1357 Baseline Road Transportation Impact Assessment

Strategy Report

January 17, 2020

Prepared for:

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Prepared by:

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1.0 SCREENING

1.1 SUMMARY OF DEVELOPMENT

Municipal Address	1357 Baseline Road
Description of Location	North-east corner of the Baseline Road at Clyde Avenue intersection. The site is bound by Baseline Road to the south, Clyde Avenue to the west, and existing commercial to the north and east.
Land Use Classification	Residential, Commercial
Development Size (units)	Retirement units: 228 Apartment units: 174
Development Size (ft^2)	**Commercial:** 5,900ft^2 GFA
Number of Accesses and Locations	1 full movements access to the proposed parking garage off existing Private Access 2, approximately 25m north of Baseline Road
Phase of Development	1 Phase
Buildout Year	Assumed build-out and occupancy by 2022

If available, please attach a sketch of the development or site plan to this form.

1.2 TRIP GENERATION TRIGGER

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size	Triggered
Single-family homes	40 units	✗
Townhomes or apartments	90 units	✓
Office	3,500 m^2	✗
Industrial	5,000 m^2	✗
Fast-food restaurant or coffee shop	100 m^2	✗
Destination retail	1,000 m^2	✗
Gas station or convenience market	75 m^2	✗

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

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1.3 LOCATION TRIGGERS

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	✓	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone? *	✓	

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

1.4 SAFETY TRIGGERS

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		✗
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	✓	
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		✗
Is the proposed driveway within auxiliary lanes of an intersection?		✗
Does the proposed driveway make use of an existing median break that serves an existing site?		✗
Is there a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		✗
Does the development include a drive-thru facility?		✗

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

1.5 SUMMARY

	Yes	No
Does the development satisfy the Trip Generation Trigger?	✓	
Does the development satisfy the Location Trigger?	✓	
Does the development satisfy the Safety Trigger?	✓	

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

2.0 SCOPING

2.1 EXISTING AND PLANNED CONDITIONS

2.1.1 Proposed Development

Selection Groupe International Inc. is preparing a development application for Site Plan Control of a proposed development in the Civic Hospital / Central Park neighbourhood of Ottawa, Ontario. The proposed development is located at the north-east corner of the Baseline Road at Clyde Avenue intersection. The site is bound by Baseline Road to the south, Clyde Avenue to the west, and existing commercial to the north and east.

Figure 1 illustrates the location of the subject development. The subject site is currently zoned as Arterial Mainstreet (AM) Zone; the purpose of the AM Zone, according to the City of Ottawa Official Plan, is to:

- *"accommodate a broad range of uses including retail, service commercial, offices, residential and institutional uses in mixed-use buildings or side by side in separate buildings in areas designated Arterial Mainstreet* in the Official Plan; and
- *Impose development standards that will promote intensification while ensuring that they are compatible with the surrounding uses."*

The existing property is currently an empty lot that is the last portion to be developed of the overall 1357 Baseline Road property parcel. There are currently three existing shared private accesses to the 1357 Baseline Road property. Private Access 1 is a full movements signalized intersection and is located on Baseline Road approximately 270m east of Clyde Avenue. Private Access 2 is a right-in only intersection and is located on Baseline Road approximately 100m east of Clyde Avenue. Private Access 3 is a right-in / right-out only intersection and is located on Clyde Avenue approximately 100m north of Baseline Road. Access to the parking garage for the subject site will be located approximately 40m north of Baseline Road along Private Access 2 and will not have any turning restrictions. A total of 333 vehicle parking spaces and 156 bicycle parking spaces will be provided as part of the proposed development.

The proposed site will be constructed in one phase. Build-out and occupancy of the proposed site is anticipated to occur in 2022.

Table 1 outlines the proposed land uses assumed for the analysis which were obtained from the *Institute of Transportation (ITE) Trip Generation Manual 10th Edition*.

Figure 2 illustrates the proposed site plan.

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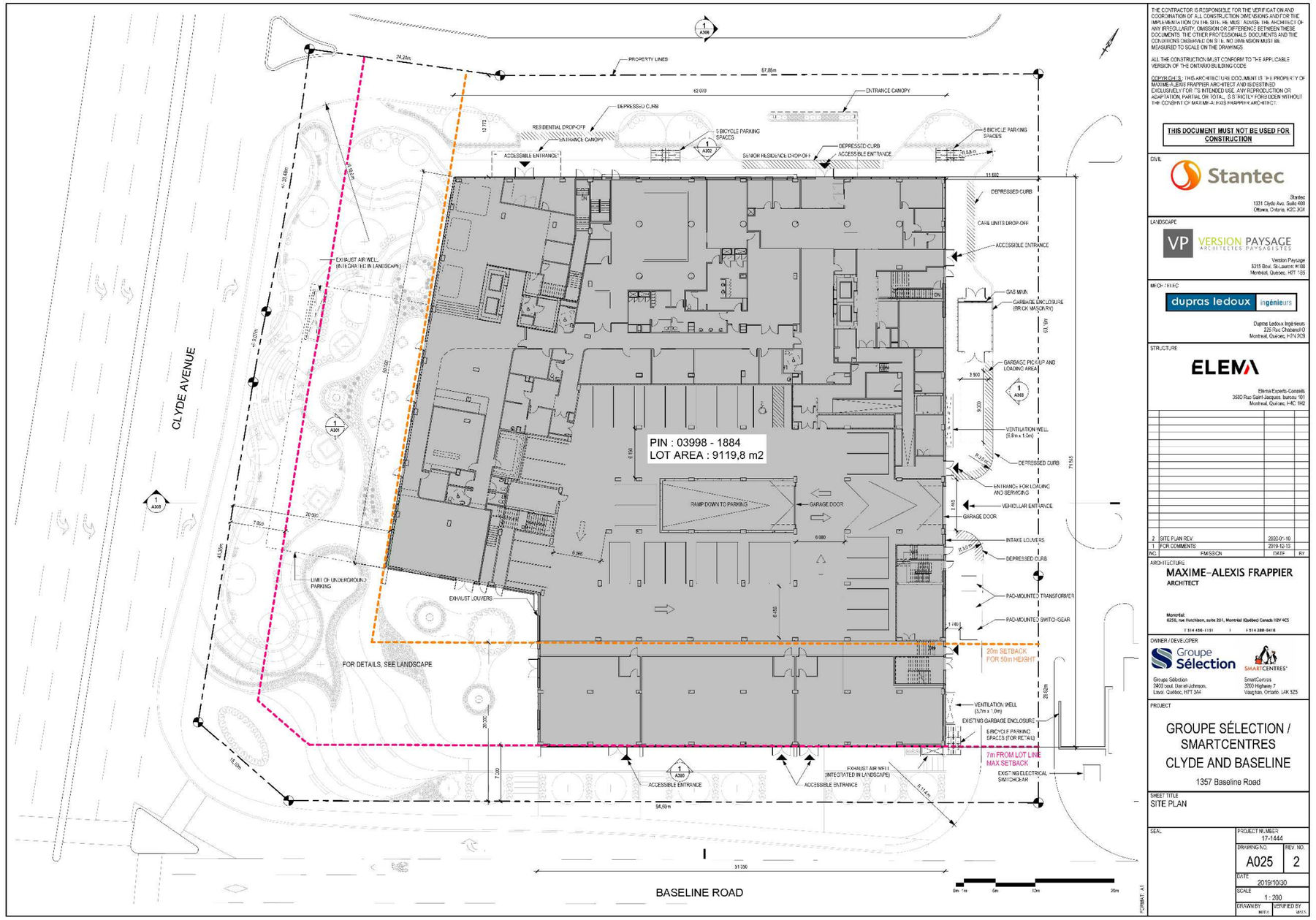
Figure 1 - Site Location

Table 1 - Proposed Land Uses / Land Use Codes

Land Use	Size	Land Use Code (LUC)
LUC 252	228 units	Senior Adult Housing – Attached
LUC 222	174 units	High-Rise Apartments
LUC 820	5,500 ft^2 GFA	Shopping Centre

Figure 2 - Site Plan



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NO.	EMISSION	DATE	BY
2	SITE PLAN REV	2020-01-10	
1	FOR COMMENTS	2019-12-13	

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PROJECT
GROUPE SÉLECTION / SMARTCENTRES
CLYDE AND BASELINE
1357 Baseline Road

SHEET TITLE
SITE PLAN

SEAL

PROJECT NUMBER	17-1444
DRAWING NO.	A025
REV. NO.	2
DATE	2019/10/30
SCALE	1 : 200
DRAWN BY	MAFX
VERIFIED BY	MFX

2.1.2 Existing Conditions

2.1.2.1 Roads and Traffic Control

The roadways under consideration in the study area are described as follows:

Baseline Road	Within the vicinity of the subject site, Baseline Road is a municipal five-lane divided arterial roadway. The posted speed limit along Baseline Road across the frontage of the subject site is 60 km/h. Sidewalks are provided along both sides of the road and an on-street bicycle lane is provided in the westbound direction. As outlined in the City's Official Plan, Baseline Road is designated as an Arterial Mainstreet across the frontage of the subject site.
Clyde Avenue	Within the vicinity of the subject site, Clyde Avenue is a municipal four-lane divided arterial roadway. The posted speed limit along Clyde Avenue across the frontage of the subject site is 60 km/h. Sidewalks are provided along both sides of Clyde Avenue. The intersection with Baseline Road is signalized and auxiliary left turn lanes are provided in all directions.

There are numerous commercial driveways along both Baseline Road and Clyde Avenue within 200m of the existing Private Accesses.

Figure 3 illustrates the existing lane configuration and traffic control.

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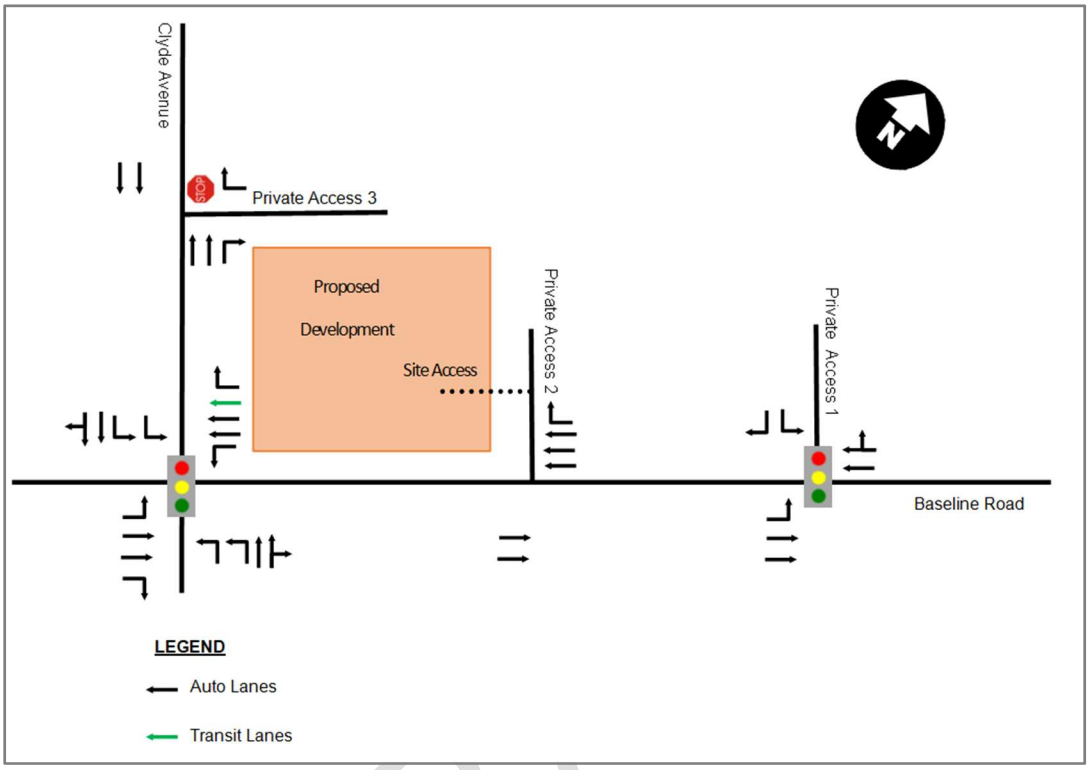
Figure 3 - Existing Lane Configuration and Traffic Control



2.1.2.2 Walking and Cycling

Within the vicinity of the subject site, sidewalks are provided on both sides of Baseline Road and Clyde Avenue. Across the frontage of the subject site, there is currently an on-street bicycle lane along Baseline Road in the westbound direction. Both Baseline Road and Clyde Avenue are designated as 'spine' cycling routes in the City of Ottawa's Ultimate Cycling Network.

2.1.2.3 Transit

Transit service is currently provided in the immediate vicinity of the proposed development via the following routes:

Route 50 Route 50 is a Local Route that runs between Tunney's Pasture Station and Lincoln Fields Station

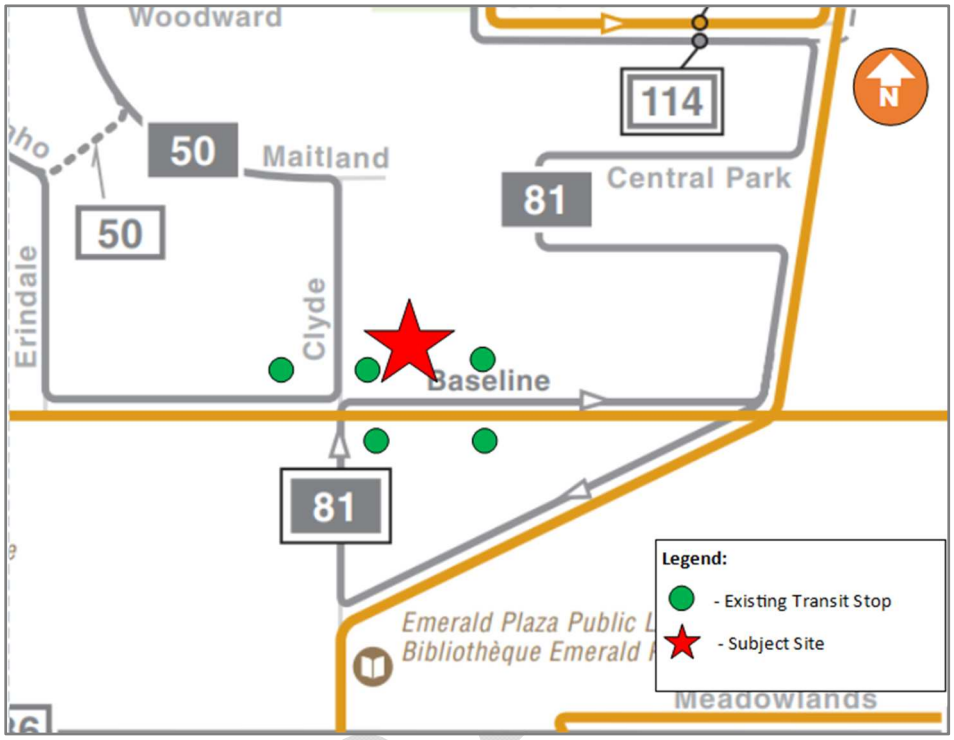
Route 81 Route 81 is a Local Route that runs between Tunney's Pasture Station and Clyde Avenue

Route 88 Route 88 is a Frequent Route that runs between Hurdman Station and Terry Fox Station

There are transit stops located at the intersection of Baseline Road and Clyde Avenue that are serviced by all three transit routes.

Figure 4 illustrates nearby transit routes and bus stop locations.

Figure 4 - Study Area Transit Routes and Stops



(Source: OC Transpo System Map, accessed November 7th, 2019)

2.1.2.4 Traffic Management Measures

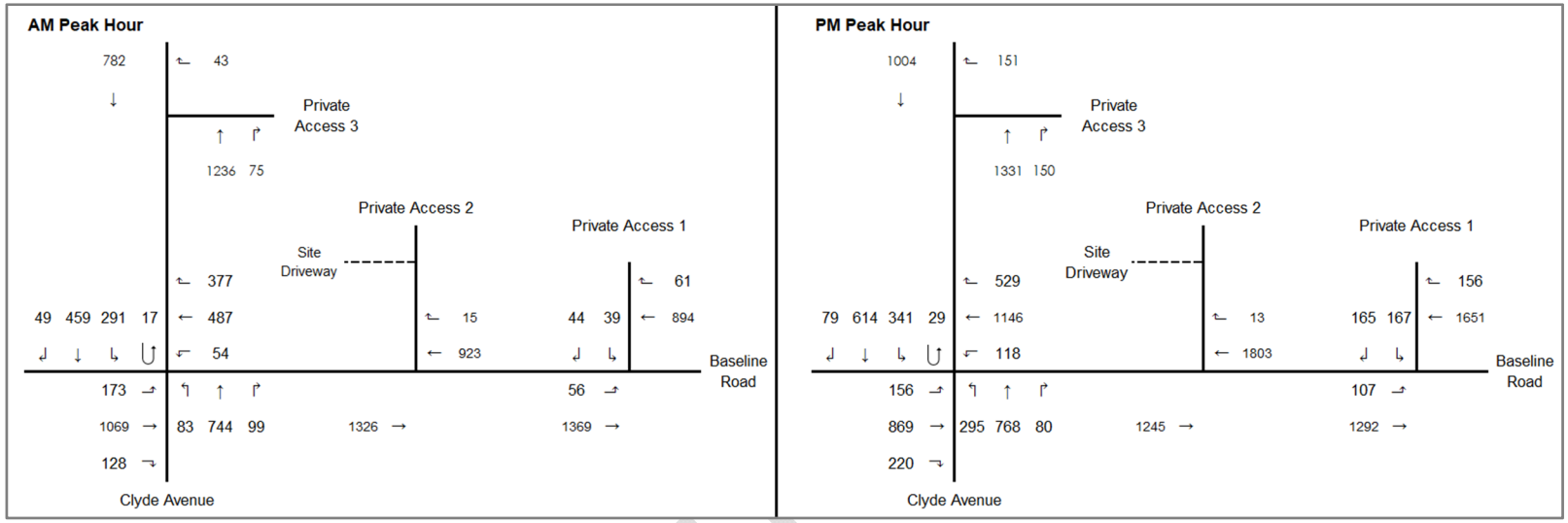
No traffic management measures are currently provided near the subject site.

2.1.2.5 Traffic Volumes

Traffic volumes at the study area intersections were collected in the summer of 2019. **Figure 5** illustrates the 2019 traffic volumes at the four study area intersections.

Appendix A contains the traffic data and is provided for reference.

Figure 5 - 2019 Existing Traffic Volumes



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2.1.2.6 Collision History

Collision data was provided by the City of Ottawa for the period January 2014 to December 2018 in the vicinity of the subject site. The data was reviewed to determine if any intersections or road segments exhibited an identifiable collision pattern during the five (5) year period.

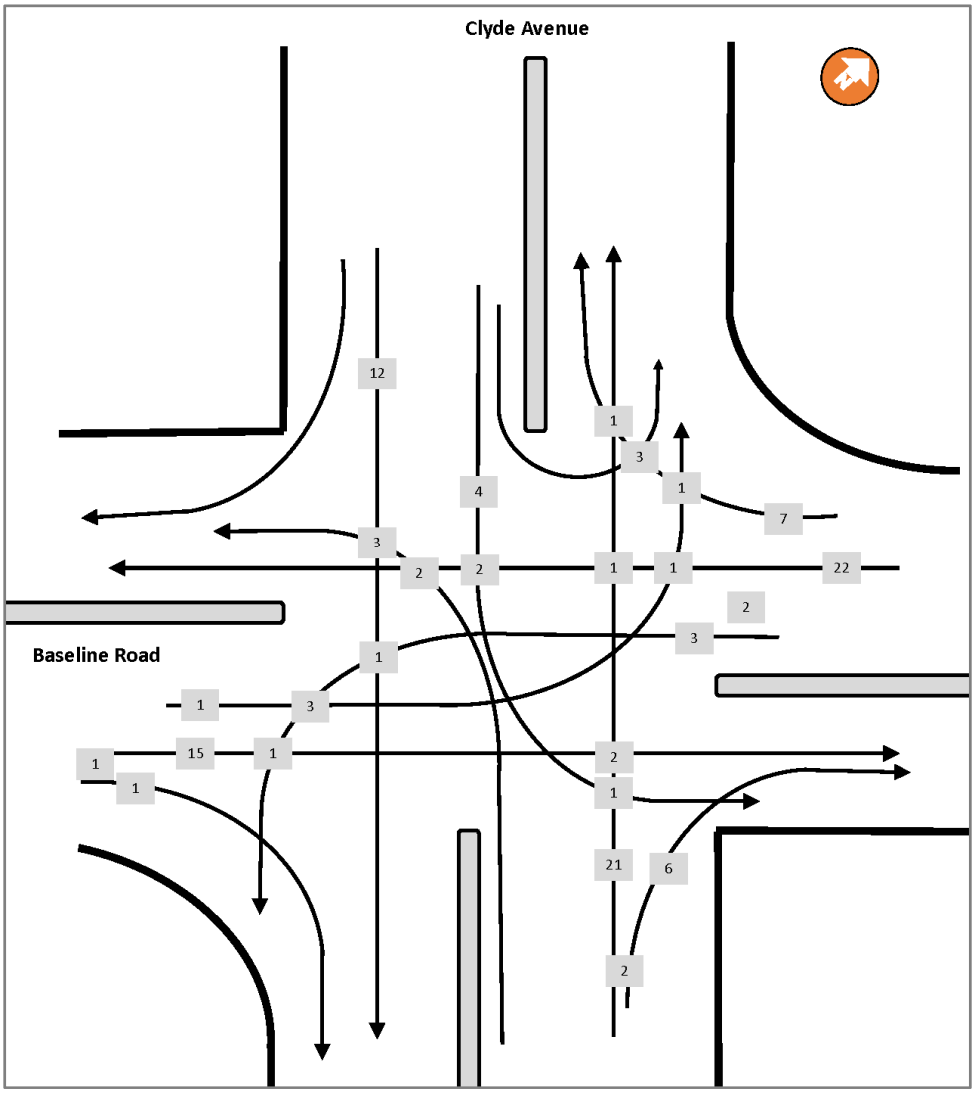
Table 2 includes the collision summary for each road segment and intersection in the study area.

Table 2 - Collision Summary

		Baseline Road at Clyde Avenue	Baseline Road at Private Access 1	Baseline Road between Clyde and Private Access 1	Clyde Avenue between Baseline Road and Maitland Avenue
Classification	Property Damage Only	104	19	16	10
	Non-Fatal Injury	19	10	6	1
	Fatal	0	0	0	1
Collision Type	Rear End	76	12	15	3
	Angle / Turning	24	13	0	4
	Sideswipe	20	0	5	3
	Single Motor Vehicle	3	4	2	2
Event	Other Motor Vehicle	112	24	19	9
	Ran off Road	0	0	1	0
	Cyclist	1	1	0	1
	Pedestrian	0	4	1	1
	Skidding	7	0	1	1
	Physical (curb, pole, barrier)	3	0	0	0

Based on the collision data summarized in **Table 2** above, it was found that the Baseline Road at Clyde Avenue intersection experienced the highest number of collisions. A collision diagram was created (**Figure 6** below) for this intersection to visually depict the directions the vehicles were traveling at the time of the collisions to determine there are any discernable patterns.

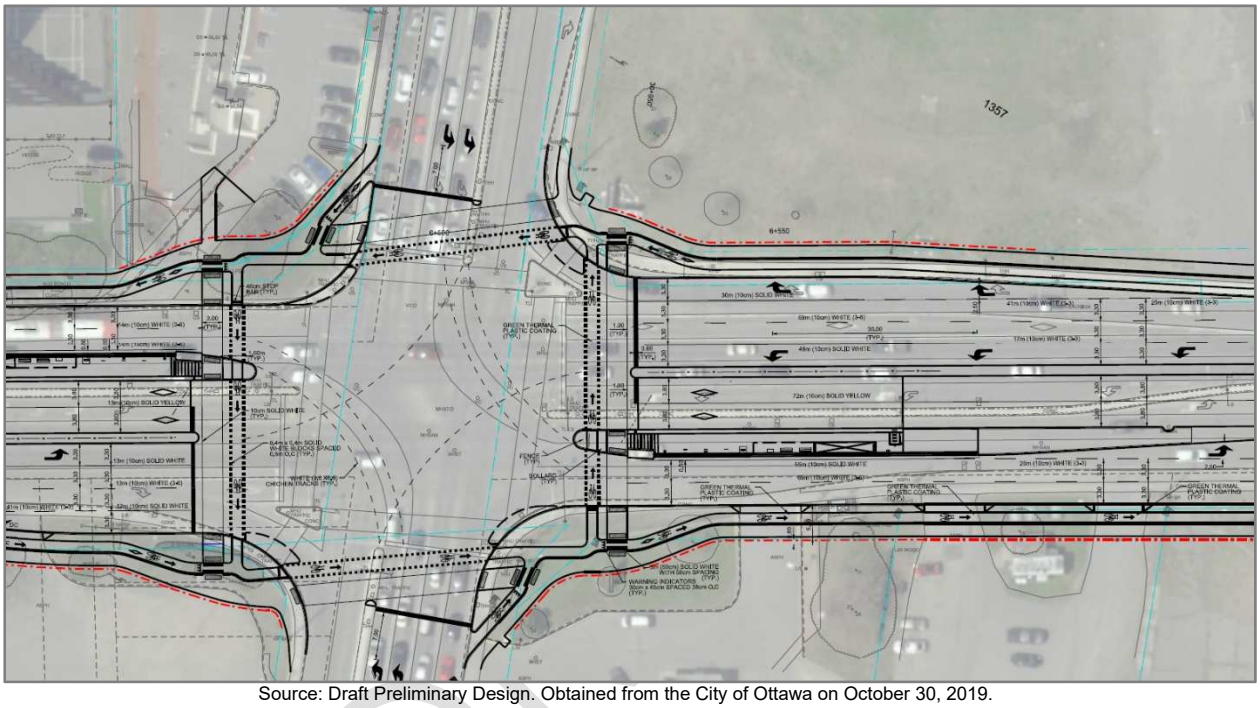
Figure 6 - Collisions at the Baseline Road at Clyde Avenue Intersection (2014 – 2018)



Based on the data depicted in **Figure 6** above, it was found the majority of the collisions at this intersection involved vehicles traveling in the westbound direction. There is a vertical crest along Baseline Road just east of Clyde Avenue which may contribute to the high frequency of collisions. Vehicles traveling in the westbound direction may not see other vehicles that are stopped at the Clyde Avenue intersection as they traverse over the crest of the hill. Their speeds may increase as they descend the hill at which point there may not be sufficient space to safely stop, thus leading to rear end collisions. The westbound right turn lane is currently configured as a regular channelized lane (i.e. instead of a smart channel), which reduces the angle of view for motorists as they attempt to check for oncoming vehicles. To add to the problem, the southbound left turn currently has two lanes with a permitted 'u-turn' sign, which is atypical for dual left turn lanes. This combination of design elements of the westbound right turn lane and permitted u-turn movements in the southbound left direction at this intersection likely contributes to the abnormal number of collisions involving the westbound right turn lane.

Once the Baseline Road Bus Rapid Transit (BRT) in place, the cross-section of Baseline Road across the frontage of the subject site will change. Based on the draft preliminary design for the Baseline Road BRT, the Baseline Road at Clyde Avenue intersection will include a westbound left turn lane, a westbound through lane, a two westbound through lanes, and a westbound right turn lane (**Figure 7** below).

Figure 7 - Baseline at Clyde from Draft Preliminary Design



Source: Draft Preliminary Design. Obtained from the City of Ottawa on October 30, 2019.

2.1.3 Planned Conditions

2.1.3.1 Road Network Modifications

One transit improvement is scheduled to occur within the vicinity of the subject development, as outlined in the City of Ottawa's Transportation Master Plan and are summarized in **Table 3** below.

Table 3 - City of Ottawa Transportation Master Plan Projects

Project	Description	TMP Phase
Baseline / Heron / Walkley / St. Laurent	At-grade Bus Rapid Transit connecting Baseline Station to Heron Station	Affordable Network (2031)
	At-grade Bus Rapid Transit connecting Bayshore Station to St. Laurent Station	Network Concept (i.e. beyond 2031)

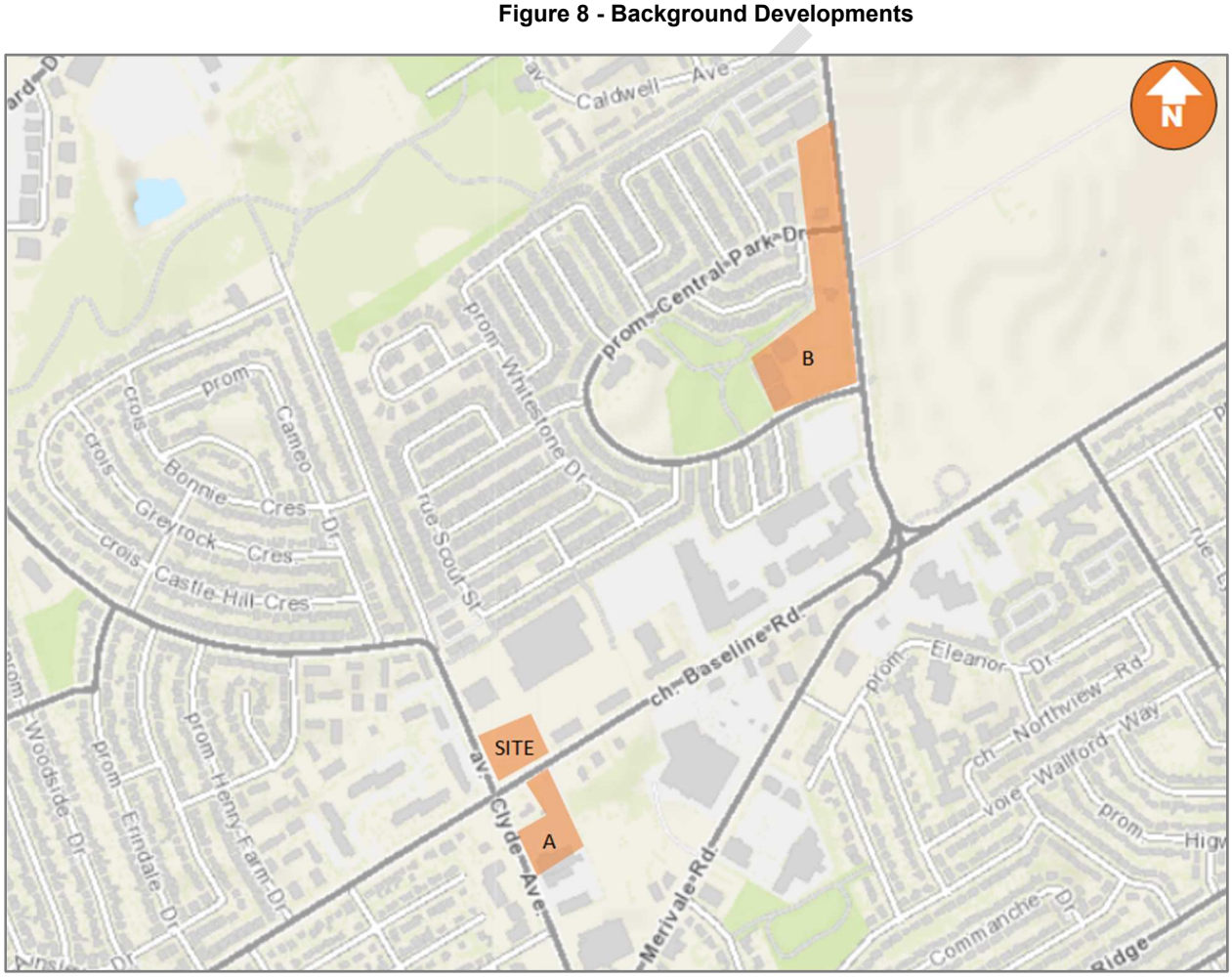
2.1.3.2 Future Background Developments

There are two developments scheduled to occur within the vicinity of the subject site, as illustrated in **Figure 8** and described in **Table 4**.

Table 4 - Background Developments

Key Plan Reference	Development	Location	Description	Build-Out Horizon
A	1375 Clyde Avenue	Southeast quadrant of the Baseline Road at Clyde Avenue intersection.	Self-storage facility, restaurant and expansion of existing retail building.	2020
B	300 Central Park	West of Merivale Road, between Central Park Drive and Caldwell Avenue	740 high-rise apartment units, 180,000 ft^2 of retail, and 48,000 ft^2 of office.	No definitive timeline outlined in the TIA. Assumed to be by 2022 for the subject TIA.

Figure 8 - Background Developments



2.2 STUDY AREA AND TIME PERIODS

2.2.1 Study Area

The proposed study area is limited to the following intersections:

1. Baseline Road at Clyde Avenue;
2. Baseline Road at Private Access 1;
3. Baseline Road at Private Access 2; and
4. Clyde Avenue at Private Access 3.

2.2.2 Time Periods

The proposed scope of the transportation assessment includes the following analysis time periods:

- Weekday AM peak hour of roadway; and
- Weekday PM peak hour of roadway.

2.2.3 Horizon Years

The scope of the transportation assessment proposes the following horizon years:

- 2019 existing conditions;
- 2022 future background conditions;
- 2022 total future conditions (site build-out); and
- 2027 total future conditions (5 years beyond build-out).

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2.3 EXEMPTIONS REVIEW

Table 5 summarizes the Exemptions Review table from the City of Ottawa's *2017 Transportation Impact Assessment Guidelines*.

Table 5 - Exemptions Review

Module	Element	Exemption Considerations	Exempted?
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	No
	4.1.3 New Street Networks	Only required for plans of subdivision	Yes
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	No
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Yes
Network Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	No
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Yes
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	Yes
4.9 Intersection Design	All Elements	Not required if site generation trigger is not met.	No

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3.0 FORECASTING

The Step 3.0 – Forecasting section has been reviewed by the City of Ottawa and was subject to revision as per the comments prepared by the City, dated November 27th, 2019. The comment responses reflected are herein. Further detail can be found in **Appendix B**.

3.1 DEVELOPMENT GENERATED TRAVEL DEMAND

3.1.1 Trip Generation and Mode Shares

The *Institute of Transportation (ITE) Trip Generation Manual* (10th edition) was used to forecast auto trip generation for the proposed senior's residence and commercial land use. The *TRANS Trip Generation Residential Trip Rates Study Report* was used to forecast auto trip generation for the apartment land use. Land use codes 252 – Senior Adult Housing Attached (ITE), 820 – Shopping Centre (ITE), and 222 – High-Rise Apartments (TRANS) were thought to be the most representative of the proposed land uses. **Table 6** outlines the assumed land uses and the trip generation rates for each land use.

As per the City of Ottawa's *2017 TIA Guidelines,* the auto trip generation rates of the apartment land use were converted to person trips using the auto mode shares outlined in Table 3.13 in the *TRANS Trip Generation Residential Trip Rates Study Report*. The auto trip generation rates of the senior's residence and commercial land use were converted to person trips using a conversion factor of 1.28. **Table 7** outlines development-generated person trips for each land use.

Table 6 - Land Uses and Trip Generation Rates

LUC	Land Use	Size	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Rate	In	Out	Total
252	Senior Adult Housing Attached	228 units	35%	65%	0.20	55%	45%	0.26
820	Shopping Centre	5,500 ft² GFA	62%	38%	0.94	48%	52%	3.81
222	High-Rise Apartments	174 units	24%	76%	0.31	61%	39%	0.36

Table 7 - Person Trips Generated by Land Use

LUC	Land Use	Trip Conversion	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
252	Senior Adult Housing Attached	Auto Trips	16	29	45	32	27	59
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	20	37	58	41	35	76
820	Shopping Centre	Auto Trips	4	2	6	11	11	22
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	5	3	8	14	14	28
222	High-Rise Apartments	Auto Trips	13	41	54	38	25	63
		Auto Mode Share	37%			40%		
		Person Trips	27	86	114	73	45	118
Total		**Auto Trips**	**30**	**63**	**93**	**72**	**56**	**128**
		Person Trips	**52**	**126**	**180**	**128**	**94**	**222**

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To reflect local travel characteristics, the person trips were assigned to the four primary modal shares (i.e. auto, passenger, transit, and active moves) according to the TRANS Committee's 2011 Origin-Destination (O-D) Survey for the Merivale District. The subject site is located within the Baseline Road Bus Rapid Transit Corridor, however, based on direction from the City of Ottawa, the BRT is planned to be constructed by 2023, which is one year after the build-out of the subject site. As such, the characteristics from the Merivale District were used to develop the mode shares for the subject development for the 2022 build-out horizon.

Table 8 outlines the anticipated trip generation potential of the proposed development by travel mode based on assumed mode share targets for the 2022 horizon year.

Table 8 - Trips Generated by Travel Mode – Without Baseline BRT

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
252	Senior Adult Housing Attached	Auto	50%	10	19	29	21	18	38
		Passenger	15%	3	6	9	6	5	11
		Walk	10%	2	4	6	4	4	8
		Bike	5%	1	2	3	2	2	4
		Transit	20%	4	7	12	8	7	15
820	Shopping Centre	Auto	50%	3	2	4	7	7	14
		Passenger	15%	1	0	1	2	2	4
		Walk	10%	1	0	1	1	1	3
		Bike	5%	0	0	0	1	1	1
		Transit	20%	1	1	2	3	3	6
222	High-Rise Apartments	Auto	50%	14	43	57	37	23	59
		Passenger	15%	4	13	17	11	7	18
		Walk	10%	3	9	11	7	5	12
		Bike	5%	1	4	6	4	2	6
		Transit	20%	5	17	23	15	9	24
Total		**Auto Trips**		**27**	**64**	**90**	**65**	**48**	**111**
		Passenger		**8**	**19**	**27**	**19**	**14**	**33**
		Walk		**6**	**13**	**18**	**12**	**10**	**23**
		Bike		**2**	**6**	**9**	**7**	**5**	**11**
		Transit		**10**	**25**	**37**	**26**	**19**	**45**

Once the Baseline Road BRT Is operational, the transit modal share for the subject development will increase and thus the auto modal share will decrease. Therefore, the number of auto trips that the proposed development will generate will decrease once the Baseline Road BRT is constructed. A second trip generation was developed to reflect the revised modal shares once the Baseline BRT is open, as shown in **Table 9** below. These modal shares were agreed upon by the City prior to the submission of the Step 3 TIA.

Table 9 - Trips Generated by Travel Mode – With Baseline BRT

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
252	Senior Adult Housing Attached	Auto	30%	6	11	17	12	11	23
		Passenger	15%	3	6	9	6	5	11
		Walk	10%	2	4	6	4	4	8
		Bike	5%	1	2	3	2	2	4
		Transit	40%	8	15	23	16	14	30
820	Shopping Centre	Auto	30%	2	1	2	4	4	8
		Passenger	15%	1	0	1	2	2	4
		Walk	10%	1	0	1	1	1	3
		Bike	5%	0	0	0	1	1	1
		Transit	40%	2	1	3	6	6	11
222	High-Rise Apartments	Auto	30%	8	26	34	22	14	35
		Passenger	15%	4	13	17	11	7	18
		Walk	10%	3	9	11	7	5	12
		Bike	5%	1	4	6	4	2	6
		Transit	40%	11	34	46	29	18	47
Total		**Auto Trips**		**16**	**38**	**53**	**38**	**29**	**66**
		Passenger		**8**	**19**	**27**	**19**	**14**	**33**
		Walk		**6**	**13**	**18**	**12**	**10**	**23**
		Bike		**2**	**6**	**9**	**7**	**5**	**11**
		Transit		**21**	**50**	**72**	**51**	**38**	**88**

3.1.2 Trip Distribution

The distribution of traffic to / from the proposed development was determined through examination of the Trans Committee's 2011 Origin-Destination (O-D) Survey for the Merivale District. **Table 10** provides a summary of the estimated distribution for the traffic generated by the proposed development.

Table 10 - Traffic Distribution Assumptions

Cardinal Direction		Via (to / from)			
		Clyde Avenue (North)	Clyde Avenue (South)	Baseline Road (West)	Baseline Road (East)
North	15%	15%			
East	40%	32%			8%
South	5%		5%		
West	10%	5%		5%	
Internal (Merivale)	30%		24%		6%
Total	**100%**	**52%**	**29%**	**5%**	**14%**

3.1.3 Trip Assignment

Site generated trips were assigned to the study area road network based on the trip distribution assumptions outlined in **Table 10** above. **Figure 9** outlines the site assignment assumptions. It should be noted that the red value represent the outbound trips and the black values represent the inbound trips.

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Figure 10 illustrates the site generated trips for the proposed site during the AM and PM peak hours without the Baseline Road BRT in place.

Figure 11 illustrates the site generated trips for the proposed site during the AM and PM peak hours with the Baseline Road BRT in place.

Figure 9 - Site Traffic Assignment

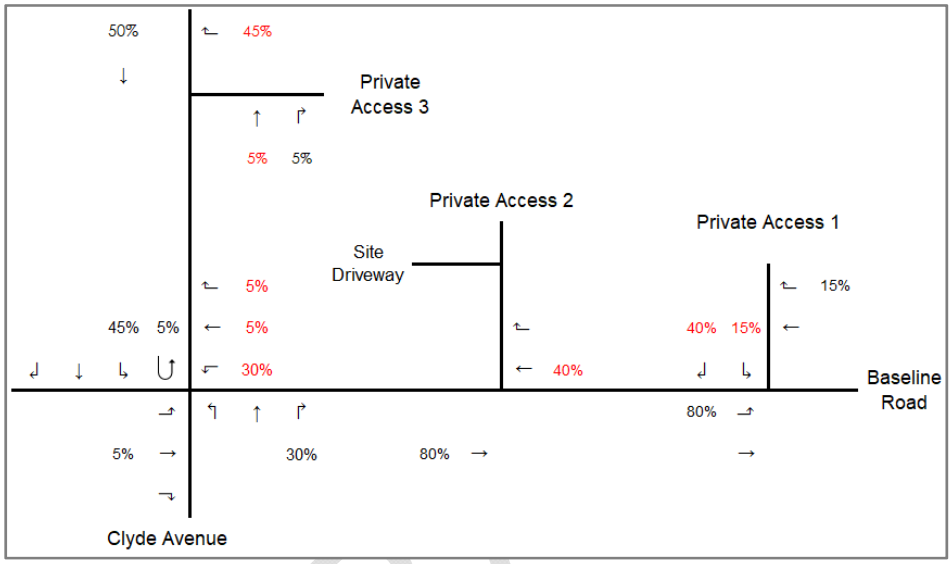

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Figure 10 - Site Generated Traffic Volumes – Without Baseline BRT

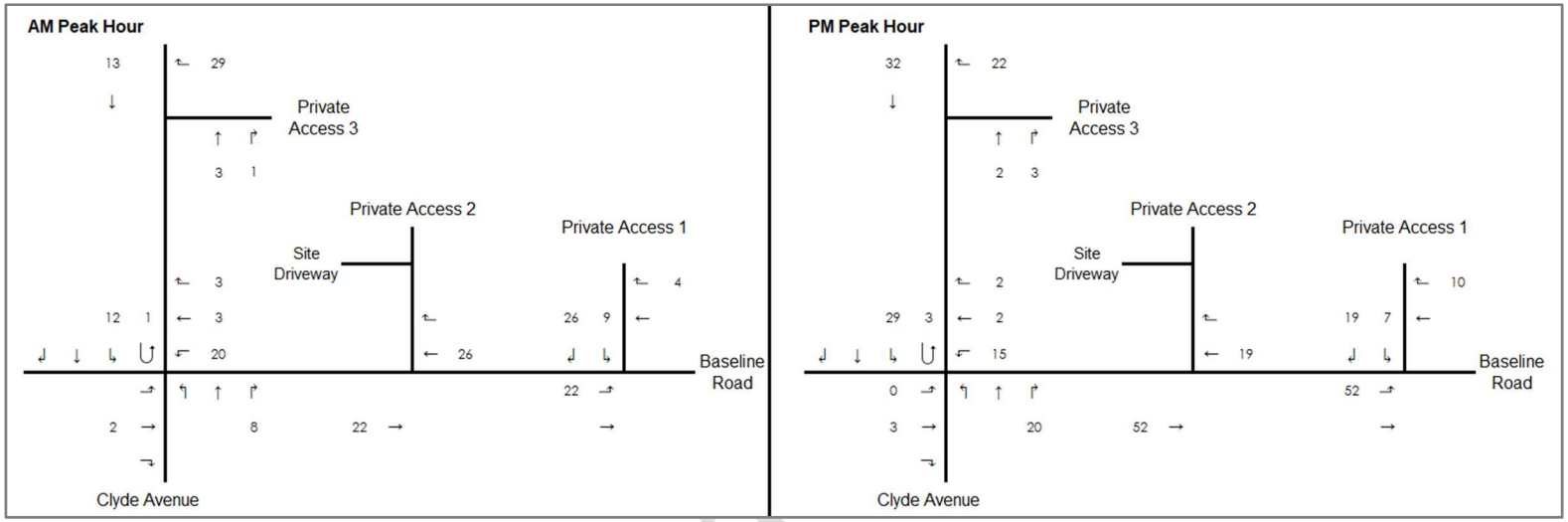
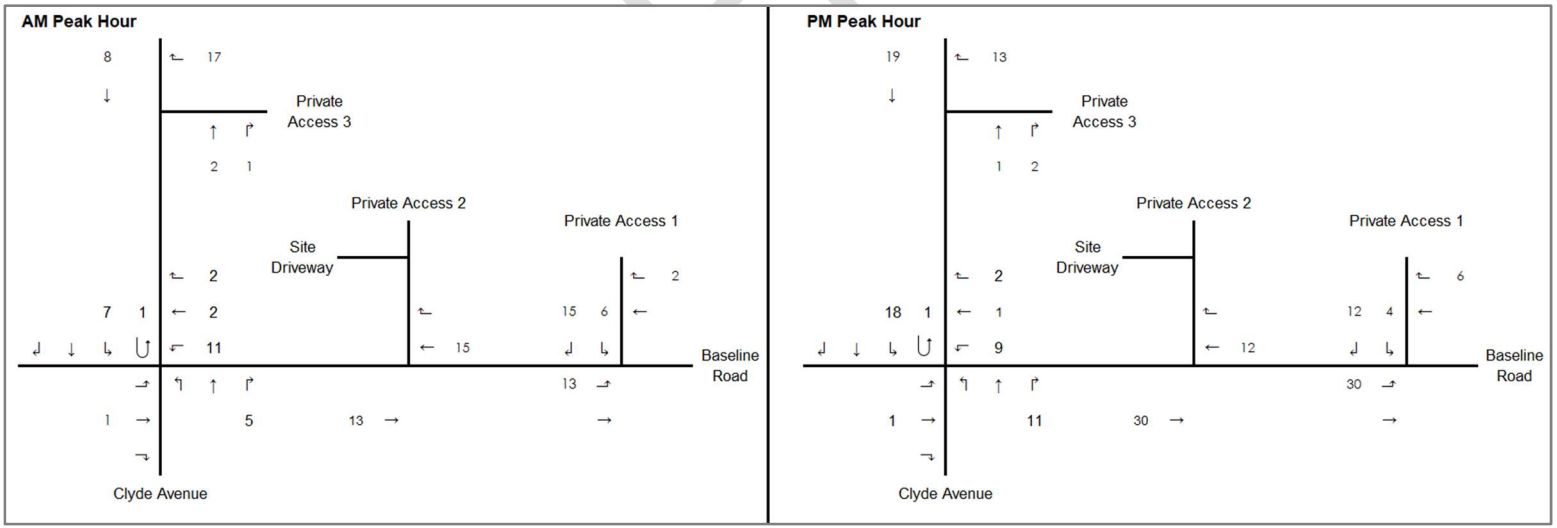


Figure 11 - Site Generated Traffic Volumes - With Baseline BRT



3.2 BACKGROUND NETWORK TRAVEL DEMAND

3.2.1 Transportation Network Plans

As outlined in **Table 3** in **section 2.1.3.1**, the only road infrastructure project that is included in the TMP within the vicinity of the subject site is the Baseline Road Bus Rapid Transit. As per direction from the City of Ottawa, it is assumed that this BRT will be constructed by 2023.

3.2.2 Background Growth

The City of Ottawa provided **Figure 12** below, which outlines the average annual growth rates based on trend lines. As illustrated in **Figure 12**, the average annual growth in the vicinity of the subject site is in the range of 0.2% - 2.0%. To be conservative, a 2% annual background growth rate was used in the subject analysis until the BRT is constructed, which is assumed to be by 2023.

As outlined in the *Baseline Road Bus Rapid Transit Planning and Environmental Assessment Study* (July 2017), the BRT is anticipated to reduce the traffic volumes on Baseline Road by approximately 10% when comparing 2010 volumes to 2031 projected volumes. Considering that the BRT will be constructed by 2023, this 10% reduction in traffic equates to roughly 1.25% reduction per annum between 2023 and the 2031.

Based on the above, a 2% growth rate was used in the subject analysis between 2019 and 2023 (i.e. until the Baseline BRT is constructed). Between 2023 and 2027 (i.e. the 5-year horizon for the subject development), a -1.25% growth rate was used to account for the shift in modal share from automobile to transit.

As part of the Step 1 and 2 Report, the City of Ottawa agreed that the future volumes on Baseline Road should be capped at approximately 1,600 – 1,800 vehicles per hour (vph) per direction, which is consistent with the existing capacity of the two-lane section of Baseline Road. Using the above growth projections, the 2027 ultimate volumes along Baseline Road at anticipated to be in accordance with the 1,600 – 1,800 vph capacity.

3.2.3 Other Developments

In addition to the background growth rate outlined in **Section 3.2.2** above, there are two background developments that are assumed to be built by the 2027 ultimate horizon, per **Table 4**. The site trips were obtained from their respective traffic studies and explicitly added to the transportation network as background traffic.

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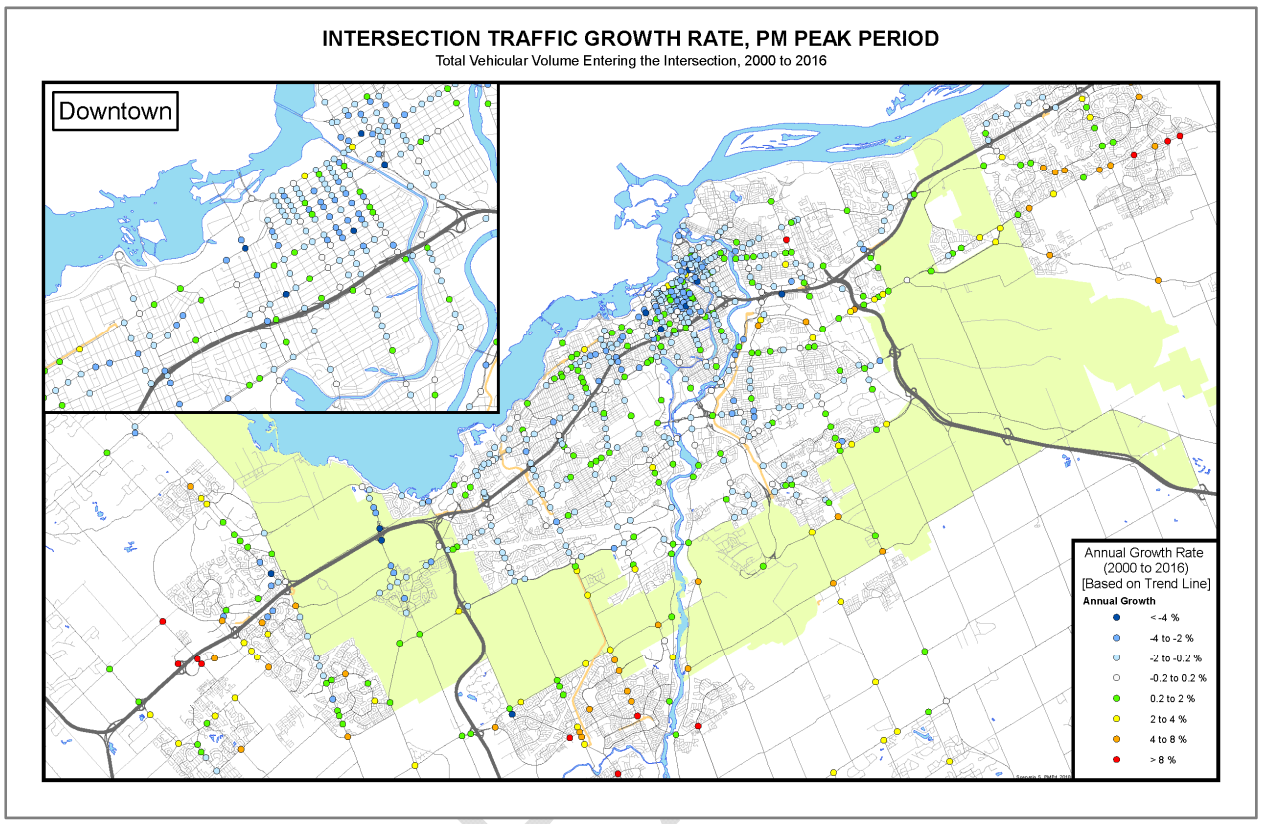
Figure 12 – Annual Growth Rates



3.3 DEMAND RATIONALIZATION

Based on direction from the City of Ottawa, the realistic demands along Baseline Road once the BRT is operational will be in the range of 1,600 – 1,800 vehicles per hour per direction. Based on the aforementioned sections, the volumes along Baseline Road were forecasted to remain within this range. The City has provided direction that these volumes should not be further reduced to account for demand rationalization. This methodology was applied moving forward, even if the operations at the intersections are found to be poor.

4.0 STRATEGY

4.1 DEVELOPMENT DESIGN

4.1.1 Design for Sustainable Modes

Bicycle facilities: A total of 156 bicycle parking spaces are provided for the proposed development. Eighteen (18) spaces are provided at the northern and eastern sides of the building while the rest is provided underground on parking level P1.

Pedestrian facilities: Pedestrian connections are included on the site plan which will connect the proposed building to the existing sidewalks along Baseline Road and Clyde Avenue.

Parking areas: A total of 333 vehicle parking spaces are provided in addition to one (1) loading space. The 333 parking spaces consist of 287 regular vehicle parking spaces, 37 visitor parking spaces, and 9 accessible parking spaces.

The accessible parking spaces are dispersed across all parking levels. The loading space is located at the eastern side of the building, along Private Access 2.

Transit facilities: Transit stops for OC Transpo routes 50, 81, and 88 are currently serviced by stops located at the vicinity of the intersection of Baseline Road and Clyde Avenue Drive. There are sidewalks along both sides of Baseline Road and Clyde Avenue as well as pedestrian crosswalks at the intersection for pedestrians to access these transit stops.

4.1.2 Circulation and Access

One site access (Site Driveway) is proposed approximately 40m north of Baseline Road along the Private Access 2. The Site Driveway connects the developments ground level and underground parking to Private Access 2. The site access will be full movements access with no turning restrictions and will be stop controlled along the access's approach. It should be noted that Private Access 2 intersection at Baseline Road is a Right-In (RI) only access, which means that vehicles existing the Site Driveway will have to use Private Access 1 and Private Access 3 to access the public roadway network. Vehicles heading towards the development's parking structure can utilize Private Accesses 1, 2, and 3 depending on their direction of travel. **Figure 3** shows a schematic of the study area's access as well as private and public roadways.

Within the vicinity of the subject site, pedestrian access is facilitated through the existing sidewalks along Baseline Road and Clyde Avenue. Sidewalk connections are proposed between at all sides of the development. Boulevards are proposed at the southern and western sides of the building and will connect to sidewalks along Baseline Road and Clyde Avenue, respectively.

4.1.3 New Street Networks

Not applicable; exempted during screening and scoping.

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4.2 PARKING

4.2.1 Parking Supply

Auto Parking - As per Schedule 1A of the city's zoning by-law No. 2008-250, the development is located in Area B (Outer Urban / Inner Suburban). However, Area X (Inner Urban) rates apply due to the proximity of the development to the future Bus Rapid Transit (BRT) stations as identified in Schedule 2A. Based Sections 101 and 102, the minimum vehicle parking space requirement is 0.25 per rooming unit for the residential component and 1.25 vehicle parking spaces per 100m^2 for the retail component. No off-street parking spaces are required for the first 12 residential units. The minimum requirement for visitor parking spaces is 0.1 vehicle parking space per unit.

Based on the proposed land uses, a minimum of 101 vehicle parking spaces are required for the residential component, 7 vehicle parking spaces are required for the retail component, and 37 vehicle parking spaces are required for visitors.

Within area B, the maximum total provided spaces shall not exceed 703 spaces, of which the maximum allowed visitor's parking spaces is 60.

The proposed site plan indicates there will be a total of 333 parking spaces provided, of which 20 vehicle parking spaces are allocated for retail uses, 267 vehicle parking spaces for the residential component, and 37 vehicle parking spaces are dedicated for visitors. In addition, one space at the eastern side of the building is allocated for loading and offloading activities. The proposed parking spaces fall within the City of Ottawa minimum and maximum allowed ranges as summarized in **Table 11**.

Table 11 - Summary of Development Parking Spaces

#	Land Use	Min. Requirement (# Spaces)	Max. Requirement (# Spaces)	Provided (# Spaces)
1	Retail	7	20	20
2	Residential	101	703	267
3	Visitors	37	60	37
4	Loading	NA	NA	1*
5	Accessible	9	NA	9
5	Total	154	783	333

** Excluded from the total parking spaces calculations*

Bicycle Parking – As per City of Ottawa Zoning By-law 2008-250 (Section 111), the minimum bicycle parking rate of 0.25 bicycle parking space per residential unit and 1 bicycle parking space per 250m^2 of retail (gross floor area) are required.

Based on the proposed land uses, a minimum of 101 bicycle spaces are required for the residential component and 2 bicycle spaces are required for the retail component. The proposed site plan indicates there will be a total of 156 bicycle spaces provided, where 150 is allocated for the residential component and 6 for the retail component. The provided bicycle parking spaces meets the minimum requirements.

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4.2.2 Spillover Parking

Not applicable; exempted during screening and scoping.

4.3 BOUNDARY STREET DESIGN

4.3.1 Design Concept

The subject development is located in an area that will experience a substantial amount of change over the next few years in terms of the transportation environment. The Baseline Road BRT is scheduled to be implemented by 2023, which will have a large impact on the transportation network in the surrounding area. Two separate MMLOS analyses were completed; one for the existing conditions (i.e. before the Baseline Road BRT) and one for the ultimate conditions (i.e. after the Baseline Road BRT).

Appendix C contains the detailed MMLOS analysis and is provided for reference.

4.3.1.1 Existing Conditions (i.e. before the Baseline Road BRT)

As outlined in the City of Ottawa's *Official Plan* Schedule B, both Baseline Road and Clyde Avenue fall within the 'General Urban Area' designation. In addition, the following information was found:

- Baseline Road and Clyde Avenue are both classified as Arterial Roadways;
- Baseline Road and Clyde Avenue are both classified as Cycling Spine Routes;
- Baseline Road is classified as a Cross-Town Bikeway;
- Baseline Road is classified as a Transit Corridor; and
- Baseline Road is classified as a Full Loads truck route.

Based on the aforementioned information, the Pedestrian Level of Service (PLOS) target for both Baseline Road and Clyde Avenue is C. The Bicycle Level of Service (BLOS) target is B for Baseline Road and C for Clyde Avenue. The Transit Level of Service (TLOS) target is B for Baseline Road and D for Clyde Avenue. The Truck Level of Service (TkLOS) target is D for Baseline Road and E for Clyde Avenue.

Figure 13 illustrates the MMLOS targets and results for both roadway segments under existing conditions.

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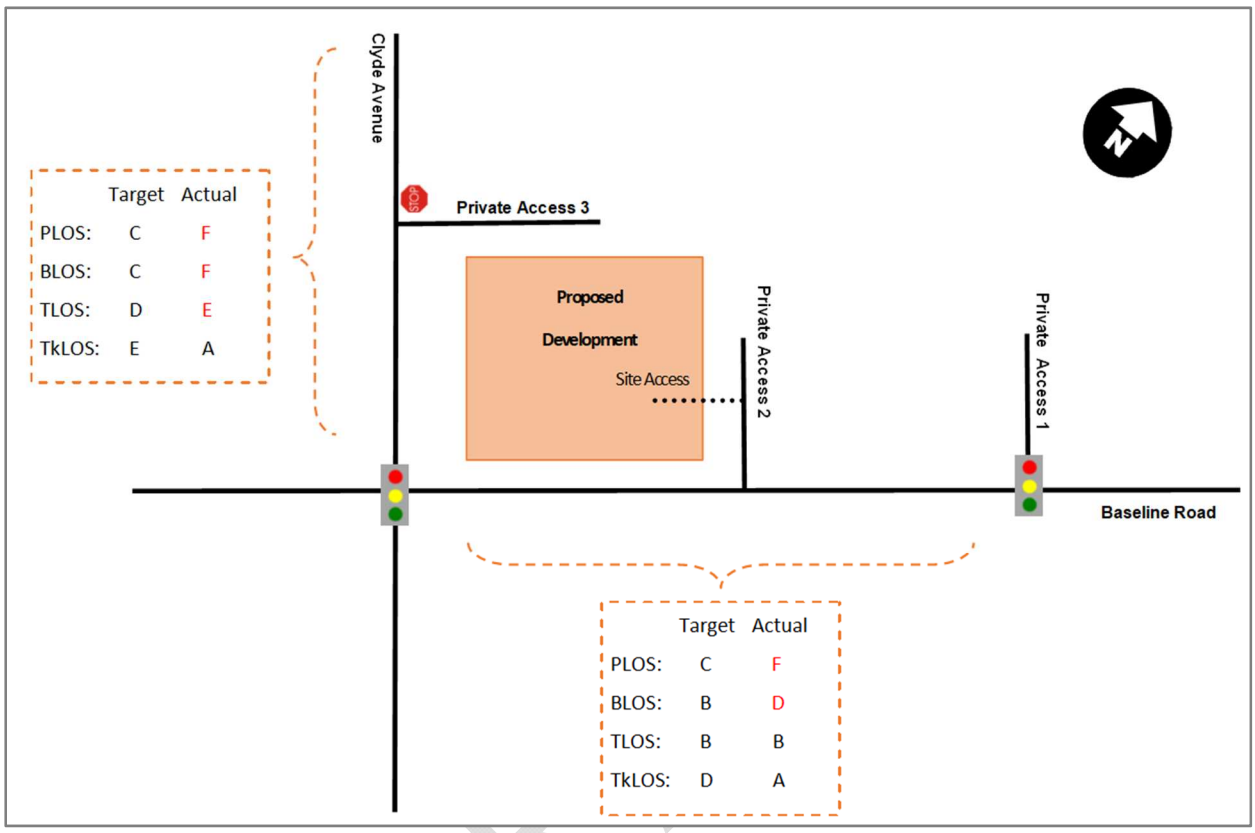
Figure 13 – Existing Conditions – MMLOS Targets and Results



Baseline Road

The PLOS target of C along Baseline Road, across the frontage of the subject development, is not currently being met due to the width of the existing sidewalk, lack of boulevards, volume of traffic, and posted speed limit. To improve the PLOS and meet the target of C, the sidewalk width would need to be increased to 2.0m, a 2.0m boulevard would need to be implemented, and the posted speed limit would need to be reduced to 50 km/h. As Baseline Road is an arterial roadway, reducing the posted speed limit is likely not a viable option. The ultimate design for the Baseline Road BRT includes modifications to the pedestrian facilities, which will be further explored in the MMLOS analysis for the ultimate conditions.

The BLOS target of B along Baseline Road, across the frontage of the subject development, is not currently being met due to the number of vehicle lanes, as well as the posted speed limit. Due to the number of lanes along Baseline Road, the only feasible option to achieve the BLOS target would be to implement a physically separated cycling facility (i.e. cycle track). The ultimate design for the Baseline Road BRT includes cycle tracks along Baseline Road, which will be further explored in the MMLOS analysis for the ultimate conditions.

The TLOS target of B along Baseline Road, across the frontage of the subject development, is currently being met due to the limited parking / driveway friction along the corridor.

The TkLOS target of D along Baseline Road, across the frontage of the subject development, is currently being met due to the number and width of the travel lanes.

Clyde Avenue

The PLOS target of C along Clyde Avenue, across the frontage of the subject development, is not currently being met due to the width of the existing sidewalk, lack of boulevards, volume of traffic, and posted speed limit. To improve the PLOS and meet the target of C, the sidewalk width would need to be increased to 2.0m, a 2.0m boulevard would need to be implemented, and the posted speed limit would need to be reduced to 50 km/h. As Clyde Avenue is an arterial roadway, reducing the posted speed limit is likely not a viable option.

The BLOS target of C along Clyde Avenue, across the frontage of the subject development, is not currently being met due to the lack of cycling facilities, the number of lanes, as well as the posted speed limit. Due to the number of lanes along Clyde Avenue, the only feasible option to achieve the BLOS target would be to implement a physically separated cycling facility (i.e. cycle track), however, this would have financial and property constraints.

The TLOS target of D along Clyde Avenue, across the frontage of the subject development, is currently being met due to the limited parking / driveway friction along the corridor.

The TkLOS target of E along Clyde Avenue, across the frontage of the subject development, is currently being met due to the number and width of the travel lanes.

4.3.1.2 Ultimate Conditions (i.e. after the Baseline Road BRT)

By the year 2023, the city is expecting to implement the BRT corridor upgrades with dedicated transitway ROW and transit priority measures along Baseline Road. In terms of the MMLOS targets, both roadway segments will fall under the 'within 600m of a rapid transit station' Policy Area once the Baseline BRT is implemented and the proposed transit station at the Baseline Road at Clyde Avenue intersection is built. The geometric elements of the ultimate Baseline Road cross-section were taken from **Figure 7**, included in **Section 2.1.2.6**.

The Pedestrian Level of Service (PLOS) target for both Baseline Road and Clyde Avenue will be A. The Bicycle Level of Service (BLOS) target will be A for Baseline Road and C for Clyde Avenue. The Transit Level of Service (TLOS) target will be A for Baseline Road and D for Clyde Avenue. The Truck Level of Service (TkLOS) targets will remain unchanged at D for Baseline Road and E for Clyde Avenue.

Figure 14 illustrates the MMLOS targets and results for both roadway segments under ultimate conditions.

Baseline Road

The Baseline Road BRT design includes a boulevard and cycle track separating the sidewalk and the vehicle travel lanes. This improves the PLOS in the ultimate conditions, however, with the implementation of the BRT corridor, the PLOS target will increase to an A. Despite the increased width between the pedestrians and vehicles, the PLOS target of A is not anticipated to be met in the ultimate conditions. Reducing the speed limit to 30 km/h or reducing the traffic volumes to less than 3000 AADT would allow the PLOS target of A to be met, however, as Baseline Road is an arterial road, these are not feasible solutions.

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With the implementation of the BRT corridor, the BLOS target will increase to an A along Baseline Road. The Baseline Road BRT design includes separated cycling facilities along both sides of Baseline Road, which will allow the BLOS target of A to be met in the ultimate conditions.

With the rapid transit corridor in place, the TLOS target along Baseline Road will increase to an A, which is anticipated to be met in the ultimate conditions.

The TkLOS target of D along Baseline Road, across the frontage of the subject development, is anticipated to continue to be met due to the number and width of the travel lanes.

Clyde Avenue

The PLOS target of A along Clyde Avenue, across the frontage of the subject development, is anticipated to continue to not be met due to the width of the existing sidewalk, lack of boulevards, volume of traffic, and posted speed limit. To improve the PLOS and meet the target of A, the sidewalk width would need to be increased to 2.0m, a 2.0m boulevard would need to be implemented, the posted speed limit would need to be reduced to 50 km/h, and the volume of traffic would need to be reduced to less than 3000 AADT. As Clyde Avenue is an arterial roadway, reducing the posted speed limit and traffic volumes are likely not viable options.

The BLOS target of C along Clyde Avenue, across the frontage of the subject development, is anticipated to continue to not be met due to the lack of cycling facilities, the number of lanes, as well as the posted speed limit. Due to the number of lanes along Clyde Avenue, the only feasible option to achieve the BLOS target would be to implement a physically separated cycling facility (i.e. cycle track), however, this would have financial and property constraints.

The TLOS target of D along Clyde Avenue, across the frontage of the subject development, is anticipated to continue to not be met due to the limited parking / driveway friction along the corridor.

The TkLOS target of E along Clyde Avenue, across the frontage of the subject development, is anticipated to continue to be met due to the number and width of the travel lanes.

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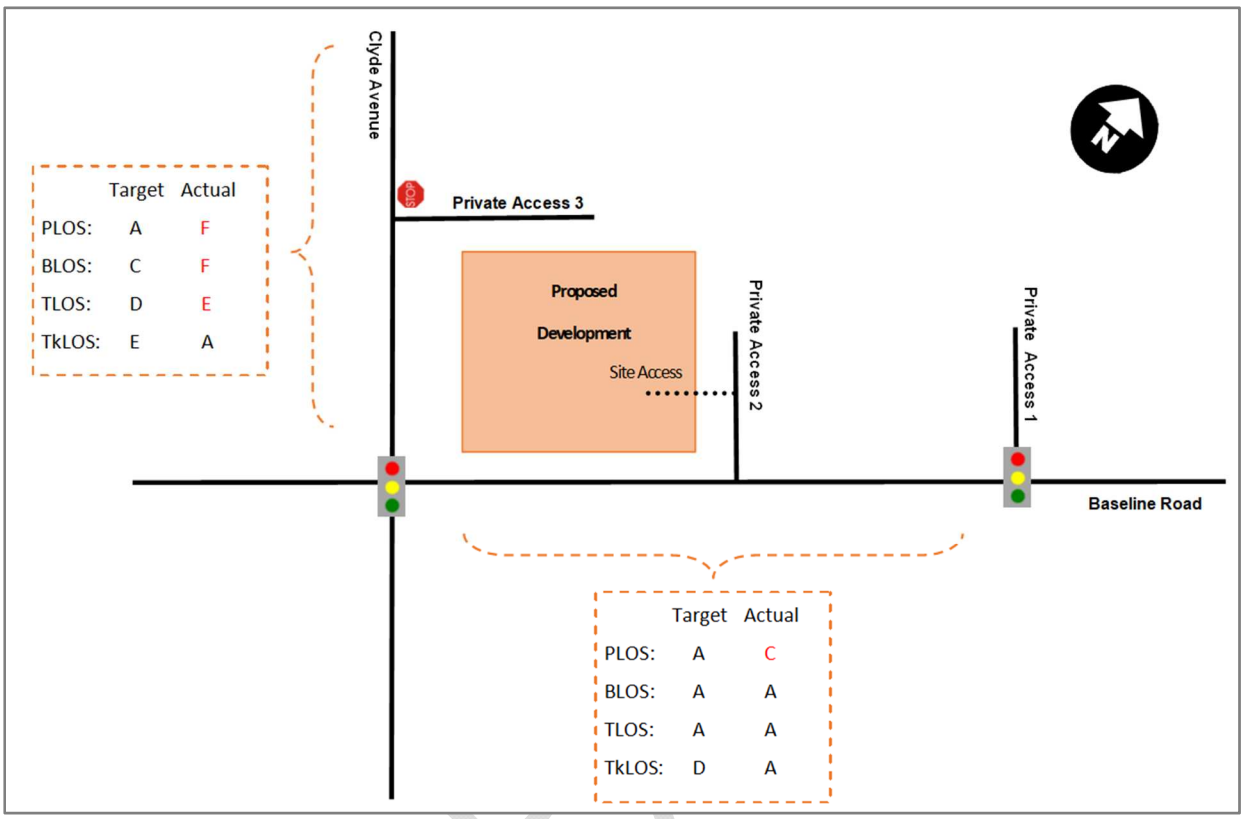
Figure 14 – Ultimate Conditions – MMLOS Targets and Results



4.4 ACCESS INTERSECTIONS DESIGN

4.4.1 Location and Design of Access

The parking garage access for the subject site will be located approximately 45m north of Baseline Road along Private Access 2 and will not have any turning restrictions. The garage entrance will facilitate both ingress and egress and will be approximately 6.5m wide with a variable grade of approximately 6% - 16%.

4.4.2 Intersection Control

The site access is a low-volume driveway located on a Private Shared Access (Private Access 2) and is anticipated to be a One Way Stop Control (OWSC) access.

4.4.3 Intersection Design

Section 4.9.2 contains the detailed intersection and MMLOS analyses under all horizons.

4.5 TRANSPORTATION DEMAND MANAGEMENT

4.5.1 Context for TDM

The proposed development is currently owned by Selection Groupe International Inc. The site consists of senior residential units, apartment units, and three retail units and is expected to be open by the year 2022.The tenants for the retail component are not known yet. As outlined in **Section 3.1.1**, the Traffic Assessment Zone (TAZ) in which the subject development resides calls for an auto mode share of 50% and a transit share of 20%. However, after the implementation of the BRT corridor improvements along Baseline Road, the auto modal share is expected to decrease to 30% while the transit modal share is expected to increase to 40%. These transit modal shares were agreed upon by the City during the preparation of the Step 3 – Forecasting Report. It is expected that BRT service will have a 5-6 minute headway during the AM peak and a 7-8 minute headway during the PM peak, which will support these transit modal share assumptions.

To support the future bicycle modal share of 5%, the development is planned to provide a total of 156 bicycle parking spaces. To support the future walking modal share of 10%, the development is planned to include ample sidewalk connections from the proposed building to the existing pedestrian network along both Clyde Avenue and Baseline Road.

As the proposed development is not anticipated to generate a substantial amount of vehicle traffic as compared to the traffic that is already on the boundary road network, the auto modal shares are not anticipated to be an issue.

4.5.2 Need and Opportunity

In order to support the transit and active modal share targets outlined in **Table 8**, cycling and transit modes will need to be supported. This includes the provision of bicycle parking as well as ensuring convenient pedestrian connections are provided to sidewalk facilities leading to bus stop locations. These aforementioned facilities have been included on the site plan to support active modes.

4.5.3 TDM Program

The City of Ottawa TDM Checklists were used to determine what TDM measures could be implemented based on the available information. Based on the checklists, the following TDM measures have been incorporated into the site plan:

- Locate building close to the street, and do not locate parking areas between the street and building entrances;
- Locate building entrances in order to minimize walking distances to sidewalks and transit stops;
- Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort;
- Provide convenient, direct access to stations or major stops along rapid transit routes;
- Provide safe, direct, and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major entrances, providing walkways from public streets to major building entrances;

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- Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas;
- Make sidewalks and open space as easily accessible through features such as gradual grade transition and depressed curbs at street corners;
- Include adequately spaced inter-block cycling and pedestrian connections to facilitate travel by active transportation;
- Provide safe, direct, and attractive walking routes from building entrances to nearby transit stops;
- Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible
- Provide the number of bicycle parking spaces as per the City of Ottawa By-Law;
- Ensure that bicycle parking spaces and access aisles meet minimum dimensions;
- Where more than 50 bicycle parking spaces are provided, locate at least 25% of spaces within the building;
- Provide a designated area for carpool drivers without using fire lanes or other no-stopping zones;
- Do not provide more parking than permitted by zoning, nor less than required by zoning; and
- Cyclists have the option of using the elevators to access the underground bicycle parking instead of relying on the vehicle ramp.

The TDM checklists are contained in **Appendix D.**

4.6 NEIGHBOURHOOD TRAFFIC MANAGEMENT

Not applicable; exempted during screening and scoping.

4.7 TRANSIT

4.7.1 Route Capacity

An assumed transit modal share of 20% was adopted for all land uses contained within the proposed development prior to the implementation of the 2023 BRT corridor upgrades along Baseline Road. The 2022 interim forecasted transit trips for the proposed development is 37 and 45 total transit trips during the AM and PM peak hours, respectively.

There are three OC Transpo transit routes within approximately 230m walking distance of the proposed site; routes 50, 81, and 88. Route 50 is a local route that runs Monday to Saturday during peak periods between Lincoln Fields and Tunney's Pasture Station with 30-minute headways. Route 81 is a local route that runs daily with 20- to 30-minute headways between Clyde and Tunney's Pasture Station. Route 88 is a frequent route that runs daily with headways reaching 6-10 minutes during the peak hours between Hurdman and Terry Fox stations.

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Standard and articulated buses have seated capacities of 40 and 70 people; respectively. Based on the current transit routes in the vicinity of the subject site, the hourly transit capacity is estimated between 400 and 700 people during the weekday AM and PM peak hours. The proposed development is therefore anticipated to occupy a maximum of 5% to 11% of transit capacity prior to the implementation of Baseline Road's BRT corridor upgrades.

Once the BRT upgrades along Baseline Road are implemented, the subject development's transit trips are expected to increase to 72 and 88 trips during the AM and PM peak hours, respectively. Based on the *Baseline Road Bus Rapid Transit Corridor Transit and Traffic Operations Assessment (2016)* (which is Appendix B of the *Baseline Road Bus Rapid Transit Planning and Environmental Assessment Study),* the anticipated headways of the BRT corridor are approximately 5 minutes during the AM peak hour and approximately 7 minutes during PM peak hours. It has been assumed that once the BRT is operational, transit route 50 will continue to run with the same schedule as existing, whereas, transit routes 81 and 88 will operate under the BRT headways, as previously described.

The anticipated capacity of the BRT corridor is 480 to 840 people during the weekday AM peak hour and 340 to 600 people during the weekday PM peak. The anticipated capacity of transit route 50 is expected to remain at 80 to 140 people during both the weekday AM and PM peak hours. The total transit capacity in the study area is therefore anticipated to be 560 to 920 people during the weekday AM peak hour and 480 to 745 people during the weekday PM peak hour. The proposed development is therefore anticipated to occupy between 8% to 13% of the transit capacity during the weekday AM peak hour and 12% to 18% during the weekday PM peak hour once the Baseline Road BRT is operational.

4.7.2 Transit Priority

Prior to the implementation of the BRT corridor upgrades along Baseline Road, the proposed development will utilize the existing transit stops abutting the subject site and is therefore not expected to significantly impact the transit travel times of the existing routes or trigger the need for transit priority measures. Currently, localized transit priority measures are implemented at the intersection of Baseline Road at Clyde Avenue and consist of bus queue jumps along the eastbound and westbound approaches of the intersection. It is planned that the east-west transit service will run at a dedicated BRT Transitway with TSP measures implemented at intersections during the 2023 horizon year. Based on direction from the City of Ottawa, it is anticipated that TSP operations will be implemented along Baseline Road at signalized intersections. Therefore, a Bus TSP phasing with the ability to truncate conflicting phases and extend parallel phases that can run with the BRT was assumed at the intersections of Baseline Road with Clyde Avenue and Private Access 1. The method of TSP detection and anticipated operations are not known at this time and could affect the Measures of Effectiveness (MOEs) at the intersection (i.e. delays and queues for transit and general traffic). For the purpose of the ultimate conditions' assessment, it has been assumed that the TSP can truncate conflicting phases left turn phases by 4 to 6 seconds and extend parallel non-conflicting phases (eastbound and westbound through movements) by the same time during the AM peak hour. During the PM peak hour, it was assumed that the TSP is capable of truncating conflicting left turns by up to two seconds and is able to extend parallel phases by two seconds at the intersection of Baseline Road / Clyde Avenue. At the intersection of Baseline Road / Private Access 1, the TSP was assumed to be capable of truncating the westbound left turn phase by up to 8 seconds while the same duration was assumed to be used as parallel phases' extension when transit is detected prior to the end of the east-west phases green time.

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It should be noted that for TSP phase extension operations, typically transit vehicles are detected in advance of the approach's stop bar. Upon bus detection, the controller decides whether to extend the parallel phase, if already operating, based on the travel time needed to reach and clear the intersection or decides to terminate the parallel phase early then operates all upcoming conflicting phases at specified minimum splits in order to serve buses as early as possible. Factors influencing the controller's decision to extend or truncate include the travel time and travel time reliability from the point of detection (i.e. slack time) as well as the method of TSP activation (loop detection versus wireless).

4.8 REVIEW OF NETWORK CONCEPT

Not applicable; exempted during screening and scoping.

4.9 INTERSECTION DESIGN

4.9.1 Intersection Control

The existing intersection control will be maintained as the default control for all study area intersections for existing and 2022 assessments. The 2027 horizon year assessment utilizes the BRT corridor upgrades as illustrated in **Figure 7**. It should be noted that the ultimate intersection design for the intersection of Baseline Road at Private Access 1 was not available, however, the intersection operations assumed no improvements were planned except for the implementation of a dedicate BRT ROW as well as TSP operations and the addition of a continuous segregated cycling facility was running east-west through the intersection. Any intersection improvements triggered through the intersection level of service analysis will be highlighted and adopted accordingly. The existing signal timing plan for the intersections of Baseline Road with Clyde Avenue and Private Access 1 were obtained from the City of Ottawa.

4.9.2 Intersection Design

An assessment of the study area intersections was undertaken to determine the operational characteristics of the study area intersections under the horizons identified in the Screening and Scoping report. Intersection operational analysis was facilitated by Synchro 10.0™ software package and the MMLOS analysis was completed for the signalized intersection for all modes and compared against the City of Ottawa's MMLOS targets. The Highway Capacity Manual (HCM) 6th edition analysis method in Synchro was used to assess the study intersections. It should be noted that this method has some limitations which were addressed as follows:

- Unsignalized Movement Delays (Channelized Right turns with yield control): The HCM method does not report on unsignalized movements delays. Rather these movements were analyzed and reported on using Synchro's percentile method as a mean to approximate delays and queues experienced by right turning traffic. This limitation impacts the 2019 and 2022 horizon year vehicular LOS assessments.

- RTOR: HCM's implementation of right turns on red is conservative and assumes no vehicles performing RTOR. RTOR influence on signal operations was incorporated using the equations provided by Trafficware's white paper on HCM 6th edition implementation in Synchro[2].

[2] http://www.trafficware.com/uploads/2/2/2/5/22256874/hcm6th_working_white_paper_synchro_-_march2018.pdf

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- Synchro does not report on the intersection volume-to-capacity ratio using HCM 6th edition method. Therefore, intersection volume-to-capacity is not reported for the overall intersection operations. For the MMLOS purpose, the maximum movement's volume-to-capacity at the intersection was used to assess the intersections performance.

4.9.2.1 2019 Existing Conditions

Figure 5 illustrates 2019 existing AM and PM peak hour traffic volumes at the study area intersections.

Intersection Capacity Analysis

Table 12 summarizes the results of the Synchro analysis under 2019 existing conditions. The intersection of Baseline Road at Clyde Avenue is currently operating at or above capacity with several individual movements operating at LOS F during the AM and PM peak hours. No improvements are recommended as this intersection is expected to be upgraded to favor east-west BRT transit once the BRT upgrades are implemented along Baseline Road by 2023. Furthermore, implementing intersection treatments to address vehicular operations is expected to negatively impact the multi-modal traffic operations for other modes (transit, cycling, and pedestrian).

The southbound movement at the intersection of Baseline Road at Private Access 1 is currently operating with more than 50s of delay during both the AM and PM peak hours, while the volume to capacity ratios remain acceptable (i.e. less than 0.90). This suggests that any additional traffic (background or site generated) will likely cause the delays to increase.

The Clyde Avenue at Private Access 3 intersection is currently operating acceptably.

Appendix E contains detailed intersection performance worksheets.

Table 12 - 2019 Existing Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Baseline Road at Clyde Avenue	Traffic Signals	EB	Left	F (F)	1.17 (1.16)	177.1 (182.0)	120.4 (114.1)
			Through	F (D)	1.02 (0.84)	72.0 (46.6)	221.9 (159.6)
			Right	A* (A*)	0.24* (0.41*)	5.1* (15.4*)	11.2* (37.8*)
		WB	Left	C (D)	0.78 (0.87)	72.6 (97.1)	28.0 (70.7)
			Through	A (F)	0.56 (1.10)	38.1 (101.8)	83.3 (282.1)
			Right	B* (E)	0.70* (0.94*)	22.6* (50.6*)	69.1* (#164.7)
		NB	Left	B (D)	0.64 (0.90)	61.1 (80.9)	19.6 (77.0)
			Through / Right	E (F)	0.99 (1.08)	81.8 (113.9)	186.9 (224.0)
		SB	Left	D (F)	0.86 (1.04)	68.4 (114.8)	69.3 (100.8)
			Through / Right	A (D)	0.47 (0.88)	31.3 (64.5)	79.8 (147.7)
		Overall Intersection		-	-	**62.1 (82.7)**	-
Baseline Road at Private Access 1	Traffic Signals	EB	Left	A (B)	0.14 (0.70)	3.8 (38.5)	4.2 (59.5)
			Through	A (A)	0.54 (0.55)	3.9 (6.6)	70.0 (93.1)
		WB	Through / Right	A (D)	0.42 (0.84)	6.7 (24.0)	67.9 (228.9)
		SB	Left	A (D)	0.37 (0.83)	55.4 (62.7)	17.5 (77.7)
			Right	A (A)	0.09 (0.42)	52.7 (53.2)	7.7 (67.9)
		Overall Intersection		-	-	**5.9 (19.9)**	-
Clyde Avenue at Private Access 3 (right-in / right-out)	Minor Stop	WB	Right	A (A)	0.13 (0.50)	15.8 (26.3)	2.8 (18.9)
		Overall Intersection		-	-	-	-

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Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity
3. * Estimated using Synchro's Percentile Method
4. # for v/c <1, queue requires multiple cycles to be cleared
5. Red highlight: Movement operating at or above capacity; Orange Highlight: Movement operating near capacity.

Multi-Modal Level of Service Analysis – Signalized Intersections

The MMLOS targets at intersections are determined by taking the most stringent of the MMLOS targets for each individual road segment. As such, based on **Section 4.3.1**, the PLOS target is currently C, the BLOS target is currently B, the TLOS target is currently D, and the TkLOS target is currently D. The Vehicle Level of Service (VLOS) target is currently D for both intersections. The aforementioned targets apply to both study area signalized intersections.

Baseline Road at Clyde Avenue

The Pedestrian Level of Service (PLOS) at the intersection of Baseline Road at Clyde Avenue is currently operating at a PLOS F, which does not meet the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross at the intersection. Due to the nature of arterial roads, reducing the number of lanes at the intersection is not a feasible option. Incorporating pedestrian refuge areas by means of wide medians (i.e. > 2.4m) along with operational measures such as prohibition of RTOR are not expected to highly improve the PLOS.

The Bicycle Level of Service (BLOS) is currently operating at a BLOS of D at the intersection of Baseline Road at Clyde Avenue which does not meet the desired target of B. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Introducing dedicated bike lanes as well as reducing the speed limit to 50 km/h is expected to result in meeting the desired BLOS target of B. As the Baseline Road BRT plans include cycling infrastructure (i.e. cycle tracks), it is not recommended to implement any improvements as an interim mitigation measure.

The Transit Level of Service (TLOS) at the intersection of Baseline Road at Clyde Avenue is currently operating with a TLOS of F which does not meet the desired target of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. The signal timing plans that were obtained from the City of Ottawa indicates that this intersection operates with a conventional NEMA phasing. The Synchro analysis indicate that the eastbound and westbound queues at the intersection of Baseline Road / Clyde Avenue reach beyond the bus queue jumps in both directions. Therefore, buses are highly impacted by traffic operations. It is not recommended to implement any improvements as an interim mitigation measure as Baseline Road's corridor within the vicinity of the study area is expected to be upgraded to include a dedicated east-west BRT corridor.

The Truck Level of Service (TkLOS) at the intersection of Baseline Road at Clyde Avenue is currently operating with a TkLOS of B, which meets the target of D.

The Vehicular Level of Service (VLOS) is currently operating at VLOS F at the intersection of Baseline Road at Clyde Avenue, which does not meet the target of D. Improving the intersection can be performed by adding additional roadway capacity through increasing the number of lanes; however, this treatment may not be feasible due to cost, ROW restrictions, and adverse impacts on MMLOS performance for other modes.

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Appendix C contains the detailed MMLOS analysis and is provided for reference.

Baseline Road at Private Access 1

The Pedestrian Level of Service (PLOS) at the intersection of Baseline Road and Private Access 1 currently operates with a PLOS F, which does not meet the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes at the intersection is not a feasible option. Incorporating pedestrian refuge areas by means of wide medians (i.e. > 2.4m) along with operational measures such as prohibition of RTOR are not expected to highly improve the PLOS to the desired targets.

The Bicycle Level of Service (BLOS) at the intersection of Baseline Road at Private Access 1 is currently operating a BLOS of F, which does not meet the desired target of B. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Introducing dedicated bike lanes as well as reducing the speed limits to 50 km/h is expected to result in meeting the desired BLOS target of B. As the Baseline Road BRT plans include cycling infrastructure (i.e. cycle tracks), it is not recommended to implement any improvements as an interim mitigation measure.

The Transit Level of Service (TLOS) at the intersection of Baseline Road at Private Access 1 is currently operating with a TLOS of E, which does not meet the targeted value of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Currently, buses operate under mixed traffic conditions with high exposure to signal delays. No improvements are recommended to address existing conditions as Baseline Road's corridor within the vicinity of the study area is expected to be upgraded to include a dedicated east-west running BRT corridor.

The Truck Level of Service (TkLOS) at the intersection of Baseline Road at Private Access 1 is currently operating with a TkLOS of B, which meets the target of D.

The Vehicular Level of Service (VLOS) at the intersection of Baseline Road at Private Access 1 is currently operating at VLOS of D, which meets the desired target.

Appendix C contains the detailed MMLOS analysis and is provided for reference.

4.9.2.2 2022 Future Background Conditions

Figure 15 illustrates the 2022 future background AM and PM peak hour traffic volumes at the study area intersections.

Intersection Capacity Analysis

Table 13 summarizes the results of the Synchro analysis for the 2022 future background horizon. Consistent with the existing conditions, the intersection of Baseline Road at Clyde Avenue is expected to operate at or above capacity with multiple movements operating at LOS F during both the AM and PM peak hours. However, geometric improvements are not recommended as this intersection is expected to be upgraded to favor east-west BRT transit through BRT corridor upgrades by the year 2023. Furthermore, implementing intersection treatments to address vehicular operations is expected to negatively impact the multi-modal traffic operations for other modes (transit, cycling, and pedestrian).

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Although no geometric improvements are recommended, there is an opportunity to improve the overall intersection operations during the AM peak hour by increasing the eastbound left turn split by 6 seconds, which is time taken from the conflicting westbound through traffic phase. The overall intersection cycle length was maintained at 120 seconds during the AM peak hour similar to the existing Signal Timing Plan (STP). This signal timing adjustment improves the operations for the eastbound left turn movement, particularly during the AM peak hour. The operations for both the existing signal timing plan as well as this optimized signal timing plan was reported in **Table 13** below.

Consistent with the results from the existing conditions analysis, the southbound movement at the intersection of Baseline Road at Private Access 1 is anticipated to experience more than 50s of delay during both the AM and PM peak hours. Despite this, the volume to capacity ratios remains acceptable.

The intersection of Clyde Avenue at Private Access 3 is anticipated to continue to operate acceptably.

Appendix E contains detailed intersection performance worksheets.

Table 13 - 2022 Future Background Conditions Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Baseline Road at Clyde Avenue	Traffic Signals	EB	Left	F (F)	1.12 (1.11)	160.3 (163.9)	111.3 (105.7)
			Through	E (D)	1.00 (0.83)	65.7 (46.1)	210.7 (156.8)
			Right	A* (A)	0.23* (0.39*)	4.6* (14.5*)	10.0* (35.0*)
		WB	Left	C (D)	0.78 (0.86)	72.6 (94.3)	28.0 (68.6)
			Through	A (F)	0.56 (1.09)	38.0 (97.5)	84.0 (274.4)
			Right	B* (E)	0.70* (0.92*)	22.0* (46.7*)	68.2* (#157.9*)
		NB	Left	B (D)	0.64 (0.89)	61.2 (80.0)	18.9 (76.3)
			Through / Right	E (F)	0.95 (1.06)	72.9 (109.2)	172.2 (217.0)
		SB	Left	D (F)	0.85 (1.03)	67.8 (111.7)	67.9 (99.4)
			Through / Right	A (D)	0.45 (0.84)	31.1 (59.5)	76.3 (137.2)
		Overall Intersection		-	-	**57.5 (79.0)**	-
		Optimized Signal Timing Plan (AM Peak) – EBL split increased by 6 seconds taken from WBT split					
Baseline Road at Clyde Avenue		EB	Left	D (F)	0.87 (1.11)	75.2 (163.9)	79.8 (105.7)
			Through	E (D)	1.00 (0.83)	65.7 (46.1)	210.7 (156.8)
			Right	A* (A)	0.23* (0.39*)	4.6* (14.5*)	10.0* (35.0*)
		WB	Left	C (D)	0.78 (0.86)	72.6 (94.3)	28.0 (68.6)
			Through	A (F)	0.62 (1.09)	41.8 (97.5)	87.5 (274.4)
			Right	B* (E)	0.73* (0.92*)	23.0* (46.7*)	67.0* (#157.9*)
		NB	Left	B (D)	0.64 (0.89)	61.2 (80.0)	18.9 (76.3)
			Through / Right	E (F)	0.95 (1.06)	72.9 (109.2)	172.2 (217.0)
		SB	Left	D (F)	0.85 (1.03)	67.8 (111.7)	67.9 (99.4)
			Through / Right	A (D)	0.45 (0.84)	31.1 (59.5)	76.3 (137.2)
		Overall Intersection		-	-	**54.5 (79.0)**	-
Baseline Road at Private Access 1	Traffic Signals	EB	Left	A (A)	0.12 (0.59)	3.7 (29.9)	4.2 (35.0)
			Through	A (A)	0.54 (0.55)	3.7 (6.0)	67.2 (89.6)
		WB	Through / Right	A (D)	0.41 (0.83)	6.5 (20.7)	65.1 (229.6)
		SB	Left	A (D)	0.35 (0.82)	55.5 (63.6)	16.1 (71.4)
			Right	A (A)	0.08 (0.42)	53.0 (54.4)	6.3 (63.0)
		Overall Intersection		-	-	**5.7 (17.5)**	-
Clyde Avenue at Private Access 3 (right-in / right-out)	Minor Stop	WB	Right	A (A)	0.11 (0.45)	15.4 (24.1)	2.8 (15.4)
		Overall Intersection		-	-	-	-

Notes:
1. Table format: AM (PM)

Intersection	Intersection Control	Approach / Movement	LOS	V/C	Delay (s)	Queue 95th (m)

2. v/c – represents the anticipated volume divided by the predicted capacity
3. * Estimated using Synchro's Percentile Method
4. # for v/c <1, queue requires multiple cycles to be cleared
5. Red highlight: Movement operating at or above capacity; Orange Highlight: Movement operating near capacity.

Multi-Modal Level of Service Analysis – Signalized Intersections

The intersection operating conditions remain similar to existing conditions; therefore, the intersection MMLOS discussion in **Section 4.9.2.1** applies to the 2022 future background analysis.

Appendix C contains the detailed MMLOS analysis and is provided for reference.

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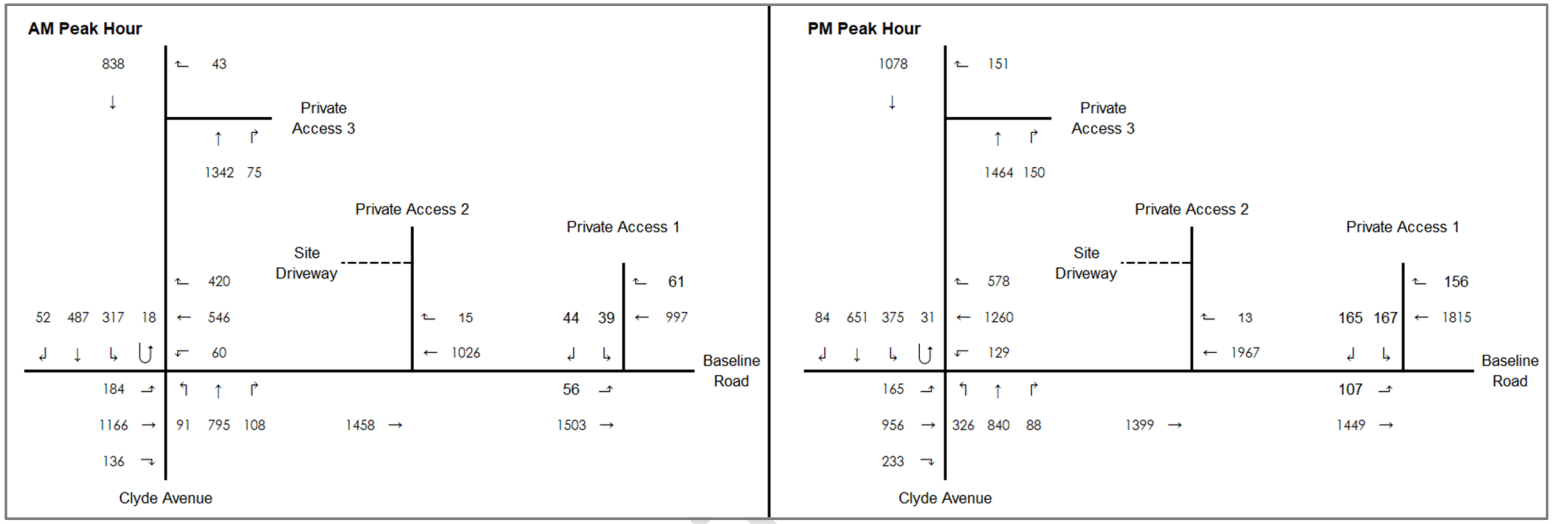
Figure 15 – 2022 Future Background Traffic Volumes



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4.9.2.3 2022 Total Future Conditions

Figure 16 illustrates 2022 total future AM and PM peak hour traffic volumes at the study area intersections.

Intersection Capacity Analysis

Table 14 summarizes the results of the Synchro analysis for the 2022 total future horizon. Consistent with the previous two horizons, the intersection of Baseline Road at Clyde Avenue is expected to continue to operate at or above capacity with multiple movements operating at LOS F during the AM and PM peak hours. However, no improvements are recommended as this intersection is expected to be upgraded to favor east-west BRT transit as the BRT corridor upgrades take place by the year 2023. Furthermore, implementing intersection treatments to address vehicular operations is expected to negatively impact the multi-modal traffic operations for other modes (transit, cycling, and pedestrian).

Consistent with the previous horizons, the southbound movement at the intersection of Baseline Road at Private Access 1 is anticipated to experience more than 50s of delay during both the AM and PM peak hours. Despite this, the volume to capacity ratios remains acceptable.

The intersection of Clyde Avenue at Private Access 3 is anticipated to continue to operate acceptably.

Appendix E contains detailed intersection performance worksheets.

Table 14 – 2022 Total Future Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Baseline Road at Clyde Avenue	Traffic Signals	EB	Left	D (F)	0.87 (1.11)	75.2 (163.9)	79.8 (105.7)
			Through	F (D)	1.06 (0.83)	83.1 (46.2)	230.3 (157.5)
			Right	A* (A*)	0.24* (0.39*)	4.6* (14.5*)	10.0* (35.0*)
		WB	Left	C (E)	0.79 (0.96)	68.8 (119.3)	36.4 (83.3)
			Through	B (F)	0.63 (1.09)	42.4 (98.2)	88.2 (275.8)
			Right	B* (E)	0.74* (0.93*)	23.7* (48.7*)	68.2* (#160.9)
		NB	Left	B (D)	0.64 (0.89)	61.2 (80.0)	18.9 (76.3)
			Through / Right	E (F)	0.96 (1.09)	75.3 (118.3)	175.7 (228.2)
		SB	Left	D (F)	0.86 (1.11)	69.1 (136.4)	70.7 (114.1)
			Through / Right	A (D)	0.45 (0.84)	30.8 (59.5)	76.3 (137.2)
		Overall Intersection		-	-	**59.8 (83.6)**	-
Baseline Road at Private Access 1	Traffic Signals	EB	Left	A (B)	0.17 (0.86)	4.3 (58.0)	5.6 (62.3)
			Through	A (A)	0.54 (0.55)	4.2 (6.3)	72.1 (91.7)
		WB	Through / Right	A (D)	0.42 (0.85)	7.2 (23.0)	70.7 (242.9)
		SB	Left	A (D)	0.37 (0.82)	54.2 (63.0)	18.9 (73.5)
			Right	A (A)	0.29 (0.50)	53.6 (55.1)	28.0 (74.9)
		Overall Intersection		-	-	**6.9 (20.3)**	-
Clyde Avenue at Private Access 3 (right-in / right-out)	Minor Stop	WB	Right	A (A)	0.19 (0.52)	16.3 (26.5)	4.9 (19.6)
		Overall Intersection		-	-	-	-

Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity
3. * Estimated using Synchro's Percentile Method
4. # for v/c <1, queue requires multiple cycles to be cleared
5. Red highlight: Movement operating at or above capacity; Orange Highlight: Movement operating near capacity.

Multi-Modal Level of Service Analysis – Signalized Intersections

The intersection operating conditions remain similar to existing conditions; therefore, the intersection MMLOS discussion in **Section 4.9.2.1** applies to the 2022 total future analysis.

Appendix C contains the detailed MMLOS analysis and is provided for reference.

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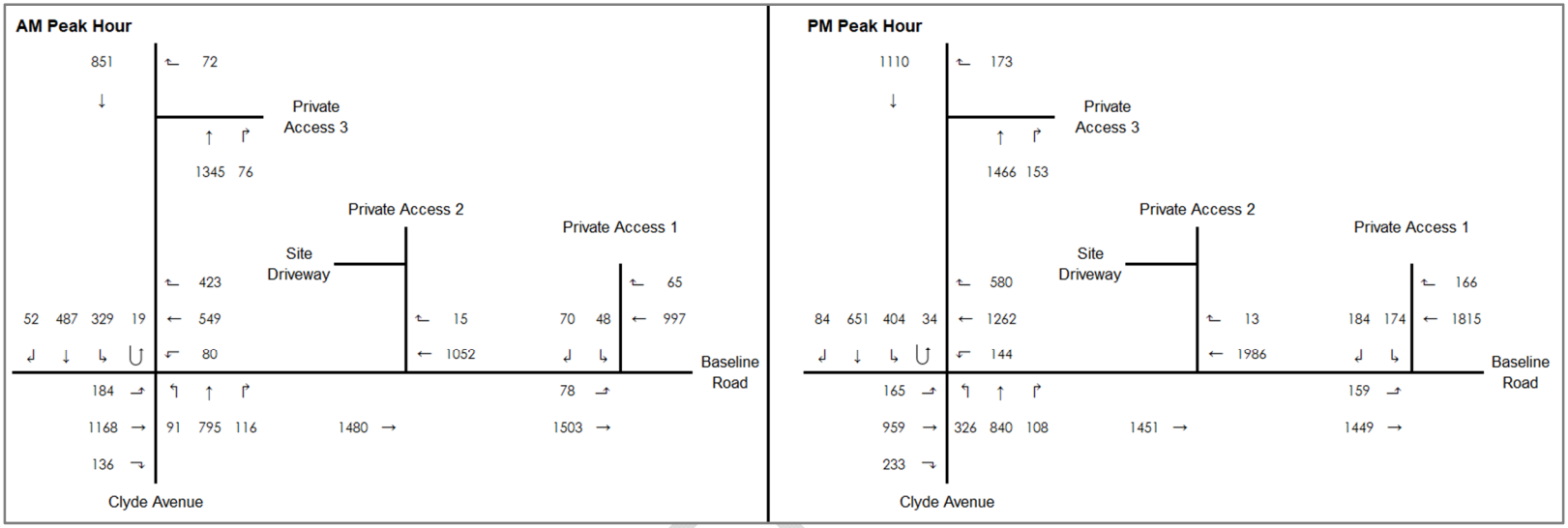
Figure 16 – 2022 Total Future Traffic Volumes



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4.9.2.4 2027 Ultimate Conditions

Figure 17 illustrates 2027 ultimate AM and PM peak hour traffic volumes at the study area intersections.

Intersection Capacity Analysis

Table 15 summarizes the results of the Synchro analysis for the 2027 ultimate horizon. The intersection of Baseline Road at Clyde Avenue was assessed using the preliminary design geometry that includes the BRT Transitway upgrades shown in **Figure 7**. The intersection of Baseline Road at Private Access 1 was assessed with a dedicated BRT Transitway as well as a segregated cycling facility. It was assumed that right turn on red (RTOR) operations will be prohibited at both Baseline Road Intersections within the vicinity of the development due to the segregated cycling facilities.

Based on discussions with the City of Ottawa, both signalized intersections are expected to operate under intersection TSP measures. It was assumed that the bus phase operates with non-conflicting traffic phases, i.e. eastbound and westbound through traffic phases. TSP operations were assumed to run through advanced detection and TSP activation was assumed to be able to truncate conflicting phases or extend non-conflicting phases that can run with the bus phase. The TSP operations were assumed not to be able to omit or rotate traffic phases.

Generally, once a bus is detected in advance, prior reaching the signal's stop line, if there is sufficient time for the bus to reach and clear the intersection, within the allowable maximum phase extension limits, the eastbound and westbound through phases will be extended to allow the unimpeded movement of the bus. On the other hand, if the bus's travel time to the intersection is greater than the allowable parallel phases' green extension, the parallel phases will be terminated early and the signal will run all conflicting phases at pre-defined minimum times so that the stopped bus gets service early. For a signal to be able to extend parallel phases, bus travel time reliability is usually considered in the decision to extend versus truncate phases. For instance, if the detection method is wireless with a travel time uncertainty of 2 seconds, the traffic controller adds 2 seconds to the detection travel time and compares the total to remaining green time in the parallel phase added to the maximum extension limit.

Typically, for median running at-grade BRT corridors, parallel left turn lanes operate as fully protected left phases as a safety requirement. This is due to the fact that it is challenging for left turners to look for conflicts for buses coming from behind. In the case of the study intersections, all eastbound and westbound left turn movements must be fully protected at the intersections of Baseline Road with Clyde Avenue and Private Access 1. Further to the above, it was assumed that all RTOR operations will be prohibited both intersections as a full implementation of a complete streets design with cycling facilities is expected. The signalized intersections within the study area were assessed and summarized in **Table 15** both with and without TSP operations in place. It should be noted that the TSP assessment using Synchro is only an approximation and is not intended to be an accurate assessment. To approximate TSP operations, left turn phase splits were reduced manually to a minimum split that results in less than 3 minutes of average delay for conflicting vehicular movements.

As indicated in **Table 15**, without TSP phase implementation, the intersection of Baseline Road at Clyde Avenue is expected to continue to operate at or above capacity with several individual movements operating at LOS F during both the weekday AM and PM peak hours. With the TSP implementation, the non-conflicting through movements (eastbound and westbound through movements) are expected to improve slightly but remain close to capacity operating conditions. Conflicting left turn phases are expected to experience deteriorated operations as compared to the without TSP

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scenario. Although there are multiple movements operating at or above capacity, no improvements are recommended to address vehicular operational delays.

At the intersection of Baseline Road / Private Access 1, the scenario without TSP operations results in high delays for the eastbound left and southbound movements. Once TSP operations are in place, it was found that the delays for the eastbound left turn movement deteriorate substantially and the volume to capacity ratio exceeds 1.0.

Adding vehicular capacity is expected to result in deteriorated Pedestrian and Bicycle Levels of Service. Furthermore, higher vehicular delays are generally acceptable along highly active multi-modal corridors especially those served by frequent rapid transit.

The intersection of Clyde Avenue at Private Access 3 is anticipated to continue to operate acceptably under 2027 ultimate conditions.

Appendix E contains detailed intersection performance worksheets.

Table 15 – 2027 Ultimate Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Baseline Road at Clyde Avenue	Traffic Signals *Without TSP*	EB	Left	D (F)	0.86 (1.07)	74.1 (153.4)	77.7 (100.1)
			Through	E (C)	0.99 (0.80)	62.7 (44.6)	200.2 (150.5)
			Right	A (A)	0.26 (0.45)	30.0 (36.2)	39.9 (74.2)
		WB	Left	C (D)	0.79 (0.88)	70.5 (100.1)	31.5 (72.8)
			Through	A (F)	0.59 (1.06)	40.8 (85.7)	84.7 (252.7)
			Right	F (F)	1.02 (1.13)	93.7 (123.4)	179.2 (280)
		NB	Left	B (D)	0.64 (0.87)	61.3 (76.6)	18.2 (72.8)
			Through / Right	E (F)	0.95 (1.07)	72.6 (111.8)	170.8 (219.8)
		SB	Left	D (F)	0.85 (1.04)	67.5 (116.3)	67.2 (102.2)
			Through / Right	A (D)	0.44 (0.82)	31.0 (57.1)	74.9 (131.6)
		Overall Intersection		-	-	**61.0 (85.2)**	-
	Traffic Signals *With TSP*	EB	Left	F (F)	1.08 (1.07)	148.5 (153.4)	105.0 (100.1)
			Through	E (C)	0.92 (0.77)	48.6 (41.6)	181.3 (146.3)
			Right	A (A)	0.25 (0.43)	27.6 (34.3)	38.5 (72.8)
		WB	Left	C (D)	0.79 (0.88)	70.5 (100.1)	31.5 (72.8)
			Through	A (F)	0.50 (1.01)	34.6 (70.5)	78.4 (235.9)
			Right	D (F)	0.86 (1.08)	56.3 (104.1)	144.9 (260.4)
		NB	Left	B (E)	0.65 (1.00)	61.7 (109.7)	18.2 (85.4)
			Through / Right	E (F)	0.95 (1.07)	72.6 (111.8)	170.8 (219.8)
		SB	Left	F (F)	1.10 (1.21)	136.8 (179.4)	90.3 (121.1)
			Through / Right	A (D)	0.48 (0.82)	33.4 (57.6)	77.7 (132.3)
		Overall Intersection		-	-	**61.4 (85.6)**	-
Baseline Road at Private Access 1	Traffic Signals *Without TSP*	EB	Left	C (D)	0.79 (0.84)	73.6 (73.4)	30.8 (62.3)
			Through	A (A)	0.53 (0.54)	4.2 (6.7)	70.0 (91.7)
		WB	Through / Right	A (D)	0.42 (0.90)	7.8 (32.9)	71.4 (277.9)
		SB	Left	A (D)	0.32 (0.70)	53.4 (57.4)	16.8 (67.2)
			Right	A (A)	0.47 (0.82)	55.6 (62.3)	46.9 (121.8)
		Overall Intersection		-	-	**8.3 (22.9)**	-
	Traffic Signals *With TSP*	EB	Left	C (D)	0.79 (1.02)	86.8 (143.5)	35.0 (84.0)
			Through	A (A)	0.53 (0.54)	4.2 (6.7)	70.0 (91.7)
		WB	Through / Right	A (D)	0.42 (0.88)	7.8 (29.0)	71.4 (261.8)
		SB	Left	A (D)	0.32 (0.70)	53.4 (57.4)	16.8 (67.2)

			Right	A (A)	0.47 (0.82)	55.6 (62.3)	46.9 (121.8)
		Overall Intersection		-	-	**8.6 (23.9)**	-
Clyde Avenue at Private Access 3 (right-in / right-out)	Minor Stop	WB	Right	A (A)	0.15 (0.45)	15.6 (23.9)	3.5 (16.1)
		Overall Intersection		-	-	-	-

Notes:
6. Table format: AM (PM)
7. v/c – represents the anticipated volume divided by the predicted capacity
8. * Estimated using Synchro's Percentile Method
9. # for v/c <1, queue requires multiple cycles to be cleared
10. Red highlight: Movement operating at or above capacity; Orange Highlight: Movement operating near capacity.

Multi-Modal Level of Service Analysis – Signalized Intersections

By 2027, the Baseline Road BRT upgrades will be implemented, and as such, both study area signalized intersections will be considered 'within 600m of a rapid transit station' Policy Area due to the proposed transit stop at the Baseline Road at Clyde Avenue intersection. The multi-modal level of service (MMLOS) targets at intersections are determined by taking the most stringent of the MMLOS targets for each individual roadway segment. As such, for both signalized intersections, the Pedestrian Level of Service (PLOS) target is A, Bicycle Level of Service (BLOS) target is A, Transit Level of Service (TLOS) target is A, Truck Level of Service (TkLOS) target is D, and Vehicular Level of Service (VLOS) target is E.

Baseline Road at Clyde Avenue

The Pedestrian Level of Service (PLOS) is projected to operate with a PLOS of F, which does not meet the desired target of A. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes at the intersection is not a feasible option. Incorporating other improvements such as pedestrian leading intervals or reducing the corner radii are not expected to highly improve the PLOS to the desired targets and will have minimal impacts to the PLOS.

The ultimate geometry for the Baseline Road at Clyde Avenue intersection includes cycle tracks and cross-rides. Based on this configuration, the Bicycle Level of Service (BLOS) is expected to operate with a BLOS of A, which meets the desired target.

The Transit Level of Service (TLOS) is projected to operate with a TLOS of F, which does not meet the desired target of A. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. The signal timing plans that were obtained from the City of Ottawa indicates that this intersection operates with a conventional NEMA phasing. The ultimate conditions Synchro analysis indicate that the eastbound and westbound delays are likely 30 seconds of less. However, the north and south approaches are expected to serve transit with delays greater than 40 seconds and therefore resulting in a TLOS F. Introducing bus queue jumps may have limited benefits as queues are expected to be beyond 200 metres long. Furthermore, queue jumps may be subject to ROW limitations. Implementing intersection modifications or operating aggressive forms of TSP operations (i.e. skipping and rotating traffic phases) could improve transit service but can severely impact other modes LOS. Therefore, no improvements are recommended to address future ultimate conditions.

The Truck Level of Service (TkLOS) is projected to operate with a TkLOS of B, which meets the desired target of D.

The Vehicular Level of Service (VLOS) is projected to operate with a VLOS of F, which does not meet the desired target of E. Increasing the number of lanes at this intersection would increase capacity and thus improve the VLOS, however, it would be to the detriment of the other modes of transportation and is therefore not recommended.

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Baseline Road at Private Access 1

The Pedestrian Level of Service (PLOS) is projected to operate with a PLOS of F, which does not meet the desired target of A. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes at the intersection is not a feasible option. Incorporating other improvements such as pedestrian leading intervals or reducing the corner radii are not expected to highly improve the PLOS to the desired targets and have minimal impacts to PLOS.

The ultimate geometry for the Baseline Road BRT includes cycle tracks and cross-rides at intersecting street with Baseline Road. Based on this configuration, the Bicycle Level of Service (BLOS) is expected to operate with a BLOS of A, which meets the desired target.

The Transit Level of Service (TLOS) is projected to operate with a TLOS of C, which does not meet the targeted value of A. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Buses are expected to operate with approximately 20 seconds of delay, which is significantly less compared to general traffic. Implementing intersection modifications or operating aggressive forms of TSP operations (i.e. skipping and rotating traffic phases) could improve transit service but can severely impact other modes of transportation. Therefore, no improvements are recommended to address the TLOS at this intersection.

The Truck Level of Service (TkLOS) is projected to operate with a TkLOS of B, which meets the desired target of D.

The Vehicular Level of Service (VLOS) is projected to operate with a VLOS of D, which meets the desired target of E.

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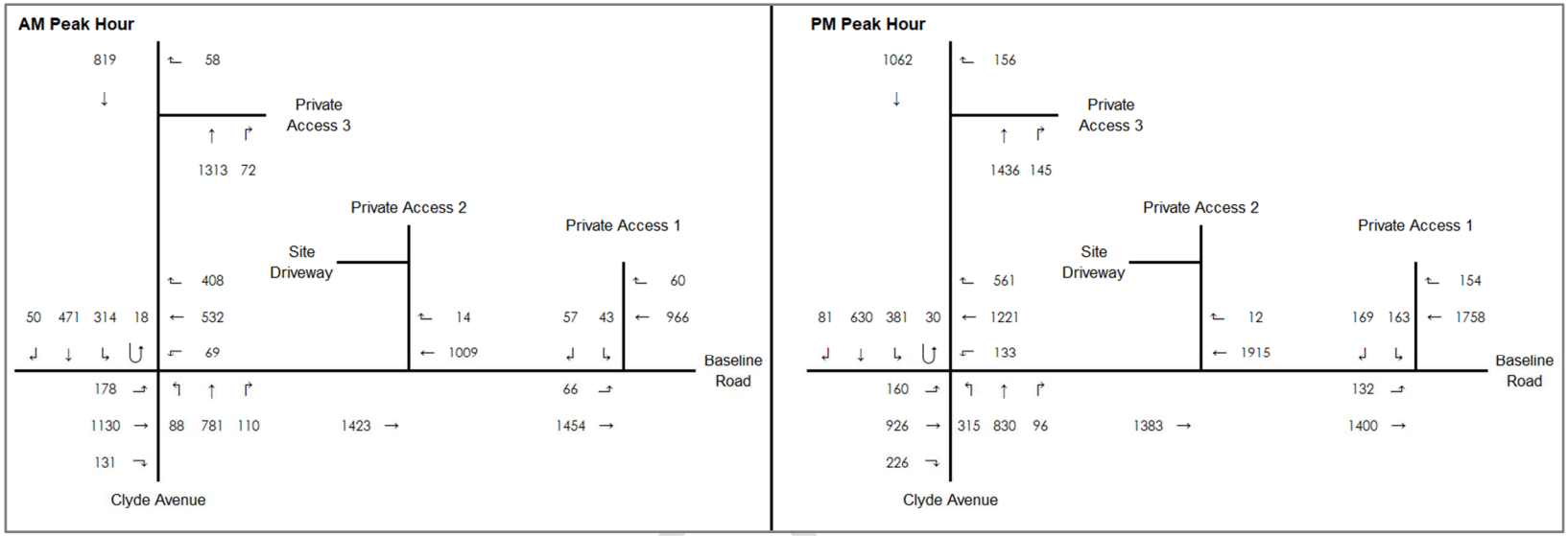
Figure 17 - 2027 Ultimate Traffic Volumes



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5.0 CONCLUSION

The subject Transportation Impact Assessment (TIA) was prepared in support of a Site Plan application for a proposed development located in the Civic Hospital / Central Park neighborhood of Ottawa, Ontario. The proposed development is located at 1357 Baseline Road at the north-east quadrant of the Baseline Road at Clyde Avenue intersection.

The proposed development includes 228 senior adult housing units, 174 apartment units, and approximately 5,500 ft^2 GFA of retail space. The development includes 333 vehicle parking spaces and 156 bicycle parking spaces. The development will be accessed via one full movements site access along Private Access 2.

2019 Existing

- The intersection of Baseline Road at Clyde Avenue is currently operating at or above capacity with several individual movements operating at a LOD F during both the AM and PM peak hours. No improvements are recommended as this intersection is expected to be upgraded to favor east-east BRT transit once the BRT upgrades are implemented along Baseline Road by 2023.
- The southbound movement at the intersection of Baseline Road at Private Access 1 is currently operating with more than 50s of delay during both the AM and PM peak hours, while the volume to capacity ratios remain acceptable (i.e. less than 0.90). This suggests that any additional traffic (background or site generated) will likely cause the delays to increase.
- The Clyde Avenue at Private Access 3 intersection is currently operating acceptably.

2022 Future Background

- Consistent with the existing conditions, the intersection of Baseline Road at Clyde Avenue is expected to operate at or above capacity with multiple movements operating at LOS F during both the AM and PM peak hours. However, geometric improvements are not recommended as this intersection is expected to be upgraded to favor east-west BRT transit through BRT corridor upgrades by the year 2023. The signal timing plan can be improved by increasing the eastbound left turn split by 6 seconds, which is time taken from the conflicting westbound through traffic phase. This signal timing adjustment improves the operations for the eastbound left turn movement, particularly during the AM peak hour.
- Consistent with the results from the existing conditions analysis, the southbound movement at the intersection of Baseline Road at Private Access 1 is anticipated to experience more than 50s of delay during both the AM and PM peak hours. Despite this, the volume to capacity ratios remains acceptable.
- The intersection of Clyde Avenue at Private Access 3 is anticipated to continue to operate acceptably.

2022 Total Future

- Consistent with the previous two horizons, the intersection of Baseline Road at Clyde Avenue is expected to continue to operate at or above capacity with multiple movements operating at LOS F during the AM and PM

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peak hours. However, no improvements are recommended as this intersection is expected to be upgraded to favor east-west BRT transit as the BRT corridor upgrades take place by the year 2023.

- Consistent with the previous horizons, the southbound movement at the intersection of Baseline Road at Private Access 1 is anticipated to experience more than 50s of delay during both the AM and PM peak hours. Despite this, the volume to capacity ratios remains acceptable.

- The intersection of Clyde Avenue at Private Access 3 is anticipated to continue to operate acceptably.

2027 Ultimate

- The Baseline Road BRT improvements are scheduled to be in place by 2023. The geometry from the draft preliminary design for the Baseline Road BRT project was used in the analysis of the 2027 ultimate horizon.

- Without Transit Signal Priority (TSP) in place along the BRT corridor, the intersection of Baseline Road at Clyde Avenue is expected to continue to operate at or above capacity with several individual movements operating at LOS F during both the weekday AM and PM peak hours. With TSP implementation, the non-conflicting through movements (eastbound and westbound through movements) are expected to improve slightly but remain close to capacity operating conditions. Conflicting left turn phases are expected to experience deteriorated operations as compared to the without TSP scenario.

- At the intersection of Baseline Road / Private Access 1, the scenario without TSP operations results in high delays for the eastbound left and southbound movements. Once TSP operations are in place, it was found that the delays for the eastbound left turn movement deteriorate substantially and the volume to capacity ratio exceeds 1.0.

- The intersection of Clyde Avenue at Private Access 3 is anticipated to continue to operate acceptably under 2027 ultimate conditions.

The Multi-Modal Level of Service (MMLOS) assessment for existing roadway segments (i.e. prior to the Baseline Road BRT) found that:

- Baseline Road and Clyde Avenue, across the frontage of the subject development, do not currently meet the Pedestrian and Bicycle Level of Service targets, while they do meet the Transit and Truck Level of Service targets. To improve the PLOS, the sidewalk widths would need to be increased to 2.0m, a 2.0m boulevard would need to be implemented, and the posted speed limit would need to be reduced to 50 km/h. To improve the BLOS, a physically separated bicycle facility (i.e. cycle track) would need to be implemented. As the Baseline Road BRT will be implemented by 2023, it is not recommended to mitigate these deficiencies as an interim condition.

The Multi-Modal Level of Service (MMLOS) assessment for ultimate roadway segments (i.e. with the Baseline Road BRT) found that:

- Implementing the Baseline Road BRT increases the PLOS target to an A along Baseline Road, which is not anticipated to be met in the ultimate conditions. Reducing the speed limit to 30 km/h or reducing the traffic

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volumes to less than 3000 AADT would allow the PLOS target of A to be met, however, as Baseline Road is an arterial road, these are not feasible solutions.

- The proposed cycle tracks along Baseline Road will allow the BLOS target on Baseline Road to be met in the ultimate conditions.
- The TLOS and TkLOS targets are anticipated to continue to be met along Baseline Road under the ultimate conditions.
- Clyde Avenue is not anticipated to meet the PLOS nor BLOS targets under the ultimate conditions. To improve these levels of service, a 2.0m sidewalks with 2.0m boulevard would need to be implemented, the volume of traffic would need to be reduced to less than 3000 AADT, the posted speed limit would need to be reduced to 50 km/h, and a physically separated bicycle facility (i.e. cycle track) would need to be implemented.
- The TLOS and TkLOS targets are anticipated to continue to be met along Clyde Avenue under the ultimate conditions.

The MMLOS assessment for existing signalized intersections (i.e. prior to the Baseline Road BRT) found that:

- The intersection of Baseline Road at Clyde Avenue currently does not meet the PLOS, BLOS, TLOS, and VLOS targets, while it does meet the TkLOS target. Measures that would improve the MMLOS include reducing the number of vehicle lanes, reducing the posted speed limit, reducing the volume of cars, and implementing higher order cycling facilities. As this intersection is scheduled to undergo geometric changes as a result of the Baseline Road BRT, no interim mitigation measures are recommended.
- The intersection of Baseline Road at Private Access 1 currently does not meet the PLOS, BLOS, and TLOS targets while it does meet the TkLOS and VLOS targets. Measures that would improve the MMLOS include reducing the number of vehicle lanes, reducing the posted speed limit, reducing the volume of cars, and implementing higher order cycling facilities. As this intersection is scheduled to undergo geometric changes as a result of the Baseline Road BRT, no interim measures are recommended.

The MMLOS assessment for ultimate signalized intersections (i.e. with the Baseline Road BRT) found that:

- The intersection of Baseline Road at Clyde Avenue is not projected to meet the PLOS, TLOS, and VLOS targets while it is projected to meet the BLOS and TkLOS targets. Despite the future geometry at this intersection, based on the crossing distance for pedestrians, it is anticipated at the PLOS target will not be met. Reducing the number of vehicle lanes would improve the PLOS, however, as Baseline Road and Clyde Avenue are both arterial roadways, this is not a feasible option. While the future geometry at this intersection includes median BRT, the transit delays in the northbound and southbound directions result in a TLOS that is below target. Introducing features such as queue jump lanes would improve the TLOS, however, there may be ROW limitations. Adding additional vehicle lanes at this intersection would improve the VLOS, however, it would be to the detriment of the other modes of transportation and is therefore not recommended.
- The intersection of Baseline Road at Private Access 1 is not projected to meet the PLOS and TLOS targets while it is anticipated to meet the BLOS, TkLOS, and VLOS targets. Reducing the number of lanes along Baseline Road would improve the PLOS, however, with the future median BRT and the classification of

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Baseline Road as an arterial roadway, this is not a feasible option. To improve the TLOS, measures such as aggressive forms of TSP operations could be implemented, however, this can severely impact other modes of transportation and is therefore not recommended.

Based on the transportation evaluation presented in this transportation study, the proposed development at 1357 Baseline Road can be supported and should be permitted to proceed from a transportation perspective.

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APPENDICES

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Appendix A TRAFFIC DATA

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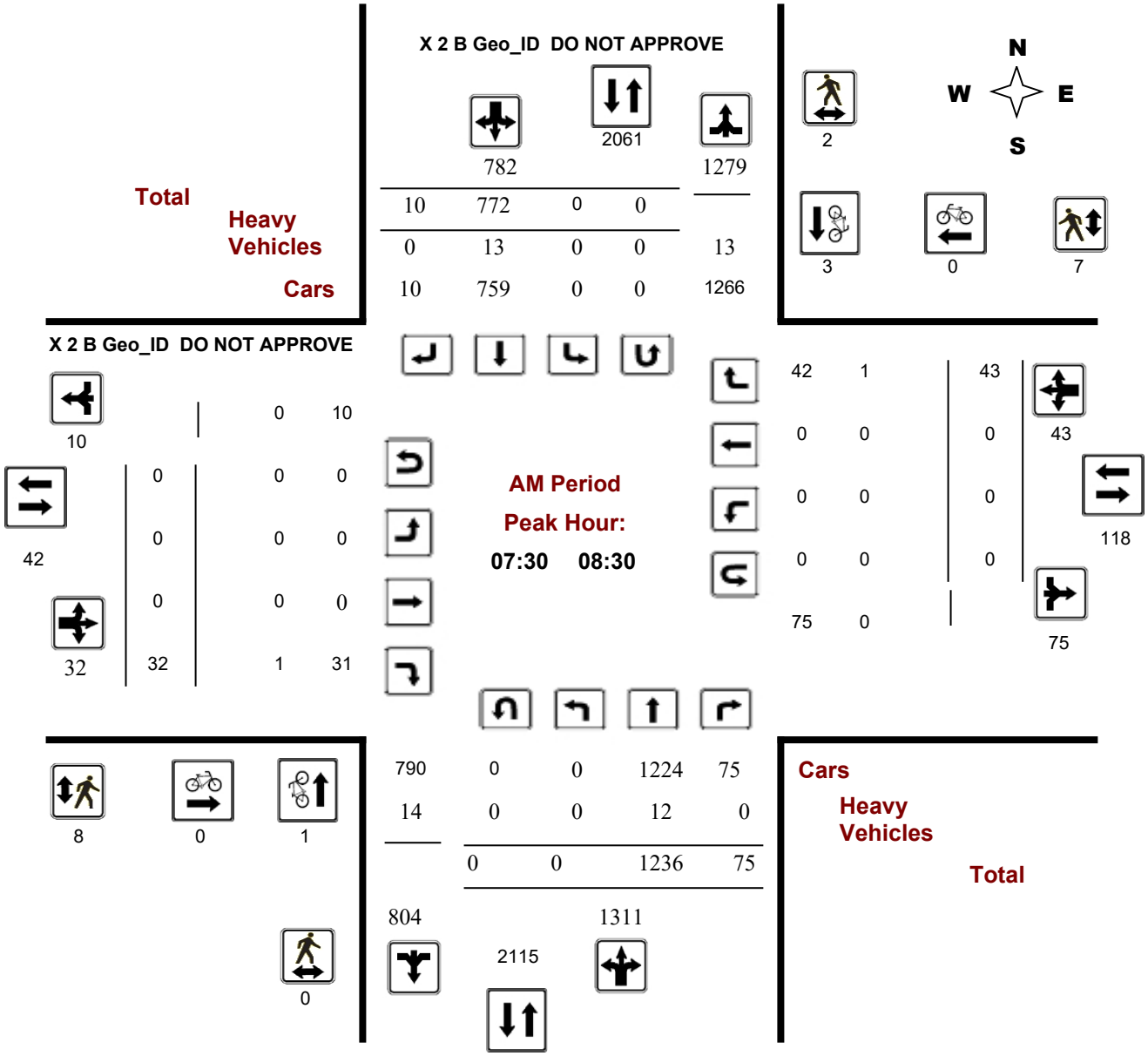
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

X 2 B Geo_ID DO NOT APPROVE @ X 2 B Geo_ID DO NOT APPROVE

Survey Date: Wednesday, August 21, 2019 **WO No:** 38718

Start Time: 07:00 **Device:** Miovision



Comments ACTUAL LOC : CLYDE AVE 90M NORTH OF BASELINE RD PRIV ACCESS

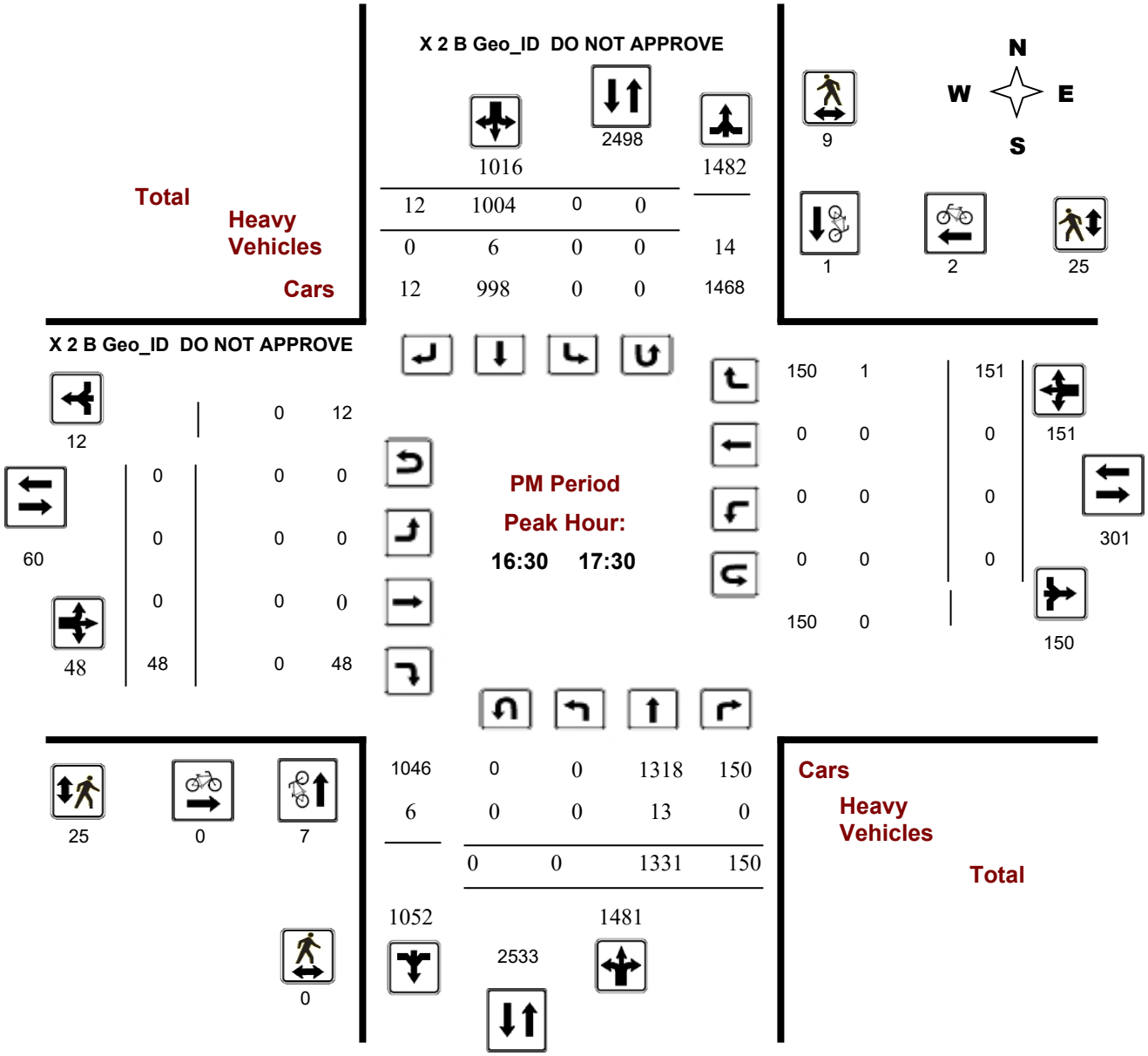
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

X 2 B Geo_ID DO NOT APPROVE @ X 2 B Geo_ID DO NOT APPROVE

Survey Date: Wednesday, August 21, 2019 **WO No:** 38718

Start Time: 07:00 **Device:** Miovision



Comments ACTUAL LOC : CLYDE AVE 90M NORTH OF BASELINE RD PRIV ACCESS

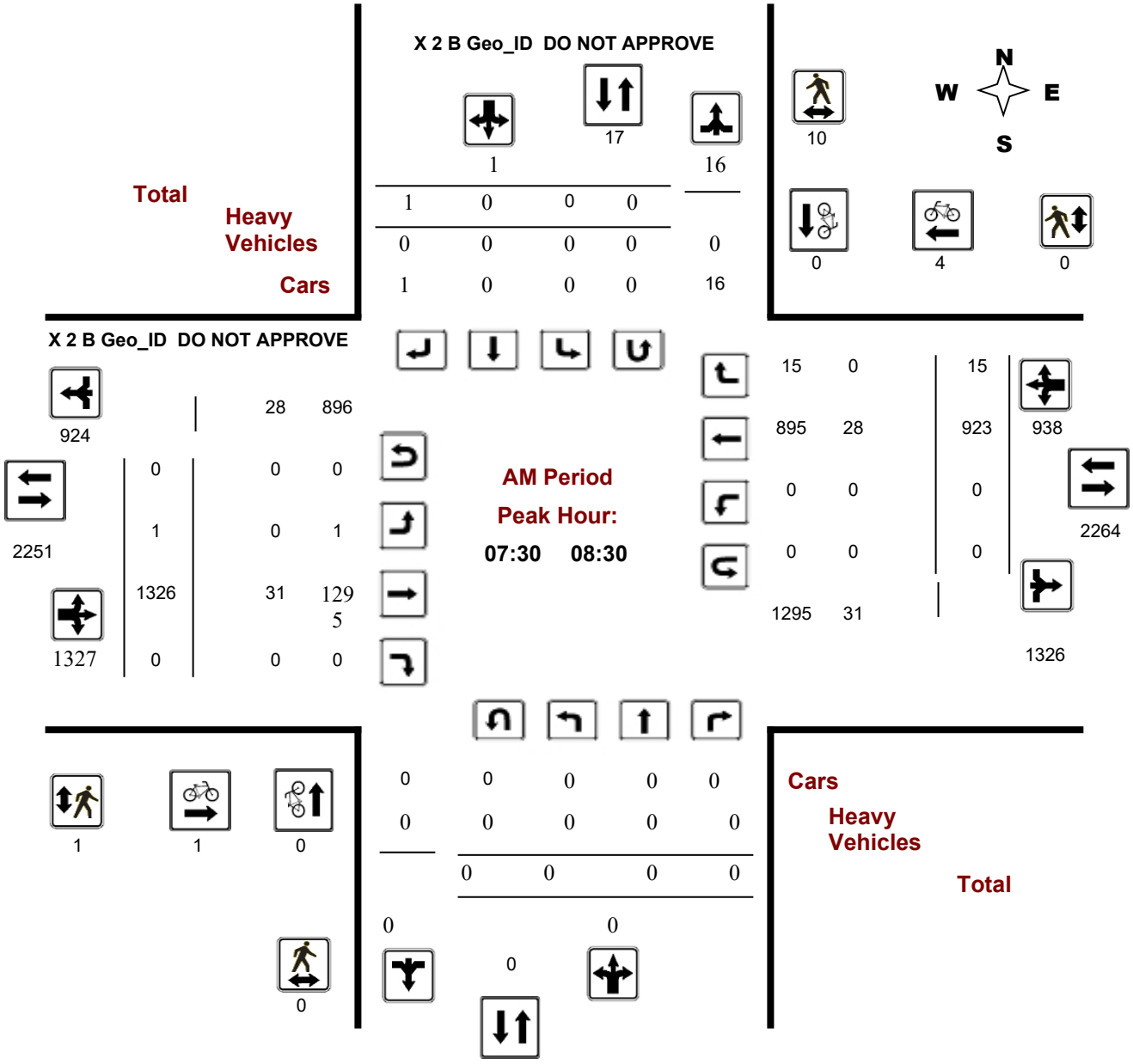
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

X 2 B Geo_ID DO NOT APPROVE @ X 2 B Geo_ID DO NOT APPROVE

Survey Date: Wednesday, August 21, 2019 **WO No:** 38719

Start Time: 07:00 **Device:** Miovision



Comments ACTUAL LOC :BASELINE RD 115M EAST OF CLYDE AVE

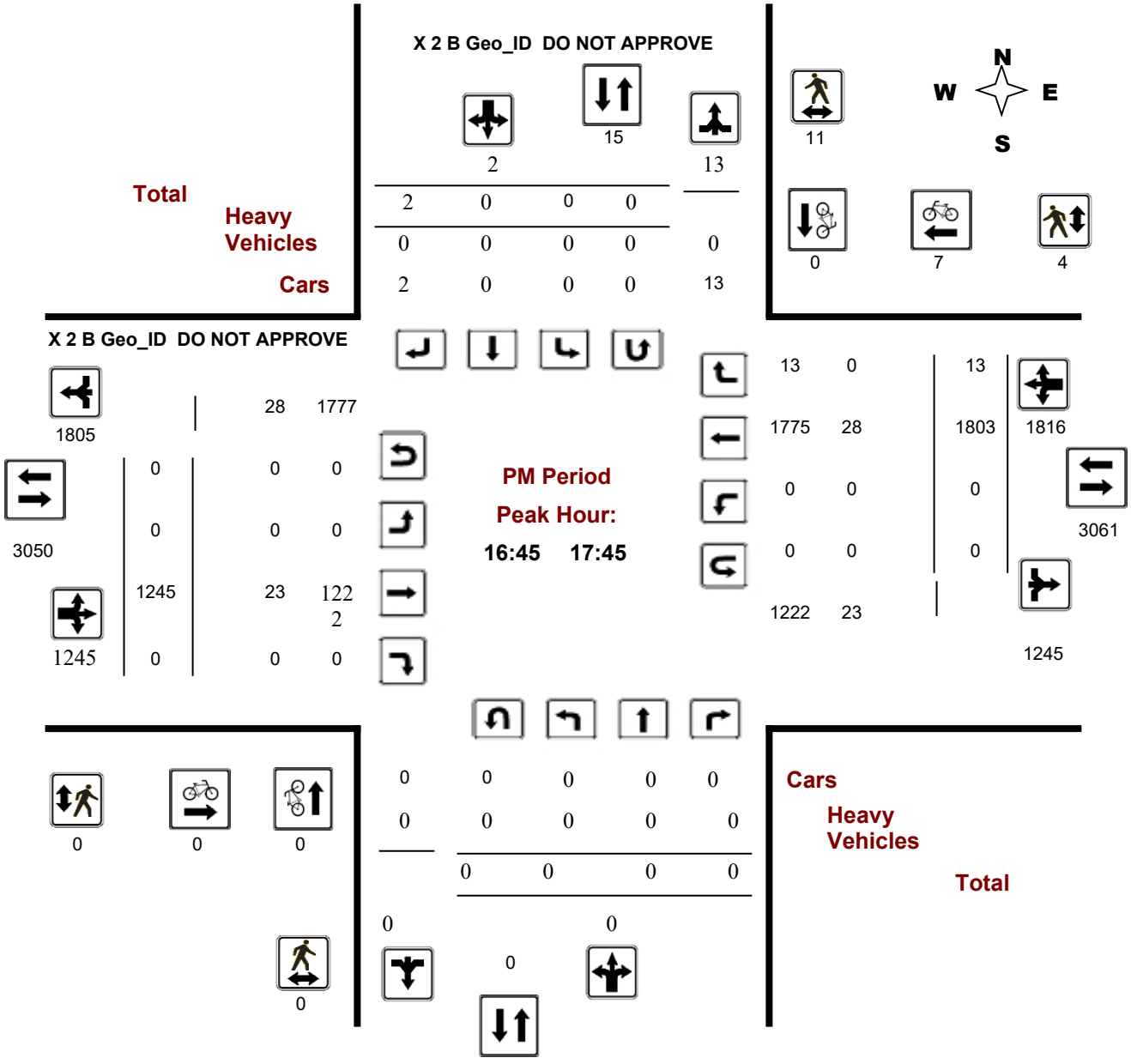
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

X 2 B Geo_ID DO NOT APPROVE @ X 2 B Geo_ID DO NOT APPROVE

Survey Date: Wednesday, August 21, 2019 **WO No:** 38719

Start Time: 07:00 **Device:** Miovision



Comments ACTUAL LOC :BASELINE RD 115M EAST OF CLYDE AVE

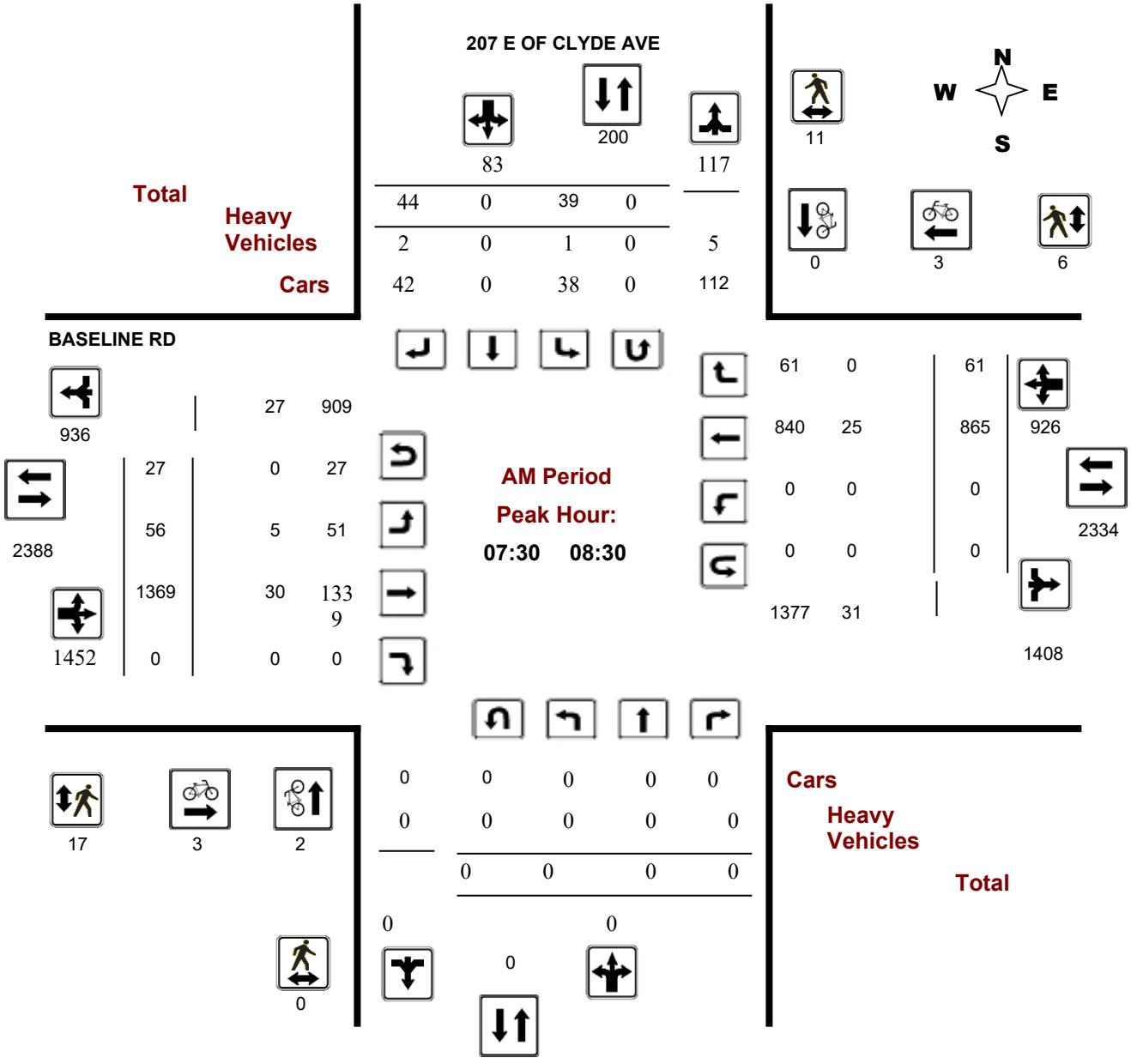
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

BASELINE RD @ 207 E OF CLYDE AVE

Survey Date: Wednesday, August 21, 2019 **WO No:** 38721

Start Time: 07:00 **Device:** Miovision



Comments

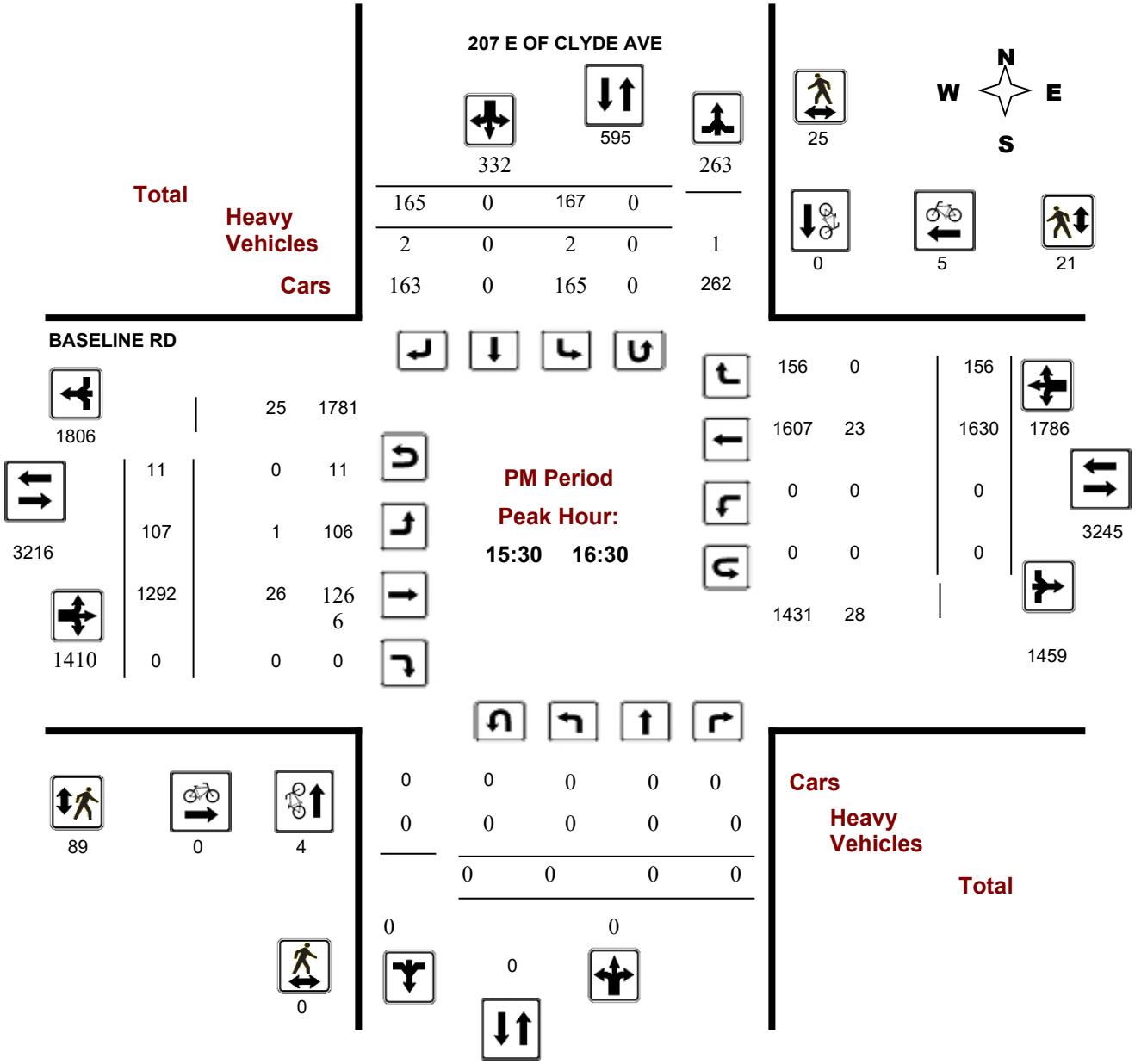
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

BASELINE RD @ 207 E OF CLYDE AVE

Survey Date: Wednesday, August 21, 2019 **WO No:** 38721

Start Time: 07:00 **Device:** Miovision



Comments

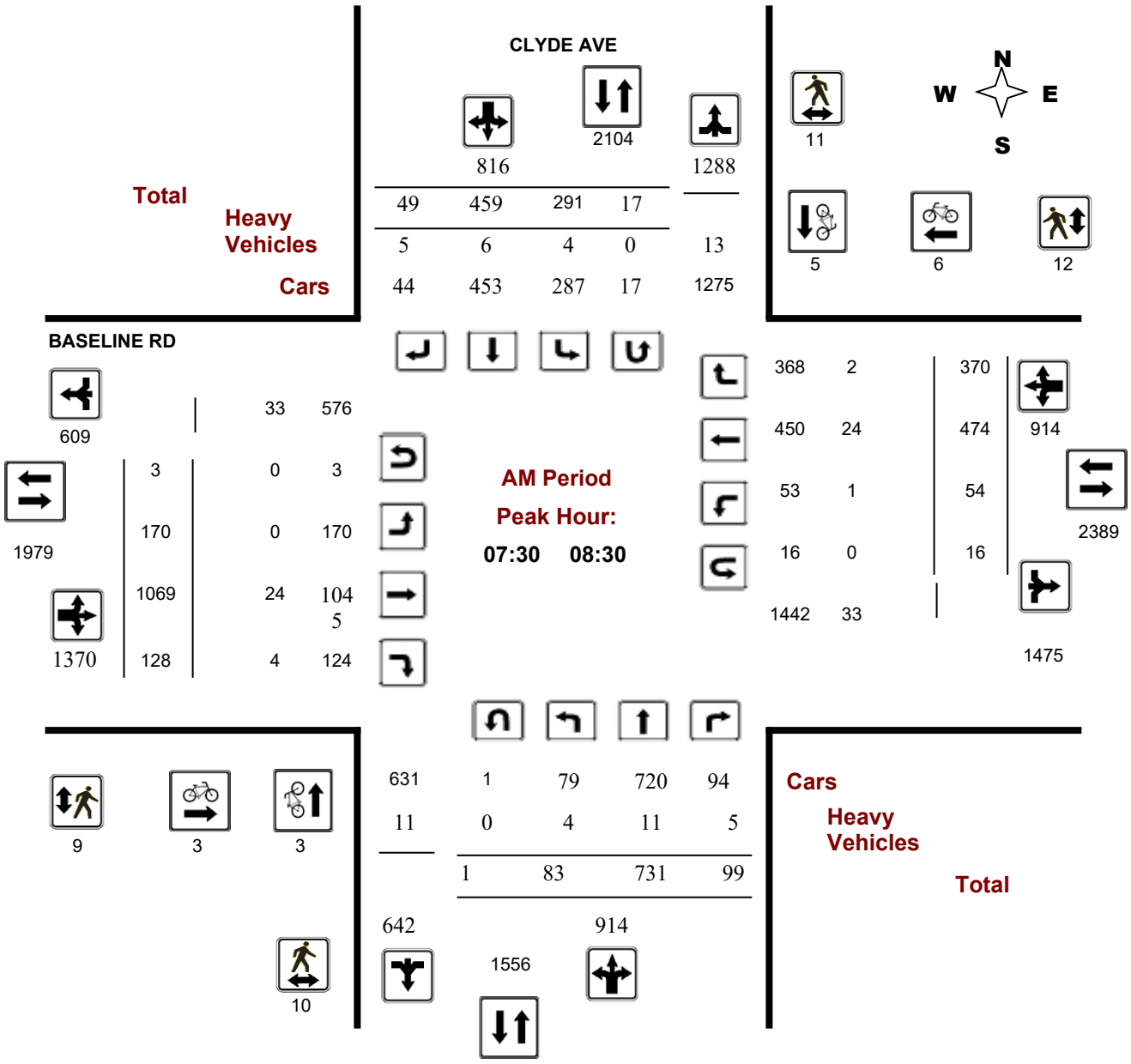
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

BASELINE RD @ CLYDE AVE

Survey Date: Wednesday, August 21, 2019 **WO No:** 38720

Start Time: 07:00 **Device:** Miovision



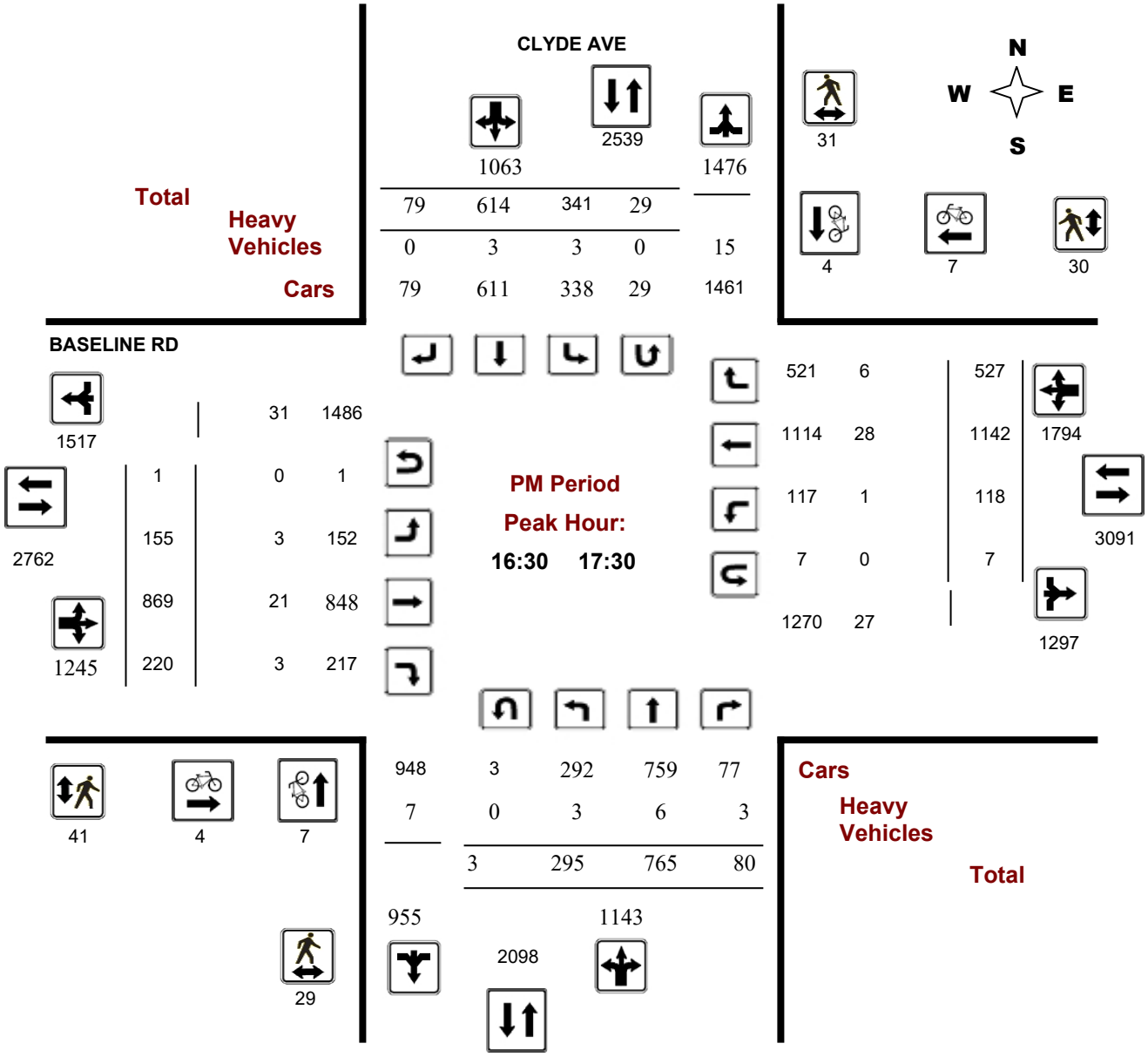
Comments

Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

BASELINE RD @ CLYDE AVE

Survey Date: Wednesday, August 21, 2019
Start Time: 07:00
WO No: 38720
Device: Miovision



Comments

Appendix B CORRESPONDANCE

DRAFT

From: Dubyk, Wally
To: O"Grady, Lauren
Cc: Moore, Sean
Subject: 1357 Baseline Rd - Forecasting Comments - response
Date: Thursday, December 12, 2019 9:46:05 AM

Lauren,

The City staff have reviewed your response and have no further comments. Please proceed with the TIA Step 4 – Strategy report and submit the report with the Site Plan Application.

Thank you,

Wally Dubyk
Project Manager - Transportation Approvals
Development Review, Central & South Branches
613-580-2424 x13783

From: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Sent: November 28, 2019 9:04 AM
To: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Cc: Moore, Sean <Sean.Moore@ottawa.ca>; Giampa, Mike <Mike.Giampa@ottawa.ca>
Subject: RE: 1357 Baseline Rd - Forecasting Comments

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Hi Wally,

Thank you for providing your comments on the Step 3 TIA. Please see my responses in green below. Can you please circulate my responses to the appropriate City staff to receive concurrence so I can proceed with the Step 4 TIA?

Thank you,

Lauren O'Grady P.Eng.
Transportation Engineer

Direct: 613-784-2264
lauren.o'grady@stantec.com

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

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From: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Sent: Wednesday, November 27, 2019 7:13 AM
To: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Cc: Moore, Sean <Sean.Moore@ottawa.ca>
Subject: 1357 Baseline Rd - Forecasting Comments

Lauren,

1357 Baseline Road
TIA Forecasting Report

Please review the following Forecasting comments;

Transportation Engineering

Use TRANS to forecast trips for Land Use Code 222. Using ITE underestimates trips generated by the development. Noted. The LUC 222 will use the TRANS rates in the Step 4 TIA.

Separate the walking and cycling mode shares. Noted. The walking and cycling mode shares will be separated in the Step 4 TIA.

Consider increasing the future transit mode share target. The Baseline BRT will front this development directly, and Stage 2 of LRT will be in place at Baseline Station a few kilometers away. Review the TDM strategies to support the transition to higher transit mode share. Reducing the available parking should be considered. As outlined in Section 3.1.1, the transit modal shares that were used in the subject TIA were agreed upon by the City prior to the submission of the Step 3 TIA. The TDM strategies will be reviewed as part of the Step 4 TIA.

Monitoring of mode share may be required if site design does not support the projected mode shares. Please refer to comment #1 from Traffic Signal Operations below.

Consider internalization or pass-by reductions for the shopping centre. Due to the negligible traffic the commercial land use is anticipated to generate (i.e. maximum of 14 two-way trips during the PM peak hour), internal capture and pass-by were not applied. Applying these two reductions would have a negligible impact on the number of trips the proposed development is anticipated to generate.

Justify the volume distribution at accesses. Since this development is adjacent to the intersection of Baseline and Clyde, the westbound traffic is directly connected to Private Access 2. Adjust Figures 8-10 if changes are made. Section 3.1.2 contained an error. The distribution of traffic at the site accesses was not based on the 2019 existing volumes as stated in Step 3, but rather, it was based on the Trans OD Survey for the Merivale district. Section 3.1.2 will be revised as part of the Step 4 TIA and will

provide clarification.

Include traffic projections from developments at 1375 Clyde, 1454 Merivale and 300 Central Park in Section 3.2.3. The proposed developments at 1375 Clyde and 300 Central Park will be included in the Step 4 TIA. It is our understanding that the development at 1454 Merivale is currently constructed and fully operational, therefore, the trips associated with this development has already been captured in the turning movement counts that were collected in the summer of 2019.

Traffic Signal Operations

The 332 vehicle parking spaces being proposed as part of development do not align with the transit modal share targets (40%). Baseline Road is already at capacity and further lane reductions as part of the bus rapid transit will add more pressure to an already congested corridor. The 40% modal share once the BRT is operational was agreed upon by the City of Ottawa during the preparation of the Step 3 TIA. The ITE and TRANS trip generation rates are based on the number of residential units and not on the number of parking spaces. The tenants that will be occupying the seniors portion of the proposed development are not likely to drive during the AM and PM peak hours (AM trip gen rate is 0.20 and PM trip gen rate is 0.26). However, based on market research, the developer wishes to provide options for parking spaces so that the seniors can keep their cars and use them as they wish (likely off peak, according to the trip generation rates). We don't anticipate the transit modal share being anything less than 40%, even with the proposed number of parking spaces. Referring to the third comment from TES above, the transit modal share might in fact be higher than 40%. Based on the zoning, providing 322 parking spaces is closer to the minimum rather than the maximum allowable parking spaces (min is appx 180 and max is appx 800). Furthermore, out of the proposed 322 parking spaces, appx 60 of them are reserved for visitors. We recommend keeping the transit modal share at 40% once the BRT is operational.

Demand Rationalization will be required if the VLOS indicates that the boundary intersections are at capacity. Noted.

Wally Dubyk
Project Manager - Transportation Approvals
Development Review, Central & South Branches
613-580-2424 x13783

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Appendix C MULTI-MODAL LEVEL OF SERVICE ASSESSMENTS

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Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**		**1357 Baseline Rd**
Scenario	**Existing Conditions**		**10-Jan-20**

SEGMENTS		LOS	Baseline Road Across Frontage	Clyde Avenue Across Frontage
Pedestrian	Sidewalk Width Boulevard Width	F	1.8 m < 0.5 m	1.8 m < 0.5 m
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no
	Level of Service		**F**	**F**
Bicycle	Type of Cycling Facility	F	Curbside Bike Lane	Mixed Traffic
	Number of Travel Lanes		≥ 3 each direction	≥ 6 lanes total
	Operating Speed		>50 to 70 km/h	≥ 50 to 60 km/h
	# of Lanes & Operating Speed LoS		**D**	**F**
	Bike Lane (+ Parking Lane) Width		≥1.5 to <1.8 m	
	Bike Lane Width LoS		**B**	**-**
	Bike Lane Blockages		Rare	
	Blockage LoS		**A**	**-**
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes
	Sidestreet Operating Speed		≤ 40 km/h	≤ 40 km/h
	Unsignalized Crossing - Lowest LoS		**A**	**A**
	Level of Service		**D**	**F**
Transit	Facility Type	F	Bus lane	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Cf ≤ 60	Vt/Vp ≤ 0.6
	Level of Service		**B**	**E**
Truck	Truck Lane Width	A	≤ 3.5 m	≤ 3.5 m
	Travel Lanes per Direction		> 1	> 1
	Level of Service		**A**	**A**

Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**		**1357 Baseline Rd**
Scenario	**Ultimate Conditions**		**10-Jan-20**

SEGMENTS			**Baseline Road Across Frontage**	**Clyde Avenue Across Frontage**
Pedestrian	Sidewalk Width Boulevard Width	**F**	≥ 2 m > 2 m	1.8 m < 0.5 m
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000
	Operating Speed On-Street Parking		> 50 to 60 km/h no	> 60 km/h no
	Exposure to Traffic PLoS		**C**	**F**
	Level of Service		**C**	**-**
Bicycle	Type of Cycling Facility	**F**	Physically Separated	Mixed Traffic
	Number of Travel Lanes			≥ 6 lanes total
	Operating Speed			≥ 50 to 60 km/h
	# of Lanes & Operating Speed LoS		**-**	**F**
	Bike Lane (+ Parking Lane) Width			
	Bike Lane Width LoS		**-**	**-**
	Bike Lane Blockages			
	Blockage LoS		**-**	**-**
	Median Refuge Width (no median = < 1.8 m)			< 1.8 m refuge
	No. of Lanes at Unsignalized Crossing			≤ 3 lanes
	Sidestreet Operating Speed			≤ 40 km/h
	Unsignalized Crossing - Lowest LoS		**A**	**A**
	Level of Service		**A**	**F**
Transit	Facility Type	**F**	Segregated ROW	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		~~Cf ≤ 60~~	Vt/Vp ≤ 0.6
	Level of Service		**A**	**E**
Truck	Truck Lane Width	**A**	≤ 3.5 m	≤ 3.5 m
	Travel Lanes per Direction		> 1	> 1
	Level of Service		**A**	**A**

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**1357 Baseline Rd**
Scenario	**2019 Existing**	**Date**	**10-Jan-20**

INTERSECTIONS		Baseline & Clyde				Baseline & Private Access 1		
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**EAST**	**WEST**
Pedestrian	Lanes	7	7	8	8	4	4	6
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected	Protected	Protected	Protected	Protected/ Permissive	Permissive	No left turn / Prohib.
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No
	Right Turn Channel	Conv'tl without Receiving Lane	No Channel	Conv'tl without Receiving Lane	Smart Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	15-25m	15-25m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**16**	**12**	**-2**	**0**	**53**	**58**	**28**
	Ped. Exposure to Traffic LoS	**F**	**F**	**F**	**F**	**D**	**D**	**F**
	Cycle Length	130	130	130	130	130	130	130
	Effective Walk Time	7	7	7	7	7	7	7
	Average Pedestrian Delay	**58**	**58**	**58**	**58**	**58**	**58**	**58**
	Pedestrian Delay LoS	**E**	**E**	**E**	**E**	**E**	**E**	**E**
	Level of Service	**F**	**F**	**F**	**F**	**E**	**E**	**F**
		F				**F**		
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>			> 50 m Introduced right turn lane	≤ 50 m Introduced right turn lane	> 50 m	Not Applicable	
	Dedicated Right Turning Speed			≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	Not Applicable	
	Cyclist Through Movement			**D**	**B**	**F**	**Not Applicable**	
	Separated or Mixed Traffic	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Mixed Traffic**	**Separated**	**Mixed Traffic**
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed		One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	≤ 40 km/h		≥ 60 km/h
	Left Turning Cyclist	**C**	**C**	**C**	**B**	**B**	**-**	**F**
	Level of Service	**C**	**C**	**D**	**B**	**F**	**-**	**F**
		D				**F**		
Transit	Average Signal Delay	> 40 sec	> 40 sec	> 40 sec	> 40 sec	0 sec	≤ 30 sec	≤ 40 sec
	Level of Service	**F**	**F**	**F**	**F**	**A**	**D**	**E**
		F				**E**		
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	> 15 m	> 15 m	10 - 15 m	10 - 15 m	
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	
	Level of Service	**B**	**B**	**A**	**A**	**B**	**B**	**-**
		B				**B**		
Auto	Volume to Capacity Ratio	> 1.00				0.81 - 0.90		
	Level of Service	**F**				**D**		

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**1357 Baseline Rd**
Scenario	**2027 Ultimate**	**Date**	**10-Jan-20**

INTERSECTIONS		Baseline & Clyde				Baseline & Private Access 1		
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Pedestrian	Lanes	6	6	8	8	4	6	7
	Median	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	Median > 2.4 m	No Median - 2.4 m	Median > 2.4 m	Median > 2.4 m
	Conflicting Left Turns	Protected	Protected	Protected	Protected	Protected	Permissive	No left turn / Prohib.
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn
	Right Turns on Red (RToR) ?	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited
	Ped Signal Leading Interval?	No	No	No	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	15-25m	15-25m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**31**	**31**	**4**	**4**	**64**	**28**	**26**
	Ped. Exposure to Traffic LoS	**E**	**E**	**F**	**F**	**C**	**F**	**F**
	Cycle Length	130	130	130	130	130	130	130
	Effective Walk Time	7	7	7	7	7	7	7
	Average Pedestrian Delay	**58**	**58**	**58**	**58**	**58**	**58**	**58**
	Pedestrian Delay LoS	**E**	**E**	**E**	**E**	**E**	**E**	**E**
	Level of Service	**E**	**E**	**F**	**F**	**E**	**F**	**F**
		F				**F**		
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Not Applicable	Not Applicable	Not Applicable	Not Applicable	> 50 m		
	Dedicated Right Turning Speed	Not Applicable	Not Applicable	Not Applicable	Not Applicable	≤ 25 km/h		
	Cyclist Through Movement	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**F**	**Not Applicable**	**Not Applicable**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**Separated**	**Separated**
	Left Turn Approach							
	Operating Speed							
	Left Turning Cyclist	-	-	-	-	-	-	-
	Level of Service	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		-				**-**		
Transit	Average Signal Delay	> 40 sec	> 40 sec	≤ 30 sec	≤ 30 sec	0 sec	≤ 20 sec	≤ 20 sec
	Level of Service	**F**	**F**	**D**	**D**	**A**	**C**	**C**
		F				**C**		
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	> 15 m	> 15 m	10 - 15 m	10 - 15 m	
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	
	Level of Service	**B**	**B**	**A**	**A**	**B**	**B**	**-**
		B				**B**		
Auto	Volume to Capacity Ratio	> 1.00				0.81 - 0.90		
	Level of Service	**F**				**D**		

Appendix D TRANSPORTATION DEMAND MANAGEMENT

DRAFT

TDM-Supportive Development Design and Infrastructure Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☑
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☑
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☐
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☐
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	☐
	2.4	**Bicycle repair station**	
BETTER	2.4.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐

	TDM-supportive design & infrastructure measures: *Non-residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☑
	4.2	**Carpool parking**	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	☐
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	☐

TDM Measures Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		1. TDM PROGRAM MANAGEMENT	
		1.1 Program coordinator	
BASIC	★	1.1.1 Designate an internal coordinator, or contract with an external coordinator	☐
		1.2 Travel surveys	
BETTER		1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
		2. WALKING AND CYCLING	
		2.1 Information on walking/cycling routes & destinations	
BASIC		2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances	☐
		2.2 Bicycle skills training	
		Commuter travel	
BETTER	★	2.2.1 Offer on-site cycling courses for commuters, or subsidize off-site courses	☐
		2.3 Valet bike parking	
		Visitor travel	
BETTER		2.3.1 Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances	☐
BASIC		3.1.2	Provide online links to OC Transpo and STO information	☐
BETTER		3.1.3	Provide real-time arrival information display at entrances	☐
		3.2	**Transit fare incentives**	
			Commuter travel	
BETTER		3.2.1	Offer preloaded PRESTO cards to encourage commuters to use transit	☐
BETTER	★	3.2.2	Subsidize or reimburse monthly transit pass purchases by employees	☐
			Visitor travel	
BETTER		3.2.3	Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	☐
		3.3	**Enhanced public transit service**	
			Commuter travel	
BETTER		3.3.1	Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.3.2	Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	☐
		3.4	**Private transit service**	
			Commuter travel	
BETTER		3.4.1	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.4.2	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	☐

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		4. RIDESHARING	
		4.1 Ridematching service	
		Commuter travel	
BASIC	★ 4.1.1	Provide a dedicated ridematching portal at OttawaRideMatch.com	☐
		4.2 Carpool parking price incentives	
		Commuter travel	
BETTER	4.2.1	Provide discounts on parking costs for registered carpools	☐
		4.3 Vanpool service	
		Commuter travel	
BETTER	4.3.1	Provide a vanpooling service for long-distance commuters	☐
		5. CARSHARING & BIKESHARING	
		5.1 Bikeshare stations & memberships	
BETTER	5.1.1	Contract with provider to install on-site bikeshare station for use by commuters and visitors	☐
		Commuter travel	
BETTER	5.1.2	Provide employees with bikeshare memberships for local business travel	☐
		5.2 Carshare vehicles & memberships	
		Commuter travel	
BETTER	5.2.1	Contract with provider to install on-site carshare vehicles and promote their use by tenants	☐
BETTER	5.2.2	Provide employees with carshare memberships for local business travel	☐
		6. PARKING	
		6.1 Priced parking	
		Commuter travel	
BASIC	★ 6.1.1	Charge for long-term parking (daily, weekly, monthly)	☐
BASIC	6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	☐
		Visitor travel	
BETTER	6.1.3	Charge for short-term parking (hourly)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		7.	**TDM MARKETING & COMMUNICATIONS**	
		7.1	**Multimodal travel information**	
			Commuter travel	
BASIC	★	7.1.1	Provide a multimodal travel option information package to new/relocating employees and students	☐
			Visitor travel	
BETTER	★	7.1.2	Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	☐
		7.2	**Personalized trip planning**	
			Commuter travel	
BETTER	★	7.2.1	Offer personalized trip planning to new/relocating employees	☐
		7.3	**Promotions**	
			Commuter travel	
BETTER		7.3.1	Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	☐
		8.	**OTHER INCENTIVES & AMENITIES**	
		8.1	**Emergency ride home**	
			Commuter travel	
BETTER	★	8.1.1	Provide emergency ride home service to non-driving commuters	☐
		8.2	**Alternative work arrangements**	
			Commuter travel	
BASIC	★	8.2.1	Encourage flexible work hours	☐
BETTER		8.2.2	Encourage compressed workweeks	☐
BETTER	★	8.2.3	Encourage telework	☐
		8.3	**Local business travel options**	
			Commuter travel	
BASIC	★	8.3.1	Provide local business travel options that minimize the need for employees to bring a personal car to work	☐
		8.4	**Commuter incentives**	
			Commuter travel	
BETTER		8.4.1	Offer employees a taxable, mode-neutral commuting allowance	☐
		8.5	**On-site amenities**	
			Commuter travel	
BETTER		8.5.1	Provide on-site amenities/services to minimize mid-day or mid-commute errands	☐

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☑
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☑
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☐
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑ complies with ZBL; bicycle storage lockers at grade
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑ bicycle parking provided at grade in locker room
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☑
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☐
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☐
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☐
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

Appendix E INTERSECTION PERFORMANCE WORKSHEETS

DRAFT

Appendix E Intersection Performance Worksheets
January 17, 2020

2019 Existing Conditions

DRAFT

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

12/20/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	173	1069	128	54	487	377	83	744	99	17	291	459
Future Volume (veh/h)	173	1069	128	54	487	377	83	744	99	17	291	459
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1800	1772	1758	1772	1730	1786	1730	1786	1786		1786	1786
Adj Flow Rate, veh/h	192	1188	0	60	541	0	92	827	101		323	510
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90
Percent Heavy Veh, %	0	2	3	2	5	1	5	1	1		1	1
Cap, veh/h	164	1160		77	967		143	837	102		377	1085
Arrive On Green	0.10	0.34	0.00	0.05	0.29	0.00	0.04	0.28	0.28		0.11	0.35
Sat Flow, veh/h	1714	3367	1490	1688	3287	1514	3196	3033	370		3300	3142
Grp Volume(v), veh/h	192	1188	0	60	541	0	92	463	465		323	275
Grp Sat Flow(s),veh/h/ln	1714	1683	1490	1688	1643	1514	1598	1697	1706		1650	1697
Q Serve(g_s), s	11.5	41.4	0.0	4.2	16.7	0.0	3.4	32.6	32.6		11.5	15.2
Cycle Q Clear(g_c), s	11.5	41.4	0.0	4.2	16.7	0.0	3.4	32.6	32.6		11.5	15.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22		1.00	
Lane Grp Cap(c), veh/h	164	1160		77	967		143	468	471		377	586
V/C Ratio(X)	1.17	1.02		0.78	0.56		0.64	0.99	0.99		0.86	0.47
Avail Cap(c_a), veh/h	164	1160		162	967		384	468	471		396	586
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	54.2	39.3	0.0	56.7	35.8	0.0	56.4	43.3	43.3		52.2	30.7
Incr Delay (d2), s/veh	122.8	32.7	0.0	15.9	2.3	0.0	4.8	38.5	38.4		16.3	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	17.2	31.7	0.0	4.0	11.9	0.0	2.8	26.6	26.7		9.9	11.2
Unsig. Movement Delay, s/veh			5.10			22.60						
LnGrp Delay(d),s/veh	177.1	72.0	5.1	72.6	38.1	22.6	61.1	81.8	81.7		68.4	31.3
LnGrp LOS	F	F	A	E	D	C	E	F	F		E	C
Approach Vol, veh/h		1522	A		1020	A		1020				879
Approach Delay, s/veh		79.0			33.8			79.9				44.9
Approach LOS		E			C			E				D

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	47.8	20.3	40.0	18.0	41.7	12.0	48.3
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	34.6	14.4	* 33	11.5	34.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	6.2	43.4	13.5	34.6	13.5	18.7	5.4	17.3
Green Ext Time (p_c), s	0.1	0.0	0.2	0.0	0.0	6.8	0.2	7.0

Intersection Summary	
HCM 6th Ctrl Delay	62.1
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [EBR, WBR] is included in calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

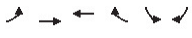
12/20/2019

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	49
Future Volume (veh/h)	49
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.98
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	46
Peak Hour Factor	0.90
Percent Heavy Veh, %	1
Cap, veh/h	98
Arrive On Green	0.35
Sat Flow, veh/h	282
Grp Volume(v), veh/h	281
Grp Sat Flow(s),veh/h/ln	1728
Q Serve(g_s), s	15.3
Cycle Q Clear(g_c), s	15.3
Prop In Lane	0.16
Lane Grp Cap(c), veh/h	597
V/C Ratio(X)	0.47
Avail Cap(c_a), veh/h	597
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	30.7
Incr Delay (d2), s/veh	0.6
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	11.4
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	31.3
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

12/20/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	1369	894	61	39	44
Future Volume (veh/h)	56	1369	894	61	39	44
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.99	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	62	1521	993	64	43	9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	458	2799	2391	154	116	103
Arrive On Green	0.04	0.83	0.74	0.74	0.07	0.07
Sat Flow, veh/h	1688	3455	3298	207	1688	1502
Grp Volume(v), veh/h	62	1521	521	536	43	9
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1733	1688	1502
Q Serve(g_s), s	0.9	16.7	13.7	13.7	2.9	0.7
Cycle Q Clear(g_c), s	0.9	16.7	13.7	13.7	2.9	0.7
Prop In Lane	1.00			0.12	1.00	1.00
Lane Grp Cap(c), veh/h	458	2799	1254	1291	116	103
V/C Ratio(X)	0.14	0.54	0.42	0.42	0.37	0.09
Avail Cap(c_a), veh/h	523	2799	1254	1291	450	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	3.7	3.1	5.6	5.6	53.4	52.4
Incr Delay (d2), s/veh	0.1	0.8	1.0	1.0	2.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	10.0	9.5	9.7	2.5	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	3.8	3.9	6.7	6.6	55.4	52.7
LnGrp LOS	A	A	A	A	E	D
Approach Vol, veh/h		1583	1057		52	
Approach Delay, s/veh		3.9	6.6		54.9	
Approach LOS		A	A		D	

Timer - Assigned Phs	2		4	5	6
Phs Duration (G+Y+Rc), s	105.6		14.4	10.4	95.2
Change Period (Y+Rc), s	* 5.8		* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 76		* 32	9.0	* 61
Max Q Clear Time (g_c+I1), s	18.7		4.9	2.9	15.7
Green Ext Time (p_c), s	44.6		0.2	0.1	25.0

Intersection Summary	
HCM 6th Ctrl Delay	5.9
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

12/20/2019

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	43	1236	75	0	782
Future Vol, veh/h	0	43	1236	75	0	782
Conflicting Peds, #/hr	0	9	0	9	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	1	1	2	1
Mvmt Flow	0	48	1373	83	0	869

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	696	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	384	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	381	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.8	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	381	-
HCM Lane V/C Ratio	-	0.125	-
HCM Control Delay (s)	-	15.8	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.4	-

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

12/20/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	156	869	220	118	1146	529	295	768	80	29	341	614
Future Volume (veh/h)	156	869	220	118	1146	529	295	768	80	29	341	614
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.95		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1772	1772	1786	1786	1772	1786	1786	1786	1786		1786	1800
Adj Flow Rate, veh/h	173	966	0	131	1273	0	328	853	82		379	682
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90
Percent Heavy Veh, %	2	2	1	1	2	1	1	1	1		1	0
Cap, veh/h	149	1155		150	1155		366	792	76		366	779
Arrive On Green	0.09	0.34	0.00	0.09	0.34	0.00	0.11	0.25	0.25		0.11	0.25
Sat Flow, veh/h	1688	3367	1514	1701	3367	1514	3300	3111	299		3300	3058
Grp Volume(v), veh/h	173	966	0	131	1273	0	328	465	470		379	381
Grp Sat Flow(s),veh/h/ln	1688	1683	1514	1701	1683	1514	1650	1697	1714		1650	1710
Q Serve(g_s), s	11.5	34.4	0.0	9.9	44.6	0.0	12.8	33.1	33.1		14.4	27.8
Cycle Q Clear(g_c), s	11.5	34.4	0.0	9.9	44.6	0.0	12.8	33.1	33.1		14.4	27.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.17		1.00	
Lane Grp Cap(c), veh/h	149	1155		150	1155		366	432	436		366	435
V/C Ratio(X)	1.16	0.84		0.87	1.10		0.90	1.08	1.08		1.04	0.87
Avail Cap(c_a), veh/h	149	1155		150	1155		366	432	436		366	435
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	59.2	39.3	0.0	58.5	42.7	0.0	57.1	48.5	48.5		57.8	46.5
Incr Delay (d2), s/veh	122.7	7.3	0.0	38.6	59.1	0.0	23.8	65.4	65.2		57.0	17.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	16.3	22.8	0.0	10.1	40.3	0.0	11.0	31.7	32.0		14.4	21.1
Unsig. Movement Delay, s/veh			15.40			50.60						
LnGrp Delay(d),s/veh	182.0	46.6	15.4	97.1	101.8	50.6	80.9	113.9	113.7		114.8	64.2
LnGrp LOS	F	D	B	F	F	D	F	F	F		F	E
Approach Vol, veh/h		1383	A		1992	A		1263				1141
Approach Delay, s/veh		58.0			86.3			105.2				81.1
Approach LOS		E			F			F				F

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	51.0	21.0	40.0	18.0	51.0	21.0	40.0
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	44.6	14.4	* 33	11.5	44.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	11.9	36.4	16.4	35.1	13.5	46.6	14.8	29.9
Green Ext Time (p_c), s	0.0	6.4	0.0	0.0	0.0	0.0	0.0	2.4

Intersection Summary	
HCM 6th Ctrl Delay	82.7
HCM 6th LOS	F

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [EBR, WBR] is included in calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

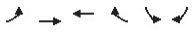
12/20/2019

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	79
Future Volume (veh/h)	79
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.94
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1800
Adj Flow Rate, veh/h	80
Peak Hour Factor	0.90
Percent Heavy Veh, %	0
Cap, veh/h	91
Arrive On Green	0.25
Sat Flow, veh/h	358
Grp Volume(v), veh/h	381
Grp Sat Flow(s),veh/h/ln	1706
Q Serve(g_s), s	27.9
Cycle Q Clear(g_c), s	27.9
Prop In Lane	0.21
Lane Grp Cap(c), veh/h	434
V/C Ratio(X)	0.88
Avail Cap(c_a), veh/h	434
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	46.5
Incr Delay (d2), s/veh	18.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	21.1
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	64.5
LnGrp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs	

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

12/20/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	107	1292	1651	156	167	165
Future Volume (veh/h)	107	1292	1651	156	167	165
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	119	1436	1834	167	186	84
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	169	2609	2155	193	224	199
Arrive On Green	0.04	0.78	0.69	0.69	0.13	0.13
Sat Flow, veh/h	1688	3455	3208	279	1688	1502
Grp Volume(v), veh/h	119	1436	975	1026	186	84
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1715	1688	1502
Q Serve(g_s), s	2.5	21.8	55.3	59.8	14.0	6.7
Cycle Q Clear(g_c), s	2.5	21.8	55.3	59.8	14.0	6.7
Prop In Lane	1.00			0.16	1.00	1.00
Lane Grp Cap(c), veh/h	169	2609	1163	1185	224	199
V/C Ratio(X)	0.70	0.55	0.84	0.87	0.83	0.42
Avail Cap(c_a), veh/h	209	2609	1163	1185	415	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.7	5.7	14.7	15.5	55.0	51.8
Incr Delay (d2), s/veh	7.8	0.8	7.3	8.6	7.8	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.8	13.3	32.7	35.9	11.1	9.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	38.5	6.6	22.0	24.0	62.7	53.2
LnGrp LOS	D	A	C	C	E	D
Approach Vol, veh/h		1555	2001		270	
Approach Delay, s/veh		9.0	23.1		59.8	
Approach LOS		A	C		E	

Timer - Assigned Phs	2	4	5	6
Phs Duration (G+Y+Rc), s	106.6	23.4	10.9	95.6
Change Period (Y+Rc), s	* 5.8	* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 86	* 32	8.0	* 72
Max Q Clear Time (g_c+I1), s	23.8	16.0	4.5	61.8
Green Ext Time (p_c), s	44.9	1.3	0.1	10.2

Intersection Summary	
HCM 6th Ctrl Delay	19.9
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

12/20/2019

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	151	1331	150	0	1004
Future Vol, veh/h	0	151	1331	150	0	1004
Conflicting Peds, #/hr	0	31	0	31	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	0	168	1479	167	0	1116

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	771	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	343	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	333	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.3	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	333	-
HCM Lane V/C Ratio	-	0.504	-
HCM Control Delay (s)	-	26.3	-
HCM Lane LOS	-	D	-
HCM 95th %tile Q(veh)	-	2.7	-

2022 Future Background Conditions – Original Signal Timing Plans

DRAFT

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

12/20/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	184	1166	136	60	546	420	91	795	108	18	317	487
Future Volume (veh/h)	184	1166	136	60	546	420	91	795	108	18	317	487
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1800	1772	1758	1772	1730	1786	1730	1786	1786		1786	1786
Adj Flow Rate, veh/h	184	1166	0	60	546	0	91	795	100		317	487
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
Percent Heavy Veh, %	0	2	3	2	5	1	5	1	1		1	1
Cap, veh/h	164	1166		77	972		142	833	105		372	1079
Arrive On Green	0.10	0.35	0.00	0.05	0.30	0.00	0.04	0.28	0.28		0.11	0.34
Sat Flow, veh/h	1714	3367	1490	1688	3287	1514	3196	3021	380		3300	3135
Grp Volume(v), veh/h	184	1166	0	60	546	0	91	446	449		317	263
Grp Sat Flow(s),veh/h/ln	1714	1683	1490	1688	1643	1514	1598	1697	1704		1650	1697
Q Serve(g_s), s	11.5	41.5	0.0	4.2	16.8	0.0	3.4	31.0	31.0		11.3	14.4
Cycle Q Clear(g_c), s	11.5	41.5	0.0	4.2	16.8	0.0	3.4	31.0	31.0		11.3	14.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22		1.00	
Lane Grp Cap(c), veh/h	164	1166		77	972		142	468	470		372	584
V/C Ratio(X)	1.12	1.00		0.78	0.56		0.64	0.95	0.95		0.85	0.45
Avail Cap(c_a), veh/h	164	1166		162	972		384	468	470		396	584
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	54.2	39.2	0.0	56.7	35.7	0.0	56.4	42.7	42.7		52.3	30.5
Incr Delay (d2), s/veh	106.1	26.4	0.0	15.9	2.3	0.0	4.8	30.2	30.2		15.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	15.9	30.1	0.0	4.0	12.0	0.0	2.7	24.5	24.6		9.7	10.7
Unsig. Movement Delay, s/veh			4.60			22.00						
LnGrp Delay(d),s/veh	160.3	65.7	4.6	72.6	38.0	22.0	61.2	72.9	72.9		67.8	31.1
LnGrp LOS	F	F	A	E	D	C	E	E	E		E	C
Approach Vol, veh/h		1486	A		1026	A		986				849
Approach Delay, s/veh		71.8			33.5			71.8				44.8
Approach LOS		E			C			E				D

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	47.9	20.1	40.0	18.0	41.9	11.9	48.2
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	34.6	14.4	* 33	11.5	34.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	6.2	43.5	13.3	33.0	13.5	18.8	5.4	16.5
Green Ext Time (p_c), s	0.1	0.0	0.2	0.0	0.0	6.9	0.2	6.9

Intersection Summary	
HCM 6th Ctrl Delay	57.5
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [EBR, WBR] is included in calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

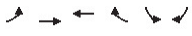
12/20/2019

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	52
Future Volume (veh/h)	52
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.98
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	45
Peak Hour Factor	1.00
Percent Heavy Veh, %	1
Cap, veh/h	99
Arrive On Green	0.34
Sat Flow, veh/h	289
Grp Volume(v), veh/h	269
Grp Sat Flow(s),veh/h/ln	1726
Q Serve(g_s), s	14.5
Cycle Q Clear(g_c), s	14.5
Prop In Lane	0.17
Lane Grp Cap(c), veh/h	594
V/C Ratio(X)	0.45
Avail Cap(c_a), veh/h	594
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	30.6
Incr Delay (d2), s/veh	0.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	10.9
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	31.1
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

12/20/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	1503	997	61	39	44
Future Volume (veh/h)	56	1503	997	61	39	44
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.99	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	56	1503	997	57	39	8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	460	2808	2423	139	111	99
Arrive On Green	0.04	0.83	0.75	0.75	0.07	0.07
Sat Flow, veh/h	1688	3455	3324	185	1688	1502
Grp Volume(v), veh/h	56	1503	519	535	39	8
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1737	1688	1502
Q Serve(g_s), s	0.8	16.1	13.4	13.4	2.7	0.6
Cycle Q Clear(g_c), s	0.8	16.1	13.4	13.4	2.7	0.6
Prop In Lane	1.00			0.11	1.00	1.00
Lane Grp Cap(c), veh/h	460	2808	1261	1301	111	99
V/C Ratio(X)	0.12	0.54	0.41	0.41	0.35	0.08
Avail Cap(c_a), veh/h	527	2808	1261	1301	450	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	3.6	3.0	5.5	5.5	53.6	52.6
Incr Delay (d2), s/veh	0.1	0.7	1.0	1.0	1.9	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	9.6	9.3	9.5	2.3	0.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	3.7	3.7	6.5	6.4	55.5	53.0
LnGrp LOS	A	A	A	A	E	D
Approach Vol, veh/h		1559	1054		47	
Approach Delay, s/veh		3.7	6.4		55.0	
Approach LOS		A	A		E	

Timer - Assigned Phs	2	4	5	6
Phs Duration (G+Y+Rc), s	105.9	14.1	10.2	95.7
Change Period (Y+Rc), s	* 5.8	* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 76	* 32	9.0	* 61
Max Q Clear Time (g_c+I1), s	18.1	4.7	2.8	15.4
Green Ext Time (p_c), s	44.5	0.2	0.1	25.0

Intersection Summary	
HCM 6th Ctrl Delay	5.7
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

12/20/2019

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	43	1342	75	0	838
Future Vol, veh/h	0	43	1342	75	0	838
Conflicting Peds, #/hr	0	9	0	9	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	2	1
Mvmt Flow	0	43	1342	75	0	838

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	680	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	393	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	390	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	390	-
HCM Lane V/C Ratio	-	0.11	-
HCM Control Delay (s)	-	15.4	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.4	-

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

12/20/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	165	956	233	129	1260	578	326	840	88	31	375	651
Future Volume (veh/h)	165	956	233	129	1260	578	326	840	88	31	375	651
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.95		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1772	1772	1786	1786	1772	1786	1786	1786	1786		1786	1800
Adj Flow Rate, veh/h	165	956	0	129	1260	0	326	840	82		375	651
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
Percent Heavy Veh, %	2	2	1	1	2	1	1	1	1		1	0
Cap, veh/h	149	1155		150	1155		366	791	77		366	778
Arrive On Green	0.09	0.34	0.00	0.09	0.34	0.00	0.11	0.25	0.25		0.11	0.25
Sat Flow, veh/h	1688	3367	1514	1701	3367	1514	3300	3106	303		3300	3055
Grp Volume(v), veh/h	165	956	0	129	1260	0	326	459	463		375	364
Grp Sat Flow(s),veh/h/ln	1688	1683	1514	1701	1683	1514	1650	1697	1713		1650	1710
Q Serve(g_s), s	11.5	33.9	0.0	9.7	44.6	0.0	12.7	33.1	33.1		14.4	26.2
Cycle Q Clear(g_c), s	11.5	33.9	0.0	9.7	44.6	0.0	12.7	33.1	33.1		14.4	26.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18		1.00	
Lane Grp Cap(c), veh/h	149	1155		150	1155		366	432	436		366	435
V/C Ratio(X)	1.11	0.83		0.86	1.09		0.89	1.06	1.06		1.03	0.84
Avail Cap(c_a), veh/h	149	1155		150	1155		366	432	436		366	435
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	59.2	39.2	0.0	58.4	42.7	0.0	57.0	48.5	48.5		57.8	45.9
Incr Delay (d2), s/veh	104.7	6.9	0.0	35.8	54.8	0.0	22.9	60.7	60.6		53.9	13.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	15.1	22.4	0.0	9.8	39.2	0.0	10.9	30.8	31.0		14.2	19.5
Unsig. Movement Delay, s/veh			14.50			46.70						
LnGrp Delay(d),s/veh	163.9	46.1	14.5	94.3	97.5	46.7	80.0	109.2	109.0		111.7	59.1
LnGrp LOS	F	D	B	F	F	D	E	F	F		F	E
Approach Vol, veh/h		1354	A		1967	A		1248				1103
Approach Delay, s/veh		55.0			82.4			101.5				77.1
Approach LOS		D			F			F				E

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	51.0	21.0	40.0	18.0	51.0	21.0	40.0
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	44.6	14.4	* 33	11.5	44.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	11.7	35.9	16.4	35.1	13.5	46.6	14.7	28.3
Green Ext Time (p_c), s	0.0	6.7	0.0	0.0	0.0	0.0	0.0	3.3

Intersection Summary	
HCM 6th Ctrl Delay	79.0
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [EBR, WBR] is included in calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

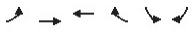
12/20/2019

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	84
Future Volume (veh/h)	84
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.94
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1800
Adj Flow Rate, veh/h	77
Peak Hour Factor	1.00
Percent Heavy Veh, %	0
Cap, veh/h	92
Arrive On Green	0.25
Sat Flow, veh/h	361
Grp Volume(v), veh/h	364
Grp Sat Flow(s),veh/h/ln	1706
Q Serve(g_s), s	26.3
Cycle Q Clear(g_c), s	26.3
Prop In Lane	0.21
Lane Grp Cap(c), veh/h	434
V/C Ratio(X)	0.84
Avail Cap(c_a), veh/h	434
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	45.9
Incr Delay (d2), s/veh	13.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	19.6
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	59.5
LnGrp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

12/20/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	107	1449	1815	156	167	165
Future Volume (veh/h)	107	1449	1815	156	167	165
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	107	1449	1815	151	167	76
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	182	2649	2211	181	204	182
Arrive On Green	0.04	0.79	0.70	0.70	0.12	0.12
Sat Flow, veh/h	1688	3455	3234	258	1688	1502
Grp Volume(v), veh/h	107	1449	958	1008	167	76
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1720	1688	1502
Q Serve(g_s), s	2.1	20.9	51.0	54.7	12.6	6.1
Cycle Q Clear(g_c), s	2.1	20.9	51.0	54.7	12.6	6.1
Prop In Lane	1.00			0.15	1.00	1.00
Lane Grp Cap(c), veh/h	182	2649	1183	1209	204	182
V/C Ratio(X)	0.59	0.55	0.81	0.83	0.82	0.42
Avail Cap(c_a), veh/h	222	2649	1183	1209	415	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	5.2	13.3	13.9	55.8	52.9
Incr Delay (d2), s/veh	3.0	0.8	6.0	6.8	7.8	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.0	12.8	30.2	32.8	10.2	9.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	29.9	6.0	19.3	20.7	63.6	54.4
LnGrp LOS	C	A	B	C	E	D
Approach Vol, veh/h		1556	1966		243	
Approach Delay, s/veh		7.6	20.0		60.7	
Approach LOS		A	C		E	

Timer - Assigned Phs	2	4	5	6
Phs Duration (G+Y+Rc), s	108.1	21.9	10.9	97.2
Change Period (Y+Rc), s	* 5.8	* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 86	* 32	8.0	* 72
Max Q Clear Time (g_c+I1), s	22.9	14.6	4.1	56.7
Green Ext Time (p_c), s	45.7	1.2	0.1	15.2

Intersection Summary	
HCM 6th Ctrl Delay	17.5
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

12/20/2019

Intersection	
Int Delay, s/veh	1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	151	1464	150	0	1078
Future Vol, veh/h	0	151	1464	150	0	1078
Conflicting Peds, #/hr	0	31	0	31	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	0	151	1464	150	0	1078

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	763	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	347	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	337	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	337	-
HCM Lane V/C Ratio	-	0.448	-
HCM Control Delay (s)	-	24.1	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	2.2	-

2022 Future Background Conditions – Optimized Signal Timing Plans

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HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road 12/20/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	184	1166	136	60	546	420	91	795	108	18	317	487
Future Volume (veh/h)	184	1166	136	60	546	420	91	795	108	18	317	487
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1800	1772	1758	1772	1730	1786	1730	1786	1786		1786	1786
Adj Flow Rate, veh/h	184	1166	0	60	546	0	91	795	100		317	487
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
Percent Heavy Veh, %	0	2	3	2	5	1	5	1	1		1	1
Cap, veh/h	212	1166		77	881		142	833	105		372	1079
Arrive On Green	0.12	0.35	0.00	0.05	0.27	0.00	0.04	0.28	0.28		0.11	0.34
Sat Flow, veh/h	1714	3367	1490	1688	3287	1514	3196	3021	380		3300	3135
Grp Volume(v), veh/h	184	1166	0	60	546	0	91	446	449		317	263
Grp Sat Flow(s),veh/h/ln	1714	1683	1490	1688	1643	1514	1598	1697	1704		1650	1697
Q Serve(g_s), s	12.6	41.5	0.0	4.2	17.5	0.0	3.4	31.0	31.0		11.3	14.4
Cycle Q Clear(g_c), s	12.6	41.5	0.0	4.2	17.5	0.0	3.4	31.0	31.0		11.3	14.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22		1.00	
Lane Grp Cap(c), veh/h	212	1166		77	881		142	468	470		372	584
V/C Ratio(X)	0.87	1.00		0.78	0.62		0.64	0.95	0.95		0.85	0.45
Avail Cap(c_a), veh/h	250	1166		162	881		384	468	470		396	584
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	51.6	39.2	0.0	56.7	38.6	0.0	56.4	42.7	42.7		52.3	30.5
Incr Delay (d2), s/veh	23.5	26.4	0.0	15.9	3.3	0.0	4.8	30.2	30.2		15.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	11.4	30.1	0.0	4.0	12.5	0.0	2.7	24.5	24.6		9.7	10.7
Unsig. Movement Delay, s/veh			4.60			23.00						
LnGrp Delay(d),s/veh	75.2	65.7	4.6	72.6	41.8	23.0	61.2	72.9	72.9		67.8	31.1
LnGrp LOS	E	F	A	E	D	C	E	E	E		E	C
Approach Vol, veh/h		1486	A		1026	A		986				849
Approach Delay, s/veh		61.3			35.9			71.8				44.8
Approach LOS		E			D			E				D

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	47.9	20.1	40.0	21.3	38.6	11.9	48.2
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	34.6	14.4	* 33	17.5	28.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	6.2	43.5	13.3	33.0	14.6	19.5	5.4	16.5
Green Ext Time (p_c), s	0.1	0.0	0.2	0.0	0.2	4.6	0.2	6.9

Intersection Summary	
HCM 6th Ctrl Delay	54.5
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [EBR, WBR] is included in calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road 12/20/2019

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	52
Future Volume (veh/h)	52
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.98
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	45
Peak Hour Factor	1.00
Percent Heavy Veh, %	1
Cap, veh/h	99
Arrive On Green	0.34
Sat Flow, veh/h	289
Grp Volume(v), veh/h	269
Grp Sat Flow(s),veh/h/ln	1726
Q Serve(g_s), s	14.5
Cycle Q Clear(g_c), s	14.5
Prop In Lane	0.17
Lane Grp Cap(c), veh/h	594
V/C Ratio(X)	0.45
Avail Cap(c_a), veh/h	594
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	30.6
Incr Delay (d2), s/veh	0.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	10.9
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	31.1
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs	

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1 12/20/2019

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	1503	997	61	39	44
Future Volume (veh/h)	56	1503	997	61	39	44
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.99	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	56	1503	997	57	39	8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	460	2808	2423	139	111	99
Arrive On Green	0.04	0.83	0.75	0.75	0.07	0.07
Sat Flow, veh/h	1688	3455	3324	185	1688	1502
Grp Volume(v), veh/h	56	1503	519	535	39	8
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1737	1688	1502
Q Serve(g_s), s	0.8	16.1	13.4	13.4	2.7	0.6
Cycle Q Clear(g_c), s	0.8	16.1	13.4	13.4	2.7	0.6
Prop In Lane	1.00			0.11	1.00	1.00
Lane Grp Cap(c), veh/h	460	2808	1261	1301	111	99
V/C Ratio(X)	0.12	0.54	0.41	0.41	0.35	0.08
Avail Cap(c_a), veh/h	527	2808	1261	1301	450	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	3.6	3.0	5.5	5.5	53.6	52.6
Incr Delay (d2), s/veh	0.1	0.7	1.0	1.0	1.9	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	9.6	9.3	9.5	2.3	0.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	3.7	3.7	6.5	6.4	55.5	53.0
LnGrp LOS	A	A	A	A	E	D
Approach Vol, veh/h		1559	1054		47	
Approach Delay, s/veh		3.7	6.4		55.0	
Approach LOS		A	A		E	

Timer - Assigned Phs	2		4	5	6
Phs Duration (G+Y+Rc), s	105.9		14.1	10.2	95.7
Change Period (Y+Rc), s	* 5.8		* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 76		* 32	9.0	* 61
Max Q Clear Time (g_c+I1), s	18.1		4.7	2.8	15.4
Green Ext Time (p_c), s	44.5		0.2	0.1	25.0

Intersection Summary	
HCM 6th Ctrl Delay	5.7
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3 12/20/2019

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	43	1342	75	0	838
Future Vol, veh/h	0	43	1342	75	0	838
Conflicting Peds, #/hr	0	9	0	9	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	2	1
Mvmt Flow	0	43	1342	75	0	838

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	680	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	393	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	390	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	390	-
HCM Lane V/C Ratio	-	0.11	-
HCM Control Delay (s)	-	15.4	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.4	-

2022 Total Future Conditions

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HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

12/20/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	184	1168	136	80	549	423	91	795	116	19	329	487
Future Volume (veh/h)	184	1168	136	80	549	423	91	795	116	19	329	487
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1800	1772	1758	1772	1730	1786	1730	1786	1786		1786	1786
Adj Flow Rate, veh/h	184	1168	0	80	549	0	91	795	108		329	487
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
Percent Heavy Veh, %	0	2	3	2	5	1	5	1	1		1	1
Cap, veh/h	212	1107		101	871		142	825	112		382	1088
Arrive On Green	0.12	0.33	0.00	0.06	0.26	0.00	0.04	0.28	0.28		0.12	0.35
Sat Flow, veh/h	1714	3367	1490	1688	3287	1514	3196	2989	406		3300	3135
Grp Volume(v), veh/h	184	1168	0	80	549	0	91	451	452		329	263
Grp Sat Flow(s),veh/h/ln	1714	1683	1490	1688	1643	1514	1598	1697	1699		1650	1697
Q Serve(g_s), s	12.6	39.5	0.0	5.6	17.7	0.0	3.4	31.5	31.5		11.8	14.4
Cycle Q Clear(g_c), s	12.6	39.5	0.0	5.6	17.7	0.0	3.4	31.5	31.5		11.8	14.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.24		1.00	
Lane Grp Cap(c), veh/h	212	1107		101	871		142	468	469		382	589
V/C Ratio(X)	0.87	1.06		0.79	0.63		0.64	0.96	0.96		0.86	0.45
Avail Cap(c_a), veh/h	250	1107		162	871		384	468	469		396	589
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	51.6	40.3	0.0	55.7	38.9	0.0	56.4	42.9	42.9		52.1	30.3
Incr Delay (d2), s/veh	23.5	42.9	0.0	13.1	3.5	0.0	4.8	32.4	32.4		17.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	11.4	32.9	0.0	5.2	12.6	0.0	2.7	25.1	25.1		10.1	10.7
Unsig. Movement Delay, s/veh			4.60			23.70						
LnGrp Delay(d),s/veh	75.2	83.1	4.6	68.8	42.4	23.7	61.2	75.3	75.3		69.1	30.8
LnGrp LOS	E	F	A	E	D	C	E	E	E		E	C
Approach Vol, veh/h		1488	A		1052	A		994				861
Approach Delay, s/veh		75.0			36.9			74.0				45.4
Approach LOS		E			D			E				D

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.7	45.9	20.5	40.0	21.3	38.2	11.9	48.6
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	34.6	14.4	* 33	17.5	28.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	7.6	41.5	13.8	33.5	14.6	19.7	5.4	16.5
Green Ext Time (p_c), s	0.1	0.0	0.1	0.0	0.2	4.5	0.2	6.9

Intersection Summary	
HCM 6th Ctrl Delay	59.8
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [EBR, WBR] is included in calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

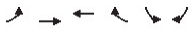
12/20/2019

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	52
Future Volume (veh/h)	52
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.98
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	45
Peak Hour Factor	1.00
Percent Heavy Veh, %	1
Cap, veh/h	100
Arrive On Green	0.35
Sat Flow, veh/h	289
Grp Volume(v), veh/h	269
Grp Sat Flow(s),veh/h/ln	1727
Q Serve(g_s), s	14.5
Cycle Q Clear(g_c), s	14.5
Prop In Lane	0.17
Lane Grp Cap(c), veh/h	599
V/C Ratio(X)	0.45
Avail Cap(c_a), veh/h	599
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	30.3
Incr Delay (d2), s/veh	0.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	10.9
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	30.8
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

12/20/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	78	1503	997	65	48	70
Future Volume (veh/h)	78	1503	997	65	48	70
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.99	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	78	1503	997	61	48	34
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	452	2768	2363	145	131	117
Arrive On Green	0.04	0.82	0.73	0.73	0.08	0.08
Sat Flow, veh/h	1688	3455	3310	197	1688	1502
Grp Volume(v), veh/h	78	1503	521	537	48	34
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1735	1688	1502
Q Serve(g_s), s	1.2	17.2	14.3	14.3	3.2	2.6
Cycle Q Clear(g_c), s	1.2	17.2	14.3	14.3	3.2	2.6
Prop In Lane	1.00			0.11	1.00	1.00
Lane Grp Cap(c), veh/h	452	2768	1235	1273	131	117
V/C Ratio(X)	0.17	0.54	0.42	0.42	0.37	0.29
Avail Cap(c_a), veh/h	514	2768	1235	1273	450	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	4.1	3.4	6.2	6.2	52.5	52.2
Incr Delay (d2), s/veh	0.2	0.8	1.1	1.0	1.7	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.8	10.3	9.9	10.1	2.7	4.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	4.3	4.2	7.2	7.2	54.2	53.6
LnGrp LOS	A	A	A	A	D	D
Approach Vol, veh/h		1581	1058		82	
Approach Delay, s/veh		4.2	7.2		53.9	
Approach LOS		A	A		D	

Timer - Assigned Phs	2	4	5	6
Phs Duration (G+Y+Rc), s	104.5	15.5	10.6	93.8
Change Period (Y+Rc), s	* 5.8	* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 76	* 32	9.0	* 61
Max Q Clear Time (g_c+I1), s	19.2	5.2	3.2	16.3
Green Ext Time (p_c), s	43.8	0.4	0.1	24.8

Intersection Summary	
HCM 6th Ctrl Delay	6.9
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

12/20/2019

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	72	1345	76	0	851
Future Vol, veh/h	0	72	1345	76	0	851
Conflicting Peds, #/hr	0	9	0	9	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	2	1
Mvmt Flow	0	72	1345	76	0	851

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	682	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	392	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	389	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	389	-
HCM Lane V/C Ratio	-	0.185	-
HCM Control Delay (s)	-	16.3	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.7	-

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

12/20/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	165	959	233	144	1262	580	326	840	108	34	404	651
Future Volume (veh/h)	165	959	233	144	1262	580	326	840	108	34	404	651
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.95		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1772	1772	1786	1786	1772	1786	1786	1786	1786		1786	1800
Adj Flow Rate, veh/h	165	959	0	144	1262	0	326	840	102		404	651
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
Percent Heavy Veh, %	2	2	1	1	2	1	1	1	1		1	0
Cap, veh/h	149	1155		150	1155		366	771	94		366	778
Arrive On Green	0.09	0.34	0.00	0.09	0.34	0.00	0.11	0.25	0.25		0.11	0.25
Sat Flow, veh/h	1688	3367	1514	1701	3367	1514	3300	3026	367		3300	3055
Grp Volume(v), veh/h	165	959	0	144	1262	0	326	471	471		404	364
Grp Sat Flow(s),veh/h/ln	1688	1683	1514	1701	1683	1514	1650	1697	1697		1650	1710
Q Serve(g_s), s	11.5	34.0	0.0	11.0	44.6	0.0	12.7	33.1	33.1		14.4	26.2
Cycle Q Clear(g_c), s	11.5	34.0	0.0	11.0	44.6	0.0	12.7	33.1	33.1		14.4	26.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22		1.00	
Lane Grp Cap(c), veh/h	149	1155		150	1155		366	432	432		366	435
V/C Ratio(X)	1.11	0.83		0.96	1.09		0.89	1.09	1.09		1.11	0.84
Avail Cap(c_a), veh/h	149	1155		150	1155		366	432	432		366	435
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	59.2	39.2	0.0	59.0	42.7	0.0	57.0	48.5	48.5		57.8	45.9
Incr Delay (d2), s/veh	104.7	7.0	0.0	60.3	55.5	0.0	22.9	69.8	69.8		78.6	13.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	15.1	22.5	0.0	11.9	39.4	0.0	10.9	32.6	32.6		16.3	19.5
Unsig. Movement Delay, s/veh			14.50			48.70						
LnGrp Delay(d),s/veh	163.9	46.2	14.5	119.3	98.2	48.7	80.0	118.3	118.3		136.4	59.1
LnGrp LOS	F	D	B	F	F	D	E	F	F		F	E
Approach Vol, veh/h		1357	A		1986	A		1268				1132
Approach Delay, s/veh		55.1			85.3			108.4				86.8
Approach LOS		E			F			F				F

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	51.0	21.0	40.0	18.0	51.0	21.0	40.0
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	44.6	14.4	* 33	11.5	44.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	13.0	36.0	16.4	35.1	13.5	46.6	14.7	28.3
Green Ext Time (p_c), s	0.0	6.6	0.0	0.0	0.0	0.0	0.0	3.3

Intersection Summary	
HCM 6th Ctrl Delay	83.6
HCM 6th LOS	F

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [EBR, WBR] is included in calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

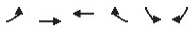
12/20/2019

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	84
Future Volume (veh/h)	84
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.94
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1800
Adj Flow Rate, veh/h	77
Peak Hour Factor	1.00
Percent Heavy Veh, %	0
Cap, veh/h	92
Arrive On Green	0.25
Sat Flow, veh/h	361
Grp Volume(v), veh/h	364
Grp Sat Flow(s),veh/h/ln	1706
Q Serve(g_s), s	26.3
Cycle Q Clear(g_c), s	26.3
Prop In Lane	0.21
Lane Grp Cap(c), veh/h	434
V/C Ratio(X)	0.84
Avail Cap(c_a), veh/h	434
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	45.9
Incr Delay (d2), s/veh	13.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	19.6
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	59.5
LnGrp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs	

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

12/20/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	159	1449	1815	166	174	184
Future Volume (veh/h)	159	1449	1815	166	174	184
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	159	1449	1815	161	174	95
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	184	2632	2163	189	212	189
Arrive On Green	0.04	0.78	0.69	0.69	0.13	0.13
Sat Flow, veh/h	1688	3455	3216	273	1688	1502
Grp Volume(v), veh/h	159	1449	963	1013	174	95
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1717	1688	1502
Q Serve(g_s), s	3.6	21.4	53.5	57.7	13.1	7.7
Cycle Q Clear(g_c), s	3.6	21.4	53.5	57.7	13.1	7.7
Prop In Lane	1.00			0.16	1.00	1.00
Lane Grp Cap(c), veh/h	184	2632	1164	1187	212	189
V/C Ratio(X)	0.86	0.55	0.83	0.85	0.82	0.50
Avail Cap(c_a), veh/h	214	2632	1164	1187	415	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.0	5.4	14.4	15.1	55.4	53.0
Incr Delay (d2), s/veh	26.0	0.8	6.8	7.9	7.6	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.9	13.1	31.7	34.7	10.5	10.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	58.0	6.3	21.2	23.0	63.0	55.1
LnGrp LOS	E	A	C	C	E	E
Approach Vol, veh/h		1608	1976		269	
Approach Delay, s/veh		11.4	22.1		60.2	
Approach LOS		B	C		E	

Timer - Assigned Phs	2		4	5	6
Phs Duration (G+Y+Rc), s	107.4		22.6	11.7	95.7
Change Period (Y+Rc), s	* 5.8		* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 86		* 32	8.0	* 72
Max Q Clear Time (g_c+I1), s	23.4		15.1	5.6	59.7
Green Ext Time (p_c), s	45.5		1.3	0.2	12.2

Intersection Summary	
HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

12/20/2019

Intersection	
Int Delay, s/veh	1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	173	1466	153	0	1110
Future Vol, veh/h	0	173	1466	153	0	1110
Conflicting Peds, #/hr	0	31	0	31	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	0	173	1466	153	0	1110

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	764	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	346	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	336	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	336	-
HCM Lane V/C Ratio	-	0.515	-
HCM Control Delay (s)	-	26.5	-
HCM Lane LOS	-	D	-
HCM 95th %tile Q(veh)	-	2.8	-

2027 Ultimate Conditions – No Transit Signal Priority

DRAFT

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

01/08/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	178	1130	131	69	532	408	88	781	110	18	314	471
Future Volume (veh/h)	178	1130	131	69	532	408	88	781	110	18	314	471
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.97		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1800	1772	1758	1772	1730	1786	1730	1786	1786		1786	1786
Adj Flow Rate, veh/h	178	1130	131	69	532	408	88	781	110		314	471
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
Percent Heavy Veh, %	0	2	3	2	5	1	5	1	1		1	1
Cap, veh/h	206	1146	496	88	895	400	138	820	115		369	1064
Arrive On Green	0.12	0.34	0.34	0.05	0.27	0.27	0.04	0.28	0.28		0.11	0.34
Sat Flow, veh/h	1714	3367	1456	1688	3287	1470	3196	2974	419		3300	3089
Grp Volume(v), veh/h	178	1130	131	69	532	408	88	446	445		314	258
Grp Sat Flow(s),veh/h/ln	1714	1683	1456	1688	1643	1470	1598	1697	1696		1650	1697
Q Serve(g_s), s	12.2	40.0	7.8	4.9	16.9	32.7	3.3	31.0	31.0		11.2	14.1
Cycle Q Clear(g_c), s	12.2	40.0	7.8	4.9	16.9	32.7	3.3	31.0	31.0		11.2	14.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.25		1.00	
Lane Grp Cap(c), veh/h	206	1146	496	88	895	400	138	468	467		369	584
V/C Ratio(X)	0.86	0.99	0.26	0.79	0.59	1.02	0.64	0.95	0.95		0.85	0.44
Avail Cap(c_a), veh/h	250	1146	496	162	895	400	384	468	468		396	584
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	51.8	39.3	28.7	56.2	37.9	43.7	56.5	42.7	42.7		52.3	30.4
Incr Delay (d2), s/veh	22.3	23.4	1.3	14.3	2.9	50.0	4.8	29.8	29.9		15.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	11.1	28.6	5.7	4.5	12.1	25.6	2.6	24.4	24.4		9.6	10.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.1	62.7	30.0	70.5	40.8	93.7	61.3	72.5	72.6		67.5	30.9
LnGrp LOS	E	E	C	E	D	F	E	E	E		E	C
Approach Vol, veh/h		1439			1009			979				835
Approach Delay, s/veh		61.1			64.2			71.6				44.7
Approach LOS		E			E			E				D

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	47.3	20.0	40.0	20.9	39.1	11.8	48.2
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	34.6	14.4	* 33	17.5	28.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	6.9	42.0	13.2	33.0	14.2	34.7	5.3	16.2
Green Ext Time (p_c), s	0.1	0.0	0.2	0.1	0.2	0.0	0.2	6.8

Intersection Summary	
HCM 6th Ctrl Delay	61.0
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

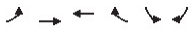
01/08/2020

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	50
Future Volume (veh/h)	50
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.98
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	50
Peak Hour Factor	1.00
Percent Heavy Veh, %	1
Cap, veh/h	112
Arrive On Green	0.34
Sat Flow, veh/h	326
Grp Volume(v), veh/h	263
Grp Sat Flow(s),veh/h/ln	1719
Q Serve(g_s), s	14.2
Cycle Q Clear(g_c), s	14.2
Prop In Lane	0.19
Lane Grp Cap(c), veh/h	592
V/C Ratio(X)	0.44
Avail Cap(c_a), veh/h	592
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	30.5
Incr Delay (d2), s/veh	0.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	10.7
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	31.0
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs	

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

01/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	1454	966	60	43	57
Future Volume (veh/h)	66	1454	966	60	43	57
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.99	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	66	1454	966	60	43	57
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	84	2759	2317	144	136	121
Arrive On Green	0.05	0.82	0.72	0.72	0.08	0.08
Sat Flow, veh/h	1688	3455	3307	200	1688	1502
Grp Volume(v), veh/h	66	1454	505	521	43	57
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1734	1688	1502
Q Serve(g_s), s	4.6	16.5	14.4	14.4	2.9	4.4
Cycle Q Clear(g_c), s	4.6	16.5	14.4	14.4	2.9	4.4
Prop In Lane	1.00			0.12	1.00	1.00
Lane Grp Cap(c), veh/h	84	2759	1212	1249	136	121
V/C Ratio(X)	0.79	0.53	0.42	0.42	0.32	0.47
Avail Cap(c_a), veh/h	127	2759	1212	1249	450	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.4	3.4	6.7	6.7	52.1	52.7
Incr Delay (d2), s/veh	17.1	0.7	1.1	1.0	1.3	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.4	10.0	10.0	10.2	2.4	6.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	73.6	4.2	7.8	7.7	53.4	55.6
LnGrp LOS	E	A	A	A	D	E
Approach Vol, veh/h		1520	1026		100	
Approach Delay, s/veh		7.2	7.8		54.7	
Approach LOS		A	A		D	

Timer - Assigned Phs	2		4	5	6
Phs Duration (G+Y+Rc), s	104.2		15.8	11.9	92.2
Change Period (Y+Rc), s	* 5.8		* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 76		* 32	9.0	* 61
Max Q Clear Time (g_c+I1), s	18.5		6.4	6.6	16.4
Green Ext Time (p_c), s	42.9		0.5	0.0	23.9

Intersection Summary	
HCM 6th Ctrl Delay	9.2
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

01/08/2020

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	58	1313	72	0	819
Future Vol, veh/h	0	58	1313	72	0	819
Conflicting Peds, #/hr	0	9	0	9	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	2	1
Mvmt Flow	0	58	1313	72	0	819

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	666	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	402	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	399	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	399	-
HCM Lane V/C Ratio	-	0.145	-
HCM Control Delay (s)	-	15.6	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.5	-

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

01/08/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	160	926	226	133	1221	561	315	830	96	30	381	630
Future Volume (veh/h)	160	926	226	133	1221	561	315	830	96	30	381	630
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.95		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1772	1772	1786	1786	1772	1786	1786	1786	1786		1786	1800
Adj Flow Rate, veh/h	160	926	226	133	1221	561	315	830	96		381	630
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
Percent Heavy Veh, %	2	2	1	1	2	1	1	1	1		1	0
Cap, veh/h	149	1155	499	150	1155	497	362	775	90		366	773
Arrive On Green	0.09	0.34	0.34	0.09	0.34	0.34	0.11	0.25	0.25		0.11	0.26
Sat Flow, veh/h	1688	3367	1454	1701	3367	1449	3300	3045	352		3300	3021
Grp Volume(v), veh/h	160	926	226	133	1221	561	315	462	464		381	356
Grp Sat Flow(s),veh/h/ln	1688	1683	1454	1701	1683	1449	1650	1697	1701		1650	1710
Q Serve(g_s), s	11.5	32.4	15.7	10.1	44.6	44.6	12.2	33.1	33.1		14.4	25.4
Cycle Q Clear(g_c), s	11.5	32.4	15.7	10.1	44.6	44.6	12.2	33.1	33.1		14.4	25.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21		1.00	
Lane Grp Cap(c), veh/h	149	1155	499	150	1155	497	362	432	433		366	437
V/C Ratio(X)	1.07	0.80	0.45	0.88	1.06	1.13	0.87	1.07	1.07		1.04	0.81
Avail Cap(c_a), veh/h	149	1155	499	150	1155	497	366	432	433		366	437
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	59.2	38.7	33.2	58.6	42.7	42.7	57.0	48.5	48.5		57.8	45.5
Incr Delay (d2), s/veh	94.1	5.9	3.0	41.5	43.0	80.7	19.6	63.4	63.4		58.5	11.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	14.3	21.5	10.6	10.4	36.1	40.0	10.4	31.3	31.4		14.6	18.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	153.4	44.6	36.2	100.1	85.7	123.4	76.6	111.8	111.8		116.3	56.7
LnGrp LOS	F	D	D	F	F	F	E	F	F		F	E
Approach Vol, veh/h		1312			1915			1241				1092
Approach Delay, s/veh		56.4			97.7			102.9				77.6
Approach LOS		E			F			F				E

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	51.0	21.0	40.0	18.0	51.0	20.9	40.1
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	44.6	14.4	* 33	11.5	44.6	14.4	* 33
Max Q Clear Time (g_c+I1), s	12.1	34.4	16.4	35.1	13.5	46.6	14.2	27.6
Green Ext Time (p_c), s	0.0	8.0	0.0	0.0	0.0	0.0	0.0	3.7

Intersection Summary	
HCM 6th Ctrl Delay	85.2
HCM 6th LOS	F

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

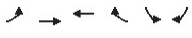
01/08/2020

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	81
Future Volume (veh/h)	81
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.94
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1800
Adj Flow Rate, veh/h	81
Peak Hour Factor	1.00
Percent Heavy Veh, %	0
Cap, veh/h	99
Arrive On Green	0.26
Sat Flow, veh/h	388
Grp Volume(v), veh/h	355
Grp Sat Flow(s),veh/h/ln	1699
Q Serve(g_s), s	25.6
Cycle Q Clear(g_c), s	25.6
Prop In Lane	0.23
Lane Grp Cap(c), veh/h	434
V/C Ratio(X)	0.82
Avail Cap(c_a), veh/h	434
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	45.5
Incr Delay (d2), s/veh	11.6
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	18.8
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	57.1
LnGrp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs	

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

01/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	132	1400	1758	154	163	169
Future Volume (veh/h)	132	1400	1758	154	163	169
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	132	1400	1758	154	163	169
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	158	2593	1974	170	232	206
Arrive On Green	0.09	0.77	0.63	0.63	0.14	0.14
Sat Flow, veh/h	1688	3455	3219	270	1688	1502
Grp Volume(v), veh/h	132	1400	933	979	163	169
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1717	1688	1502
Q Serve(g_s), s	10.0	21.3	59.6	63.8	12.0	14.2
Cycle Q Clear(g_c), s	10.0	21.3	59.6	63.8	12.0	14.2
Prop In Lane	1.00			0.16	1.00	1.00
Lane Grp Cap(c), veh/h	158	2593	1062	1083	232	206
V/C Ratio(X)	0.84	0.54	0.88	0.90	0.70	0.82
Avail Cap(c_a), veh/h	234	2593	1062	1083	415	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.0	5.9	19.9	20.6	53.5	54.5
Incr Delay (d2), s/veh	15.4	0.8	10.3	12.3	3.9	7.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.9	13.1	36.3	39.7	9.6	17.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	73.4	6.7	30.2	32.9	57.4	62.3
LnGrp LOS	E	A	C	C	E	E
Approach Vol, veh/h		1532	1912		332	
Approach Delay, s/veh		12.4	31.6		59.9	
Approach LOS		B	C		E	

Timer - Assigned Phs	2	4	5	6
Phs Duration (G+Y+Rc), s	105.9	24.1	18.1	87.8
Change Period (Y+Rc), s	* 5.8	* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 86	* 32	18.0	* 62
Max Q Clear Time (g_c+I1), s	23.3	16.2	12.0	65.8
Green Ext Time (p_c), s	43.9	1.6	0.3	0.0

Intersection Summary	
HCM 6th Ctrl Delay	26.3
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

01/08/2020

Intersection	
Int Delay, s/veh	1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	156	1436	145	0	1062
Future Vol, veh/h	0	156	1436	145	0	1062
Conflicting Peds, #/hr	0	31	0	31	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	0	156	1436	145	0	1062

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	749	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	354	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	344	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.9	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	344	-
HCM Lane V/C Ratio	-	0.453	-
HCM Control Delay (s)	-	23.9	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	2.3	-

2027 Ultimate Conditions – Soft Transit Signal Priority

DRAFT

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

01/08/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	178	1130	131	69	532	408	88	781	110	18	314	471
Future Volume (veh/h)	178	1130	131	69	532	408	88	781	110	18	314	471
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.97		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1800	1772	1758	1772	1730	1786	1730	1786	1786		1786	1786
Adj Flow Rate, veh/h	178	1130	131	69	532	408	88	781	110		314	471
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
Percent Heavy Veh, %	0	2	3	2	5	1	5	1	1		1	1
Cap, veh/h	164	1231	533	88	1058	474	136	820	115		286	988
Arrive On Green	0.10	0.37	0.37	0.05	0.32	0.32	0.04	0.28	0.28		0.09	0.32
Sat Flow, veh/h	1714	3367	1457	1688	3287	1474	3196	2974	419		3300	3089
Grp Volume(v), veh/h	178	1130	131	69	532	408	88	446	445		314	258
Grp Sat Flow(s),veh/h/ln	1714	1683	1457	1688	1643	1474	1598	1697	1696		1650	1697
Q Serve(g_s), s	11.5	38.5	7.5	4.9	15.7	31.1	3.3	31.0	31.0		10.4	14.6
Cycle Q Clear(g_c), s	11.5	38.5	7.5	4.9	15.7	31.1	3.3	31.0	31.0		10.4	14.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.25		1.00	
Lane Grp Cap(c), veh/h	164	1231	533	88	1058	474	136	468	467		286	543
V/C Ratio(X)	1.08	0.92	0.25	0.79	0.50	0.86	0.65	0.95	0.95		1.10	0.48
Avail Cap(c_a), veh/h	164	1231	533	162	1058	474	277	468	468		286	543
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	54.2	36.3	26.5	56.2	32.9	38.2	56.6	42.7	42.7		54.8	32.7
Incr Delay (d2), s/veh	94.2	12.2	1.1	14.3	1.7	18.1	5.1	29.8	29.9		82.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	15.0	25.9	5.5	4.5	11.2	20.7	2.6	24.4	24.4		12.9	10.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	148.5	48.6	27.6	70.5	34.6	56.3	61.7	72.5	72.6		136.8	33.4
LnGrp LOS	F	D	C	E	C	E	E	E	E		F	C
Approach Vol, veh/h		1439			1009			979				835
Approach Delay, s/veh		59.0			45.8			71.6				72.3
Approach LOS		E			D			E				E

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	50.3	17.0	40.0	18.0	45.0	11.7	45.3
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	38.6	10.4	* 33	11.5	38.6	10.4	* 33
Max Q Clear Time (g_c+I1), s	6.9	40.5	12.4	33.0	13.5	33.1	5.3	16.8
Green Ext Time (p_c), s	0.1	0.0	0.0	0.1	0.0	3.7	0.1	6.7

Intersection Summary	
HCM 6th Ctrl Delay	61.4
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

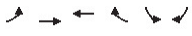
01/08/2020

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	50
Future Volume (veh/h)	50
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.98
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	50
Peak Hour Factor	1.00
Percent Heavy Veh, %	1
Cap, veh/h	104
Arrive On Green	0.32
Sat Flow, veh/h	326
Grp Volume(v), veh/h	263
Grp Sat Flow(s),veh/h/ln	1718
Q Serve(g_s), s	14.8
Cycle Q Clear(g_c), s	14.8
Prop In Lane	0.19
Lane Grp Cap(c), veh/h	550
V/C Ratio(X)	0.48
Avail Cap(c_a), veh/h	550
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	32.8
Incr Delay (d2), s/veh	0.6
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	11.1
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	33.4
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs	

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

01/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	1454	966	60	43	57
Future Volume (veh/h)	66	1454	966	60	43	57
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.99	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	66	1454	966	60	43	57
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	83	2759	2318	144	136	121
Arrive On Green	0.05	0.82	0.72	0.72	0.08	0.08
Sat Flow, veh/h	1688	3455	3307	200	1688	1502
Grp Volume(v), veh/h	66	1454	505	521	43	57
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1734	1688	1502
Q Serve(g_s), s	4.6	16.5	14.4	14.4	2.9	4.4
Cycle Q Clear(g_c), s	4.6	16.5	14.4	14.4	2.9	4.4
Prop In Lane	1.00			0.12	1.00	1.00
Lane Grp Cap(c), veh/h	83	2759	1213	1249	136	121
V/C Ratio(X)	0.79	0.53	0.42	0.42	0.32	0.47
Avail Cap(c_a), veh/h	98	2759	1213	1249	450	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.4	3.4	6.7	6.7	52.1	52.7
Incr Delay (d2), s/veh	30.3	0.7	1.1	1.0	1.3	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.0	10.0	10.0	10.2	2.4	6.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	86.8	4.2	7.8	7.7	53.4	55.6
LnGrp LOS	F	A	A	A	D	E
Approach Vol, veh/h		1520	1026		100	
Approach Delay, s/veh		7.7	7.7		54.7	
Approach LOS		A	A		D	

Timer - Assigned Phs	2		4	5	6
Phs Duration (G+Y+Rc), s	104.2		15.8	11.9	92.2
Change Period (Y+Rc), s	* 5.8		* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 76		* 32	7.0	* 63
Max Q Clear Time (g_c+I1), s	18.5		6.4	6.6	16.4
Green Ext Time (p_c), s	42.9		0.5	0.0	24.5

Intersection Summary	
HCM 6th Ctrl Delay	9.5
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

01/08/2020

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	58	1313	72	0	819
Future Vol, veh/h	0	58	1313	72	0	819
Conflicting Peds, #/hr	0	9	0	9	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	2	1
Mvmt Flow	0	58	1313	72	0	819

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	666	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	402	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	399	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	399	-
HCM Lane V/C Ratio	-	0.145	-
HCM Control Delay (s)	-	15.6	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.5	-

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

01/08/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	160	926	226	133	1221	561	315	830	96	30	381	630
Future Volume (veh/h)	160	926	226	133	1221	561	315	830	96	30	381	630
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.95		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1772	1772	1786	1786	1772	1786	1786	1786	1786		1786	1800
Adj Flow Rate, veh/h	160	926	226	133	1221	561	315	830	96		381	630
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
Percent Heavy Veh, %	2	2	1	1	2	1	1	1	1		1	0
Cap, veh/h	149	1207	522	150	1207	520	315	775	90		315	769
Arrive On Green	0.09	0.36	0.36	0.09	0.36	0.36	0.10	0.25	0.25		0.10	0.25
Sat Flow, veh/h	1688	3367	1456	1701	3367	1451	3300	3045	352		3300	3021
Grp Volume(v), veh/h	160	926	226	133	1221	561	315	462	464		381	356
Grp Sat Flow(s),veh/h/ln	1688	1683	1456	1701	1683	1451	1650	1697	1701		1650	1710
Q Serve(g_s), s	11.5	31.6	15.3	10.1	46.6	46.6	12.4	33.1	33.1		12.4	25.5
Cycle Q Clear(g_c), s	11.5	31.6	15.3	10.1	46.6	46.6	12.4	33.1	33.1		12.4	25.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21		1.00	
Lane Grp Cap(c), veh/h	149	1207	522	150	1207	520	315	432	433		315	435
V/C Ratio(X)	1.07	0.77	0.43	0.88	1.01	1.08	1.00	1.07	1.07		1.21	0.82
Avail Cap(c_a), veh/h	149	1207	522	150	1207	520	315	432	433		315	435
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	59.2	36.9	31.7	58.6	41.7	41.7	58.8	48.5	48.5		58.8	45.6
Incr Delay (d2), s/veh	94.1	4.7	2.6	41.5	28.8	62.4	50.9	63.4	63.4		120.6	11.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(95%),veh/ln	14.3	20.9	10.4	10.4	33.7	37.2	12.2	31.3	31.4		17.3	18.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	153.4	41.6	34.3	100.1	70.5	104.1	109.7	111.8	111.8		179.4	57.2
LnGrp LOS	F	D	C	F	F	F	F	F	F		F	E
Approach Vol, veh/h		1312			1915			1241				1092
Approach Delay, s/veh		54.0			82.4			111.3				100.0
Approach LOS		D			F			F				F

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	53.0	19.0	40.0	18.0	53.0	19.0	40.0
Change Period (Y+Rc), s	6.5	6.4	6.6	* 6.9	6.5	6.4	6.6	* 6.9
Max Green Setting (Gmax), s	11.5	46.6	12.4	* 33	11.5	46.6	12.4	* 33
Max Q Clear Time (g_c+I1), s	12.1	33.6	14.4	35.1	13.5	48.6	14.4	27.6
Green Ext Time (p_c), s	0.0	9.8	0.0	0.0	0.0	0.0	0.0	3.7

Intersection Summary	
HCM 6th Ctrl Delay	85.6
HCM 6th LOS	F

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Clyde Avenue & Baseline Road

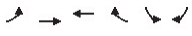
01/08/2020

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	81
Future Volume (veh/h)	81
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.94
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1800
Adj Flow Rate, veh/h	81
Peak Hour Factor	1.00
Percent Heavy Veh, %	0
Cap, veh/h	99
Arrive On Green	0.25
Sat Flow, veh/h	388
Grp Volume(v), veh/h	355
Grp Sat Flow(s),veh/h/ln	1698
Q Serve(g_s), s	25.6
Cycle Q Clear(g_c), s	25.6
Prop In Lane	0.23
Lane Grp Cap(c), veh/h	432
V/C Ratio(X)	0.82
Avail Cap(c_a), veh/h	432
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	45.7
Incr Delay (d2), s/veh	12.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	18.9
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	57.6
LnGrp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer - Assigned Phs	

HCM 6th Signalized Intersection Summary
2: Baseline Road & Private Access 1

01/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	132	1400	1758	154	163	169
Future Volume (veh/h)	132	1400	1758	154	163	169
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	132	1400	1758	154	163	169
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	130	2593	2026	175	232	206
Arrive On Green	0.08	0.77	0.65	0.65	0.14	0.14
Sat Flow, veh/h	1688	3455	3219	270	1688	1502
Grp Volume(v), veh/h	132	1400	933	979	163	169
Grp Sat Flow(s),veh/h/ln	1688	1683	1683	1717	1688	1502
Q Serve(g_s), s	10.0	21.3	57.0	60.9	12.0	14.2
Cycle Q Clear(g_c), s	10.0	21.3	57.0	60.9	12.0	14.2
Prop In Lane	1.00			0.16	1.00	1.00
Lane Grp Cap(c), veh/h	130	2593	1089	1111	232	206
V/C Ratio(X)	1.02	0.54	0.86	0.88	0.70	0.82
Avail Cap(c_a), veh/h	130	2593	1089	1111	415	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.0	5.9	18.1	18.8	53.5	54.5
Incr Delay (d2), s/veh	83.5	0.8	8.7	10.1	3.9	7.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.0	13.1	34.4	37.4	9.6	17.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	143.5	6.7	26.8	29.0	57.4	62.3
LnGrp LOS	F	A	C	C	E	E
Approach Vol, veh/h		1532	1912		332	
Approach Delay, s/veh		18.5	27.9		59.9	
Approach LOS		B	C		E	

Timer - Assigned Phs	2		4	5	6
Phs Duration (G+Y+Rc), s	105.9		24.1	16.0	89.9
Change Period (Y+Rc), s	* 5.8		* 6.2	6.0	* 5.8
Max Green Setting (Gmax), s	* 86		* 32	10.0	* 70
Max Q Clear Time (g_c+I1), s	23.3		16.2	12.0	62.9
Green Ext Time (p_c), s	43.9		1.6	0.0	7.2

Intersection Summary	
HCM 6th Ctrl Delay	26.9
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
4: Clyde Avenue & Private Access 3

01/08/2020

Intersection	
Int Delay, s/veh	1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	156	1436	145	0	1062
Future Vol, veh/h	0	156	1436	145	0	1062
Conflicting Peds, #/hr	0	31	0	31	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	-	0	-	450	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	0	156	1436	145	0	1062

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	749	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	354	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	344	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.9	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	344	-
HCM Lane V/C Ratio	-	0.453	-
HCM Control Delay (s)	-	23.9	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	2.3	-