated g/C Ratio		0.50			0.50							
Clearance Time (s)		6.0			6.0							
Lane Grp Cap (vph)		1800			1800							
v/s Ratio Prot		c0.31			0.29							
v/s Ratio Perm												
v/c Ratio		0.62			0.57							
Uniform Delay, d1		20.6			19.9							
Progression Factor		1.00			1.00							
Incremental Delay, d2		1.6			1.3							
Delay (s)		22.2			21.2							
Level of Service		C			C							
Approach Delay (s)		22.2			21.2			0.0			0.0	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1900	1750	1775	1775	1775
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	0.0		0.0	0.0		75.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	2.4			2.4			2.4			2.4		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.99	1.00		0.99	0.99		0.85		0.77	0.82	0.73	
Frt		0.984			0.982				0.850		0.873	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3165	0	1603	3217	0	1530	1879	1471	1635	2132	0
Flt Permitted	0.098			0.313			0.351			0.601		
Satd. Flow (perm)	171	3165	0	524	3217	0	479	1879	1139	845	2132	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			17				154		193	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		128.4			296.0			74.1			110.1	
Travel Time (s)		7.7			17.8			5.3			7.9	

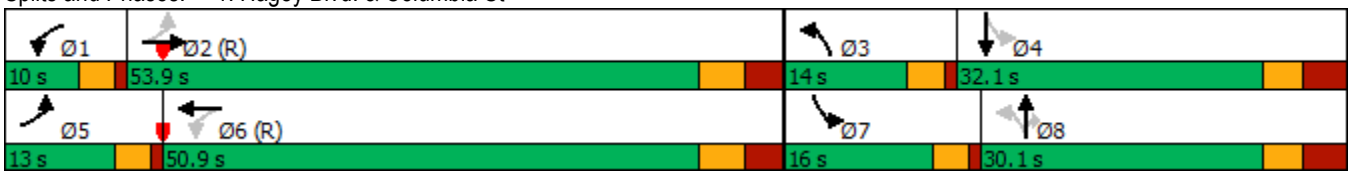
Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	153	637	107	1044	125	70	154	297	65
Future Volume (vph)	153	637	107	1044	125	70	154	297	65
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	5	2	1	6	3	8		7	4
Permitted Phases	2		6		8		8	4	
Detector Phase	5	2	1	6	3	8	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	40.2	5.0	40.2	7.0	12.0	12.0	7.0	12.0
Minimum Split (s)	9.0	47.3	9.0	47.3	11.0	30.1	30.1	11.0	30.1
Total Split (s)	13.0	53.9	10.0	50.9	14.0	30.1	30.1	16.0	32.1
Total Split (%)	11.8%	49.0%	9.1%	46.3%	12.7%	27.4%	27.4%	14.5%	29.2%
Yellow Time (s)	3.0	3.7	3.0	3.7	3.0	3.3	3.3	3.0	3.3
All-Red Time (s)	1.0	3.4	1.0	3.4	1.0	3.8	3.8	1.0	3.8
Lost Time Adjust (s)	0.0	-3.1	0.0	-3.1	0.0	-3.1	-3.1	0.0	-3.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 97 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 1: Hagey Blvd. & Columbia St

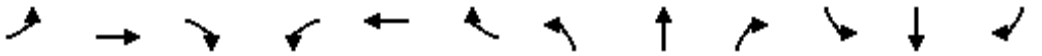




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	153	714	107	1186	125	70	154	297	415
v/c Ratio	0.65	0.46	0.30	0.79	0.55	0.21	0.47	0.80	0.93dr
Control Delay	29.3	20.0	13.2	30.0	35.7	38.7	10.7	48.7	27.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.3	20.0	13.2	30.0	35.7	38.7	10.7	48.7	27.9
Queue Length 50th (m)	13.1	49.2	8.9	106.2	19.9	13.1	0.0	53.1	23.9
Queue Length 95th (m)	#42.7	70.6	19.4	147.3	31.3	23.7	16.4	#77.6	38.3
Internal Link Dist (m)		104.4		272.0		50.1			86.1
Turn Bay Length (m)	30.0		30.0						
Base Capacity (vph)	239	1547	354	1503	229	445	387	369	688
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.46	0.30	0.79	0.55	0.16	0.40	0.80	0.60

Intersection Summary

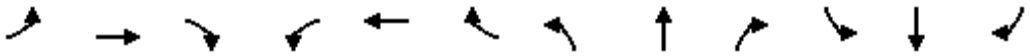
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	637	77	107	1044	142	125	70	154	297	65	350
Future Volume (vph)	153	637	77	107	1044	142	125	70	154	297	65	350
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1900	1750	1775	1775	1775
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.77	1.00	0.73	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.95	1.00	1.00	0.90	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1667	3164		1600	3217		1455	1879	1136	1465	2131	
Flt Permitted	0.10	1.00		0.31	1.00		0.35	1.00	1.00	0.60	1.00	
Satd. Flow (perm)	172	3164		527	3217		538	1879	1136	927	2131	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	153	637	77	107	1044	142	125	70	154	297	65	350
RTOR Reduction (vph)	0	8	0	0	9	0	0	0	127	0	154	0
Lane Group Flow (vph)	153	706	0	107	1177	0	125	70	27	297	261	0
Confl. Peds. (#/hr)	90		29	29		90	236		147	147		236
Confl. Bikes (#/hr)			7			9			11			9
Heavy Vehicles (%)	0%	1%	22%	4%	0%	6%	9%	0%	0%	2%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	60.4	50.4		55.6	48.0		26.8	16.4	16.4	32.8	19.4	
Effective Green, g (s)	60.4	53.5		55.6	51.1		26.8	19.5	19.5	32.8	22.5	
Actuated g/C Ratio	0.55	0.49		0.51	0.46		0.24	0.18	0.18	0.30	0.20	
Clearance Time (s)	4.0	7.1		4.0	7.1		4.0	7.1	7.1	4.0	7.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		5.0	3.0	3.0	5.0	3.0	
Lane Grp Cap (vph)	230	1538		340	1494		217	333	201	341	435	
v/s Ratio Prot	c0.06	0.22		0.02	c0.37		0.05	0.04		c0.11	0.12	
v/s Ratio Perm	0.30			0.14			0.09		0.02	c0.15		
v/c Ratio	0.67	0.46		0.31	0.79		0.58	0.21	0.14	0.87	0.93dr	
Uniform Delay, d1	18.6	18.7		14.8	24.9		34.6	38.7	38.1	35.3	39.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.1	1.0		0.5	4.3		5.8	0.3	0.3	22.3	2.3	
Delay (s)	25.7	19.7		15.3	29.2		40.4	39.0	38.5	57.5	42.0	
Level of Service	C	B		B	C		D	D	D	E	D	
Approach Delay (s)		20.7			28.0			39.2			48.5	
Approach LOS		C			C			D			D	

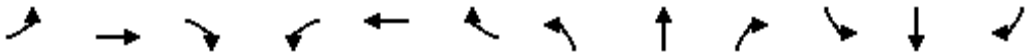
Intersection Summary			
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1900	1900	1775	1775	1900	1900	1900	1000	1900	1000
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997			0.997			0.932			0.955	
Flt Protected	0.950			0.950				0.976			0.968	
Satd. Flow (prot)	1334	3261	0	1384	3293	0	0	1709	0	0	1720	0
Flt Permitted	0.950			0.950				0.976			0.968	
Satd. Flow (perm)	1334	3261	0	1384	3293	0	0	1709	0	0	1720	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		92.3			51.1			108.3			66.6	
Travel Time (s)		5.5			3.1			9.7			6.0	

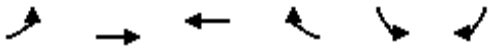
Intersection Summary	
Area Type:	Other



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1007	21	16	1163	22	96	0	96	69	0	34
Future Volume (Veh/h)	60	1007	21	16	1163	22	96	0	96	69	0	34
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	60	1007	21	16	1163	22	96	0	96	69	0	34
Pedestrians		8			17			52			69	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			4			6	
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (m)		92			186							
pX, platoon unblocked	0.75			0.80			0.85	0.85	0.80	0.85	0.85	0.75
vC, conflicting volume	1254			1080			1845	2476	583	2012	2475	670
vC1, stage 1 conf vol							1190	1190		1275	1275	
vC2, stage 2 conf vol							656	1286		736	1200	
vCu, unblocked vol	664			600			575	1319	0	772	1318	0
tC, single (s)	4.6			4.7			7.5	6.5	6.9	7.5	6.5	7.0
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.5			2.5			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	89			97			62	100	88	74	100	96
cM capacity (veh/h)	552			621			254	205	824	264	222	758

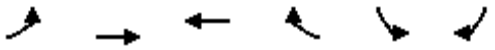
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	60	671	357	16	775	410	192	103
Volume Left	60	0	0	16	0	0	96	69
Volume Right	0	0	21	0	0	22	96	34
cSH	552	1700	1700	621	1700	1700	388	336
Volume to Capacity	0.11	0.39	0.21	0.03	0.46	0.24	0.49	0.31
Queue Length 95th (m)	2.8	0.0	0.0	0.6	0.0	0.0	20.1	9.7
Control Delay (s)	12.3	0.0	0.0	11.0	0.0	0.0	23.0	20.4
Lane LOS	B			B			C	C
Approach Delay (s)	0.7			0.1			23.0	20.4
Approach LOS							C	C

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	61.9%	ICU Level of Service		B
Analysis Period (min)	15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1775	1775	1775	1775	1550	1550
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	30.0			0.0	0.0	0.0
Storage Lanes	0			0	0	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.994			0.865
Flt Protected						
Satd. Flow (prot)	0	3302	3284	0	0	1326
Flt Permitted						
Satd. Flow (perm)	0	3302	3284	0	0	1326
Link Speed (k/h)		60	60		40	
Link Distance (m)		51.1	135.2		76.4	
Travel Time (s)		3.1	8.1		6.9	

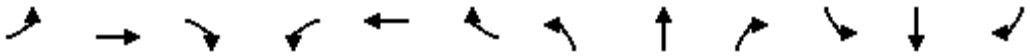
Intersection Summary	
Area Type:	Other



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1171	1190	50	0	11
Future Volume (Veh/h)	0	1171	1190	50	0	11
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1171	1190	50	0	11
Pedestrians					65	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.2	
Percent Blockage					5	
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		143	135			
pX, platoon unblocked	0.73				0.83	0.73
vC, conflicting volume	1305				1866	685
vC1, stage 1 conf vol					1280	
vC2, stage 2 conf vol					586	
vCu, unblocked vol	693				571	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	634				327	759

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	586	586	793	447	11
Volume Left	0	0	0	0	0
Volume Right	0	0	0	50	11
cSH	1700	1700	1700	1700	759
Volume to Capacity	0.34	0.34	0.47	0.26	0.01
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	0.0	0.0	9.8
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.8
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	115.0		0.0	45.0		0.0	120.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.4			2.4			2.4			2.4		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.97		0.97	0.99		0.95	0.88		0.90	0.96	
Frt		0.983			0.993			0.904			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1501	2823	0	1443	2936	0	1377	1125	0	1457	1326	0
Flt Permitted	0.190			0.106			0.403			0.355		
Satd. Flow (perm)	294	2823	0	156	2936	0	553	1125	0	491	1326	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			6			79			26	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		135.2			155.7			112.8			157.9	
Travel Time (s)		8.1			9.3			8.1			11.4	

Intersection Summary	
Area Type:	CBD

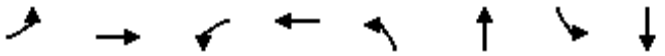
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	47	997	173	1020	128	100	130	157
Future Volume (vph)	47	997	173	1020	128	100	130	157
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	5.0	43.5	5.0	43.5	5.0	27.0	5.0	27.0
Minimum Split (s)	9.0	49.5	9.0	49.5	9.0	33.0	9.0	33.0
Total Split (s)	9.0	53.0	15.0	59.0	9.0	33.0	9.0	33.0
Total Split (%)	8.2%	48.2%	13.6%	53.6%	8.2%	30.0%	8.2%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	0.0	-2.0	0.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 48 (44%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Splits and Phases: 4: Phillip ST & Columbia St





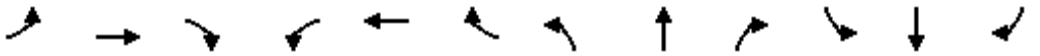
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	47	1125	173	1067	128	277	130	249
v/c Ratio	0.23	0.88	0.80	0.70	0.62	0.78	0.67	0.68
Control Delay	13.4	37.1	46.5	23.7	42.9	43.5	47.0	42.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	37.1	46.5	23.7	42.9	43.5	47.0	42.8
Queue Length 50th (m)	4.1	112.5	18.8	90.7	19.7	40.3	19.9	43.0
Queue Length 95th (m)	9.2	#155.4	#53.4	115.6	#35.4	#82.5	#39.1	71.3
Internal Link Dist (m)		111.2		131.7		88.8		133.9
Turn Bay Length (m)	115.0		45.0		120.0		35.0	
Base Capacity (vph)	200	1275	219	1519	208	354	195	368
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.88	0.79	0.70	0.62	0.78	0.67	0.68

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	997	128	173	1020	47	128	100	177	130	157	92
Future Volume (vph)	47	997	128	173	1020	47	128	100	177	130	157	92
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	0.88		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1496	2823		1440	2937		1350	1125		1411	1325	
Flt Permitted	0.19	1.00		0.11	1.00		0.40	1.00		0.36	1.00	
Satd. Flow (perm)	299	2823		161	2937		572	1125		527	1325	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	47	997	128	173	1020	47	128	100	177	130	157	92
RTOR Reduction (vph)	0	9	0	0	3	0	0	58	0	0	19	0
Lane Group Flow (vph)	47	1116	0	173	1064	0	128	219	0	130	230	0
Confl. Peds. (#/hr)	80		192	192		80	74		148	148		74
Confl. Bikes (#/hr)						6			4			5
Heavy Vehicles (%)	0%	1%	5%	4%	1%	0%	9%	1%	5%	3%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	51.3	47.3		62.0	54.0		32.0	27.0		32.0	27.0	
Effective Green, g (s)	51.3	49.3		62.0	56.0		32.0	29.0		32.0	29.0	
Actuated g/C Ratio	0.47	0.45		0.56	0.51		0.29	0.26		0.29	0.26	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	182	1265		215	1495		201	296		193	349	
v/s Ratio Prot	0.01	c0.40		c0.08	0.36		0.03	c0.19		c0.03	0.17	
v/s Ratio Perm	0.11			0.37			0.16			0.16		
v/c Ratio	0.26	0.88		0.80	0.71		0.64	0.74		0.67	0.66	
Uniform Delay, d1	17.1	27.7		20.9	20.8		34.2	37.0		34.6	36.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	9.1		19.2	2.9		6.5	15.3		8.9	9.4	
Delay (s)	17.9	36.8		40.2	23.7		40.7	52.3		43.6	45.5	
Level of Service	B	D		D	C		D	D		D	D	
Approach Delay (s)		36.0			26.0			48.6			44.8	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt												
Flt Protected												
Satd. Flow (prot)	0	3570	0	0	3570	0	0	1879	0	0	1879	0
Flt Permitted												
Satd. Flow (perm)	0	3570	0	0	3570	0	0	1879	0	0	1879	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		296.0			92.3			105.4			113.8	
Travel Time (s)		17.8			5.5			9.5			10.2	

Intersection Summary	
Area Type:	Other

Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	1088	1293		
Future Volume (vph)	1088	1293		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	12.0	12.0	12.0	12.0
Minimum Split (s)	18.0	18.0	37.0	37.0
Total Split (s)	63.0	63.0	42.0	42.0
Total Split (%)	60.0%	60.0%	40%	40%
Yellow Time (s)	4.0	4.0	2.0	2.0
All-Red Time (s)	2.0	2.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0		
Total Lost Time (s)	6.0	6.0		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	Max	Max	Max	Max

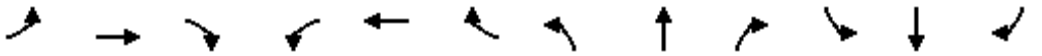
Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 105
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Pretimed

Splits and Phases: 5: LRT Rail / Laurel Trail & Columbia St



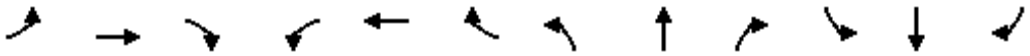
Lane Group	EBT	WBT
Lane Group Flow (vph)	1088	1293
v/c Ratio	0.56	0.67
Control Delay	17.2	19.3
Queue Delay	0.0	0.0
Total Delay	17.2	19.3
Queue Length 50th (m)	73.1	94.6
Queue Length 95th (m)	91.5	117.2
Internal Link Dist (m)	272.0	68.3
Turn Bay Length (m)		
Base Capacity (vph)	1938	1938
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.56	0.67

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑			↑	
Traffic Volume (vph)	0	1088	0	0	1293	0	0	0	0	0	0	0
Future Volume (vph)	0	1088	0	0	1293	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0							
Lane Util. Factor		0.95			0.95							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3570			3570							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3570			3570							
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1088	0	0	1293	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1088	0	0	1293	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6			8			4	
Permitted Phases												
Actuated Green, G (s)		57.0			57.0							
Effective Green, g (s)		57.0			57.0							
Actuated g/C Ratio		0.54			0.54							
Clearance Time (s)		6.0			6.0							
Lane Grp Cap (vph)		1938			1938							
v/s Ratio Prot		0.30			c0.36							
v/s Ratio Perm												
v/c Ratio		0.56			0.67							
Uniform Delay, d1		15.8			17.2							
Progression Factor		1.00			1.00							
Incremental Delay, d2		1.2			1.8							
Delay (s)		17.0			19.0							
Level of Service		B			B							
Approach Delay (s)		17.0			19.0			0.0			0.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	40.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	115.0		0.0	45.0		0.0	120.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.4			2.4			2.4			2.4		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.97		0.95	0.99		0.91	0.94		0.93	0.95	
Frt		0.985			0.986			0.927			0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1486	2781	0	1390	2861	0	1316	1185	0	1501	1267	0
Flt Permitted	0.184			0.170			0.556			0.547		
Satd. Flow (perm)	281	2781	0	237	2861	0	699	1185	0	805	1267	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			13			42			28	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		135.2			155.7			112.8			157.9	
Travel Time (s)		8.1			9.3			8.1			11.4	

Intersection Summary	
Area Type:	CBD

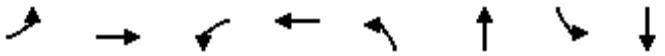
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	99	885	143	867	113	121	37	69
Future Volume (vph)	99	885	143	867	113	121	37	69
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	5.0	36.0	5.0	36.0	5.0	24.0	5.0	24.0
Minimum Split (s)	9.0	42.0	9.0	42.0	9.0	30.0	9.0	30.0
Total Split (s)	12.0	56.0	12.0	56.0	12.0	33.0	9.0	30.0
Total Split (%)	10.9%	50.9%	10.9%	50.9%	10.9%	30.0%	8.2%	27.3%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	0.0	-2.0	0.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 4: Phillip ST & Columbia St

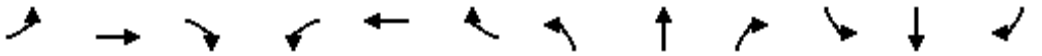




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	99	984	143	957	113	235	37	114
v/c Ratio	0.42	0.74	0.67	0.70	0.40	0.62	0.14	0.36
Control Delay	16.1	27.4	28.4	25.8	30.9	36.6	25.9	29.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	27.4	28.4	25.8	30.9	36.6	25.9	29.8
Queue Length 50th (m)	9.0	86.5	13.4	81.8	17.3	37.4	5.3	15.2
Queue Length 95th (m)	16.7	111.8	#27.4	105.5	31.3	65.7	12.6	31.6
Internal Link Dist (m)		111.2		131.7		88.8		133.9
Turn Bay Length (m)	115.0		45.0		120.0		35.0	
Base Capacity (vph)	240	1324	214	1369	282	380	259	321
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.74	0.67	0.70	0.40	0.62	0.14	0.36

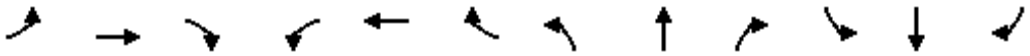
Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	885	99	143	867	90	113	121	114	37	69	45
Future Volume (vph)	99	885	99	143	867	90	113	121	114	37	69	45
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	0.94		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.95	1.00		0.96	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.93		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1481	2780		1381	2861		1252	1185		1444	1267	
Flt Permitted	0.18	1.00		0.17	1.00		0.56	1.00		0.55	1.00	
Satd. Flow (perm)	286	2780		247	2861		732	1185		832	1267	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	885	99	143	867	90	113	121	114	37	69	45
RTOR Reduction (vph)	0	8	0	0	7	0	0	30	0	0	21	0
Lane Group Flow (vph)	99	976	0	143	950	0	113	205	0	37	93	0
Confl. Peds. (#/hr)	81		169	169		81	88		77	77		88
Confl. Bikes (#/hr)			1			9			4			8
Heavy Vehicles (%)	1%	3%	7%	8%	2%	2%	14%	1%	16%	0%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	56.1	48.5		56.7	48.8		37.6	30.6		28.7	25.7	
Effective Green, g (s)	56.1	50.5		56.7	50.8		37.6	32.6		28.7	27.7	
Actuated g/C Ratio	0.51	0.46		0.52	0.46		0.34	0.30		0.26	0.25	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	228	1276		208	1321		287	351		233	319	
v/s Ratio Prot	0.03	c0.35		c0.05	0.33		c0.03	c0.17		0.00	0.07	
v/s Ratio Perm	0.19			0.30			0.11			0.04		
v/c Ratio	0.43	0.76		0.69	0.72		0.39	0.59		0.16	0.29	
Uniform Delay, d1	16.2	24.8		17.2	23.9		26.3	32.9		30.9	33.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	4.4		9.1	3.4		0.9	7.0		0.3	2.3	
Delay (s)	17.5	29.2		26.3	27.2		27.2	39.9		31.2	35.5	
Level of Service	B	C		C	C		C	D		C	D	
Approach Delay (s)		28.1			27.1			35.8			34.5	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1900	1750	1775	1775	1775
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	0.0		0.0	0.0		75.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	2.4			2.4			2.4			2.4		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.99	1.00		0.99	0.99		0.85		0.77	0.82	0.73	
Frt		0.984			0.982				0.850		0.873	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3165	0	1603	3217	0	1530	1879	1471	1635	2132	0
Flt Permitted	0.088			0.306			0.345			0.585		
Satd. Flow (perm)	153	3165	0	513	3217	0	471	1879	1139	822	2132	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			16				154		244	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		128.4			296.0			74.1			110.1	
Travel Time (s)		7.7			17.8			5.3			7.9	

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	153	637	107	1044	125	70	154	297	65
Future Volume (vph)	153	637	107	1044	125	70	154	297	65
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	5	2	1	6	3	8		7	4
Permitted Phases	2		6		8		8	4	
Detector Phase	5	2	1	6	3	8	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	40.2	5.0	40.2	7.0	12.0	12.0	7.0	12.0
Minimum Split (s)	9.0	47.3	9.0	47.3	11.0	30.1	30.1	11.0	30.1
Total Split (s)	12.0	49.0	11.0	48.0	17.9	30.1	30.1	19.9	32.1
Total Split (%)	10.9%	44.5%	10.0%	43.6%	16.3%	27.4%	27.4%	18.1%	29.2%
Yellow Time (s)	3.0	3.7	3.0	3.7	3.0	3.3	3.3	3.0	3.3
All-Red Time (s)	1.0	3.4	1.0	3.4	1.0	3.8	3.8	1.0	3.8
Lost Time Adjust (s)	0.0	-3.1	0.0	-3.1	0.0	-3.1	-3.1	0.0	-3.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 97 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 1: Hagey Blvd. & Columbia St

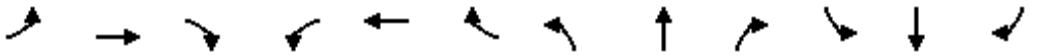




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	153	714	107	1186	125	70	154	297	415
v/c Ratio	0.67	0.48	0.31	0.82	0.49	0.23	0.49	0.75	0.85dr
Control Delay	33.5	21.6	14.1	32.7	31.7	40.1	11.3	41.5	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.5	21.6	14.1	32.7	31.7	40.1	11.3	41.5	22.1
Queue Length 50th (m)	14.0	50.7	9.2	109.5	19.6	13.5	0.0	52.1	18.2
Queue Length 95th (m)	#50.7	77.2	20.8	#166.6	29.7	23.9	16.6	68.5	32.4
Internal Link Dist (m)		104.4		272.0		50.1			86.1
Turn Bay Length (m)	30.0		30.0						
Base Capacity (vph)	229	1494	348	1450	271	445	387	395	726
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.48	0.31	0.82	0.46	0.16	0.40	0.75	0.57

Intersection Summary

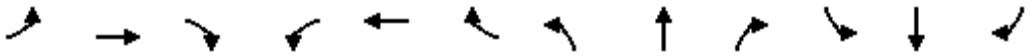
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	637	77	107	1044	142	125	70	154	297	65	350
Future Volume (vph)	153	637	77	107	1044	142	125	70	154	297	65	350
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1900	1750	1775	1775	1775
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.77	1.00	0.73	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.95	1.00	1.00	0.90	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1667	3164		1600	3217		1457	1879	1135	1471	2131	
Flt Permitted	0.09	1.00		0.31	1.00		0.34	1.00	1.00	0.58	1.00	
Satd. Flow (perm)	154	3164		516	3217		528	1879	1135	905	2131	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	153	637	77	107	1044	142	125	70	154	297	65	350
RTOR Reduction (vph)	0	7	0	0	9	0	0	0	128	0	196	0
Lane Group Flow (vph)	153	707	0	107	1177	0	125	70	26	297	219	0
Confl. Peds. (#/hr)	90		29	29		90	236		147	147		236
Confl. Bikes (#/hr)			7			9			11			9
Heavy Vehicles (%)	0%	1%	22%	4%	0%	6%	9%	0%	0%	2%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	59.0	48.6		54.2	46.2		27.9	15.2	15.2	34.5	18.5	
Effective Green, g (s)	59.0	51.7		54.2	49.3		27.9	18.3	18.3	34.5	21.6	
Actuated g/C Ratio	0.54	0.47		0.49	0.45		0.25	0.17	0.17	0.31	0.20	
Clearance Time (s)	4.0	7.1		4.0	7.1		4.0	7.1	7.1	4.0	7.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		5.0	3.0	3.0	5.0	3.0	
Lane Grp Cap (vph)	225	1487		333	1441		241	312	188	366	418	
v/s Ratio Prot	c0.06	0.22		0.02	c0.37		0.06	0.04		c0.12	0.10	
v/s Ratio Perm	0.30			0.13			0.07		0.02	c0.14		
v/c Ratio	0.68	0.48		0.32	0.82		0.52	0.22	0.14	0.81	0.85dr	
Uniform Delay, d1	19.7	19.9		15.6	26.4		33.6	39.7	39.1	33.1	39.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.2	1.1		0.6	5.2		3.7	0.4	0.3	14.3	1.2	
Delay (s)	27.9	21.0		16.2	31.7		37.4	40.1	39.4	47.5	40.8	
Level of Service	C	C		B	C		D	D	D	D	D	
Approach Delay (s)		22.2			30.4			38.8			43.6	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	115.0		0.0	45.0		0.0	120.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.4			2.4			2.4			2.4		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.97		0.97	0.99		0.95	0.88		0.90	0.96	
Frt		0.983			0.993			0.904			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1501	2823	0	1443	2936	0	1377	1125	0	1457	1326	0
Flt Permitted	0.183			0.115			0.403			0.355		
Satd. Flow (perm)	284	2823	0	169	2936	0	553	1125	0	491	1326	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			6			79			26	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		135.2			155.7			112.8			157.9	
Travel Time (s)		8.1			9.3			8.1			11.4	

Intersection Summary	
Area Type:	CBD

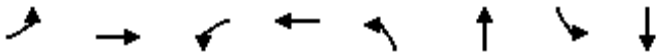
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	47	997	173	1020	128	100	130	157
Future Volume (vph)	47	997	173	1020	128	100	130	157
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	5.0	43.5	5.0	43.5	5.0	27.0	5.0	27.0
Minimum Split (s)	9.0	49.5	9.0	49.5	9.0	33.0	9.0	33.0
Total Split (s)	9.0	55.0	13.0	59.0	9.0	33.0	9.0	33.0
Total Split (%)	8.2%	50.0%	11.8%	53.6%	8.2%	30.0%	8.2%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	0.0	-2.0	0.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Splits and Phases: 4: Phillip ST & Columbia St

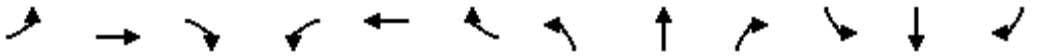




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	47	1125	173	1067	128	277	130	249
v/c Ratio	0.24	0.85	0.86	0.70	0.62	0.78	0.67	0.68
Control Delay	13.3	33.6	53.3	23.7	42.9	43.5	47.0	42.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	33.6	53.3	23.7	42.9	43.5	47.0	42.8
Queue Length 50th (m)	4.1	108.3	17.2	90.7	19.7	40.3	19.9	43.0
Queue Length 95th (m)	9.2	139.3	#55.1	115.6	#35.4	#82.5	#39.1	71.3
Internal Link Dist (m)		111.2		131.7		88.8		133.9
Turn Bay Length (m)	115.0		45.0		120.0		35.0	
Base Capacity (vph)	199	1317	202	1519	208	354	195	368
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.85	0.86	0.70	0.62	0.78	0.67	0.68

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	997	128	173	1020	47	128	100	177	130	157	92
Future Volume (vph)	47	997	128	173	1020	47	128	100	177	130	157	92
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	0.88		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1497	2823		1440	2937		1350	1125		1411	1325	
Flt Permitted	0.18	1.00		0.11	1.00		0.40	1.00		0.36	1.00	
Satd. Flow (perm)	289	2823		174	2937		572	1125		527	1325	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	47	997	128	173	1020	47	128	100	177	130	157	92
RTOR Reduction (vph)	0	9	0	0	3	0	0	58	0	0	19	0
Lane Group Flow (vph)	47	1116	0	173	1064	0	128	219	0	130	230	0
Confl. Peds. (#/hr)	80		192	192		80	74		148	148		74
Confl. Bikes (#/hr)						6			4			5
Heavy Vehicles (%)	0%	1%	5%	4%	1%	0%	9%	1%	5%	3%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	53.0	49.0		62.0	54.0		32.0	27.0		32.0	27.0	
Effective Green, g (s)	53.0	51.0		62.0	56.0		32.0	29.0		32.0	29.0	
Actuated g/C Ratio	0.48	0.46		0.56	0.51		0.29	0.26		0.29	0.26	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	183	1308		201	1495		201	296		193	349	
v/s Ratio Prot	0.01	0.40		c0.07	0.36		0.03	c0.19		c0.03	0.17	
v/s Ratio Perm	0.11			c0.41			0.16			0.16		
v/c Ratio	0.26	0.85		0.86	0.71		0.64	0.74		0.67	0.66	
Uniform Delay, d1	16.5	26.2		18.8	20.8		34.2	37.0		34.6	36.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	7.2		29.3	2.9		6.5	15.3		8.9	9.4	
Delay (s)	17.2	33.4		48.1	23.7		40.7	52.3		43.6	45.5	
Level of Service	B	C		D	C		D	D		D	D	
Approach Delay (s)		32.7			27.1			48.6			44.8	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Appendix D

City By-Law Parking Requirements

ZONING BY-LAW

AS AMENDED

2018-050

THE CORPORATION OF THE CITY OF WATERLOO

DATE OF CONSOLIDATION
16• JANUARY•2025

7.10.7 The following minimum PARKING SPACE regulations shall apply to:

- Primary Uses in section 7.10.1.1, except as specified in Table 6A
- Complementary Uses in section 7.10.1.2, except SPIRITUAL USES as specified in Table 6A
- Ancillary Uses in section 7.10.1.5, except as specified in Table 6A

Minimum Parking Rate		**Area A** on Schedule A1	**Area B** on Schedule A1	**Area C** on Schedule A1	**Area D** on Schedule A1	**Area E** on Schedule A1	**Area F** on Schedule A1	**All Other**	
RMU-20	Use	0.65	0.75	0.90	1.00	1.00	1.10	1.15	PDU*
	Visitor	0.10	0.10	0.10	0.10	0.10	0.10	0.10	PDU*
		0.75	**0.85**	**1.00**	**1.10**	**1.10**	**1.20**	**1.25**	**PDU***
RMU-30	Use	0.65	0.75	0.90	1.00	1.00	1.10	1.15	PDU*
	Visitor	0.10	0.10	0.10	0.10	0.10	0.10	0.10	PDU*
		0.75	**0.85**	**1.00**	**1.10**	**1.10**	**1.20**	**1.25**	**PDU***
RMU-40	Use	0.65	0.75	0.90	1.00	1.00	1.10	1.15	PDU*
	Visitor	0.10	0.10	0.10	0.10	0.10	0.10	0.10	PDU*
		0.75	**0.85**	**1.00**	**1.10**	**1.10**	**1.20**	**1.25**	**PDU***
RMU-60	Use	0.60	0.65	0.70	0.80	0.80	0.90	0.90	PDU*
	Visitor	0.10	0.10	0.10	0.10	0.10	0.10	0.10	PDU*
		0.70	**0.75**	**0.80**	**0.90**	**0.90**	**1.00**	**1.00**	**PDU***
RMU-81	Use	0.60	0.65	0.70	0.80	0.80	0.90	0.90	PDU*
	Visitor	0.10	0.10	0.10	0.10	0.10	0.10	0.10	PDU*
		0.70	**0.75**	**0.80**	**0.90**	**0.90**	**1.00**	**1.00**	**PDU***
Non-Residential Uses	Use	1.50	1.80	2.10	2.40	2.40	2.70	3.00	/100m2*

* PDU = Per Dwelling Unit
/100m2 = Per 100 square metres of BUILDING FLOOR AREA

NOTE: BICYCLE PARKING requirements are contained in section 6.6. LOADING SPACE requirements are contained in section 6.9.

7.10.8 A LONG TERM CARE FACILITY shall comply with the parking regulations in Table 6A.

7.10.9 An ASSISTED LIVING FACILITY shall comply with the parking regulations in Table 6A.

ZONING BY-LAW

AS AMENDED

2018-050

THE CORPORATION OF THE CITY OF WATERLOO

DATE OF CONSOLIDATION
23 • MARCH • 2026

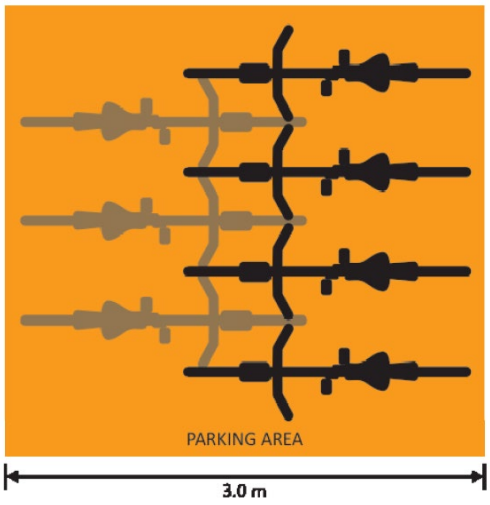
b.) Where VISITOR PARKING SPACES are provided within STRUCTURED PARKING, the drive aisle that leads to the VISITOR PARKING SPACES shall be clearly identified and marked.
c.) VISITOR PARKING SPACES shall be common elements to the BUILDING.

6.6 BICYCLE PARKING SPACES

6.6.1 BICYCLE PARKING spaces (TYPE A BICYCLE PARKING and TYPE B BICYCLE PARKING) shall comply with the dimensions in Table 6F:

TABLE 6F: BICYCLE PARKING SPACE DIMENSIONS

	Dimension	
Horizontal BICYCLE PARKING Space	Width (minimum)	0.6 metres
	Length – Single Side Rack (minimum)	2.0 metres
	Length – Double Side Rack (minimum)	3.0 metres
	Vertical Clearance (minimum)	2.0 metres
	Access Aisle Width (minimum)	1.75 metres
Vertical Mounted BICYCLE PARKING Space	Width (minimum)	0.6 metres
	Length (minimum)	1.25 metres
	Vertical Clearance (minimum)	2.0 metres
	Access Aisle Width (minimum)	1.75 metres
BICYCLE PARKING (STACKED) Space	Width (minimum)	0.6 metres
	Length (minimum)	2.0 metres
	Vertical Clearance (minimum, combined)	3.8 metres
	Access Aisle Width (minimum)	2.5 metres



(Source: Transport Canada, April 2010)

6.6.2 The following BICYCLE PARKING regulations shall apply to BUILDINGS constructed after the effective date of this BY-LAW:

a.) Where a LOT contains less than twenty (20) DWELLING UNITS, a minimum zero-point-six (0.6) TYPE A BICYCLE PARKING and or TYPE B BICYCLE PARKING spaces shall be provided for each DWELLING UNIT.

b.) Where a LOT contains twenty (20) or more DWELLING UNITS:

i.) a minimum zero-point-three (0.3) TYPE A BICYCLE PARKING spaces shall be provided for each DWELLING UNIT; and

ii.) a minimum zero-point-three (0.3) TYPE B BICYCLE PARKING spaces shall be provided for each DWELLING UNIT.

c.) For non-residential USES, the following minimum BICYCLE PARKING requirements shall apply:

i.) Within Area A on Schedule A1:

A.) BICYCLE PARKING spaces shall be provided at a minimum rate of 0.8 BICYCLE PARKING SPACES per 100 square metres of non-residential BUILDING FLOOR AREA excluding STRUCTURED PARKING. This requirement may be satisfied as TYPE A BICYCLE PARKING and or TYPE B BICYCLE PARKING, except as specified in section 6.6.2.c.)i.)B.).

B.) where non-residential BUILDING FLOOR AREA exceeds 2,400 square metres, a minimum fifty percent (50%) of the required BICYCLE PARKING shall be provided as TYPE A BICYCLE PARKING.

ii.) Within Area B on Schedule A1:

A.) BICYCLE PARKING spaces shall be provided at a minimum rate of fifty percent (50%) of the required motor vehicle PARKING SPACES. This requirement may be satisfied as TYPE A BICYCLE PARKING and or TYPE B BICYCLE PARKING, except as specified in section 6.6.2.c.).ii.).B.).

B.) where non-residential BUILDING FLOOR AREA exceeds 2,400 square metres, a minimum fifty percent (50%) of the required BICYCLE PARKING shall be provided as TYPE A BICYCLE PARKING.

iii.) For all areas other than Areas A and B on Schedule A1:

A.) BICYCLE PARKING spaces shall be provided at a minimum rate of twenty percent (20%) of the required motor vehicle PARKING SPACES. This requirement may be satisfied as TYPE A BICYCLE PARKING and or TYPE B BICYCLE PARKING, except as specified in section 6.6.2.c.).iv.).B.).

B.) where non-residential BUILDING FLOOR AREA exceeds 4,650 square metres, a minimum fifty percent (50%) of the required BICYCLE PARKING shall be provided as TYPE A BICYCLE PARKING.

d.) Notwithstanding section 6.6.2.c.), for PUBLIC SCHOOLS and PRIVATE SCHOOLS, two (2) BICYCLE PARKING spaces shall be provided for each TEACHING AREA. This requirement may be satisfied as TYPE A BICYCLE PARKING and or TYPE B BICYCLE PARKING.

6.6.3 Section 6.6.2 shall not apply to the follow USES: