800 Palladium Drive Transportation Impact Assessment

Final Submission

May 14, 2019

Prepared for:

Cominar

Prepared by:

Stantec Consulting Ltd.

Certification

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;

2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;

3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and

4. I am either a licensed[1] or registered[1] professional in good standing, whose field of expertise is either transportation engineering or transportation planning.

Signature of individual certifier that s/he meets the above four criteria.

Robert Vastag, RPP
Associate, Senior Transportation Planner
Project Manager
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

Phone: (613) 724-4354
Cell: (613) 853-2837
Fax: (613) 722-2799
Robert.Vastag@stantec.com

Lauren O'Grady P. Eng.
Transportation Engineer
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

Phone: (613) 784-2264
Fax: (613) 722-2799
Lauren.O'Grady@stantec.com

1 License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works

Table of Contents

1.0 SCREENING 1
1.1 SUMMARY OF DEVELOPMENT 1
1.2 TRIP GENERATION TRIGGER 1
1.3 LOCATION TRIGGERS 2
1.4 SAFETY TRIGGERS 2
1.5 SUMMARY 2

2.0 SCOPING 3
2.1 EXISTING AND PLANNED CONDITIONS 3
2.1.1 Proposed Development 3
2.1.2 Existing Conditions 6
2.1.3 Planned Conditions 13
2.2 STUDY AREA AND TIME PERIODS 18
2.2.1 Study Area 18
2.2.2 Time Periods 18
2.2.3 Horizon Years 18
2.3 EXEMPTIONS REVIEW 19

3.0 FORECASTING 20
3.1 DEVELOPMENT GENERATED TRAVEL DEMAND 20
3.1.1 Trip Generation and Mode Shares 20
3.1.2 Pass-By and Internal Capture 21
3.1.3 Trip Distribution 23
3.1.4 Trip Assignment 24
3.2 BACKGROUND NETWORK TRAVEL DEMAND 26
3.2.1 Transportation Network Plans 26
3.2.2 Background Growth 26
3.2.3 Other Developments 26
3.3 DEMAND RATIONALIZATION 26

4.0 STRATEGY 28
4.1 DEVELOPMENT DESIGN 28
4.1.1 Design for Sustainable Modes 28
4.1.2 Circulation and Access 28
4.1.3 New Street Networks 28
4.2 PARKING 29
4.2.1 Parking Supply 29
4.2.2 Spillover Parking 29
4.3 BOUNDARY STREET DESIGN 29
4.3.1 Design Concept 29
4.4 ACCESS INTERSECTIONS DESIGN 32
4.4.1 Location and Design of Access 32
4.4.2 Intersection Control 32
4.4.3 Intersection Design 32
4.5 TRANSPORTATION DEMAND MANAGEMENT 32
4.5.1 Context for TDM 32
4.5.2 Need and Opportunity 32
4.5.3 TDM Program 32
4.6 NEIGHBOURHOOD TRAFFIC MANAGEMENT 33

4.7 TRANSIT 33
4.7.1 Route Capacity 33
4.7.2 Transit Priority 33
4.8 REVIEW OF NETWORK CONCEPT 33
4.9 INTERSECTION DESIGN 33
4.9.1 Intersection Control 33
4.9.2 Intersection Design 34

5.0 CONCLUSION 45

List of Tables

Table 1 - Proposed Land Uses / Land Use Codes 4
Table 2 - Collision Summary for 800 Palladium Drive 12
Table 3 - Angle / Turning Impact Collisions 13
Table 4 - City of Ottawa Transportation Master Plan Projects 13
Table 5 - Background Developments 16
Table 6 - Exemptions Review 19
Table 7 - Land Uses and Trip Generation Rates 20
Table 8 - Person Trips Generated by Land Use 20
Table 9 - Trips Generated by Travel Mode 21
Table 10 - Pass-By and Internal Capture Trips 22
Table 11 - Traffic Distribution Assumptions 23
Table 12 - MMLOS Conditions (Segments) 31
Table 13 - 2019 Existing Intersection Operations 34
Table 14 - 2019 Existing Intersection MMLOS (Palladium / Cyclone Taylor) 36
Table 15 - 2019 Total Future Intersection Operations 37
Table 14 - 2019 Total Future Intersection MMLOS (Palladium / Cyclone Taylor) 40
Table 17 – 2024 Ultimate Intersection Operations 41
Table 14 – 2024 Ultimate Intersection MMLOS (Palladium / Cyclone Taylor) 44

List of Figures

Figure 1 - Site Location 4
Figure 2 - Site Plan 5
Figure 3 - Existing Lane Configuration and Traffic Control 7
Figure 4 - Cycling and Pedestrian Facilities 8
Figure 5 - Study Area Transit Routes and Stops 9
Figure 6 - 2019 Existing Traffic Volumes 11
Figure 7 - TMP Roadway and Transit Improvements 14
Figure 8 - Recommended LRT Alignment from Terry Fox Drive to Palladium Drive 15
Figure 9 - Background Developments 17
Figure 10 - Pass-By Trips (PM Peak Hour) 23
Figure 11 - Site Traffic Assignment 24
Figure 12 - Net Site Generated Traffic Volumes 25
Figure 13 - Background Developments 27
Figure 14 - 2019 Total Future Traffic Volumes 38
Figure 15 - 2024 Ultimate Traffic Volumes 42

List of Appendices

APPENDIX A COMMENT RESPONSE MEMO A.1

APPENDIX B TRAFFIC DATA B.1

APPENDIX C BACKGROUND TRAFFIC VOLUMES C.1

APPENDIX D TRANSPORTATION DEMAND MANAGEMENT CHECKLISTS D.1

APPENDIX E INTERSECTION PERFORMANCE WORKSHEETS E.1

1.0 SCREENING

1.1 SUMMARY OF DEVELOPMENT

Municipal Address	800 Palladium Drive (Kanata)
Description of Location	North-east corner of the Palladium Drive at Cyclone Taylor Boulevard intersection. The site is bound by Palladium Drive to the south, existing office buildings to the north and east, and Cyclone Taylor Boulevard to the west.
Land Use Classification	Commercial, Office, Restaurant
Development Size (units)	N/A
Development Size (m^2)	**Commercial:** 1,000 m^2 GFA (11,000 ft^2 GFA) **Office:** 7,400 m^2 GFA (80,000 ft^2 GFA) **Restaurant:** 465 m^2 GFA (5,000 ft^2 GFA)
Number of Accesses and Locations	2 full movements accesses off existing private road, one located 40m north of Palladium Drive and one located 20m east of Cyclone Taylor boulevard
Phase of Development	1 Phase
Buildout Year	Assumed build-out and occupancy by 2019

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.

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

Cominar is preparing a development application for Site Plan Control of a proposed development in the Kanata community of Ottawa, Ontario. The proposed development is located at the north-east corner of the Palladium Drive at Cyclone Taylor Boulevard intersection. The site is bound by Palladium Drive to the south, existing office buildings to the north and east, and Cyclone Taylor Boulevard to the west.

Figure 1 illustrates the location of the subject development. The subject site is currently zoned as Mixed-Use Centre (MC) Zone; the purpose of the MC Zone, according to the City of Ottawa Official Plan, is to:

- *"Ensure that the areas designated Mixed-Use Centres in the Official Plan, or a similar designation in a Secondary Plan, accommodate a combination of transit-supportive uses such as offices, secondary and post secondary schools, hotels, hospitals, large institutional buildings, community recreation and leisure centres, day care centres, retail uses, entertainment uses, services such as restaurants and personal service businesses, and high- and medium-density residential uses.*
- *Allow the permitted uses in a compact and pedestrian-oriented built form in mixed-use buildings or side by side in separate buildings, and*
- *Impose development standards that ensure medium to high profile development while minimizing its impact on surrounding residential areas."*

The existing property is currently a gravel parking lot. The two existing site accesses along the private road surrounding the subject development are proposed to remain. One site access is located approximately 40m north of Palladium Drive and the other site access is located approximately 20m east of Cyclone Taylor Boulevard. Neither site access currently has any turning movement restrictions. A total of 319 vehicle parking spaces will be provided as part of the proposed development.

The proposed development will be constructed in one phase. Build-out and occupancy of the proposed development is anticipated to occur in 2019.

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*.

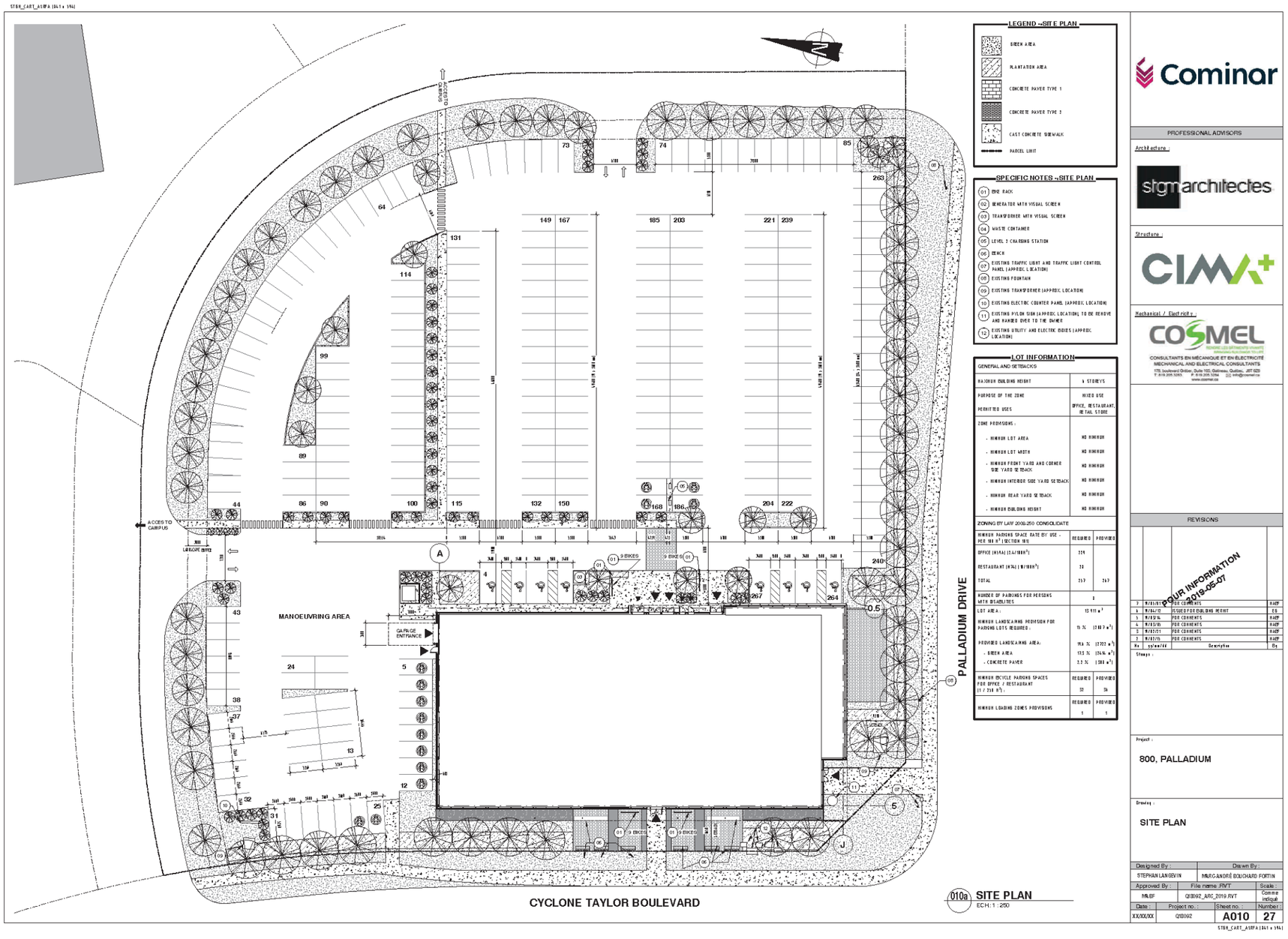
Figure 2 illustrates the proposed site plan.

Figure 1 - Site Location

Table 1 - Proposed Land Uses / Land Use Codes

Land Use	Size	Land Use Code (LUC)
LUC 820	11,000 ft^2 GFA	Shopping Centre
LUC 710	80,000 ft^2 GFA (20,000 ft^2 per floor, four floors of office space)	General Office Building
LUC 932	5,000 ft^2 GFA	High-Turnover Restaurant

Figure 2 - Site Plan



2.1.2 Existing Conditions

2.1.2.1 Roads and Traffic Control

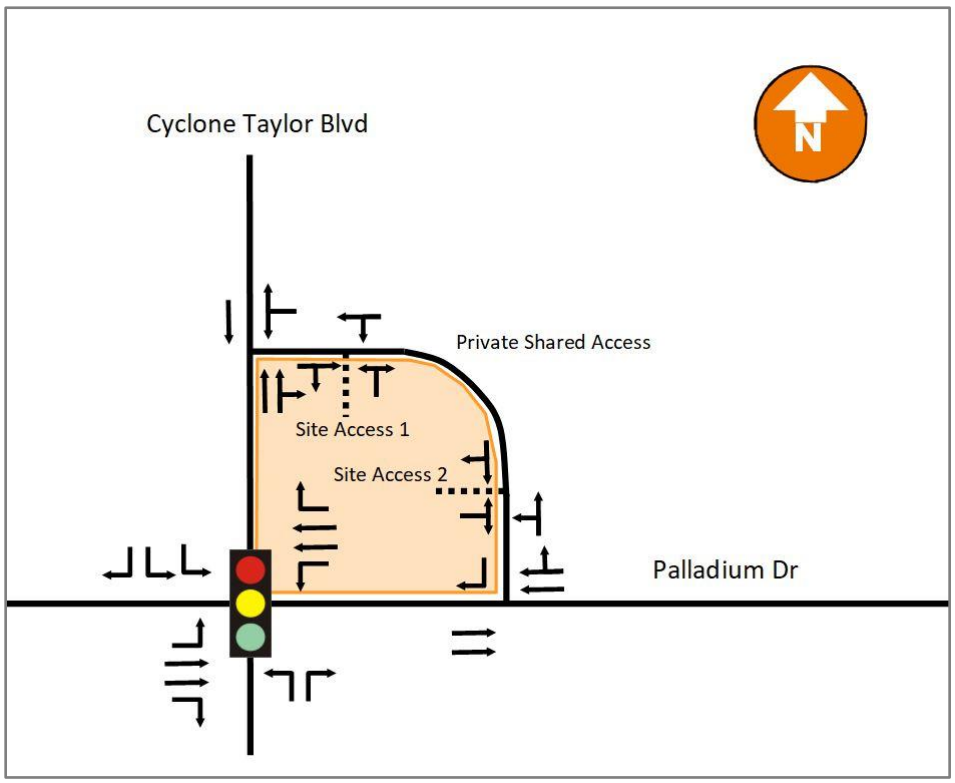
The roadways under consideration in the study area are described as follows:

Palladium Drive	Within the vicinity of the subject site, Palladium Drive is a municipal four-lane divided urban arterial roadway. The posted speed limit along Palladium Drive across the frontage of the subject site is 70 km/h. Sidewalks are provided along both sides of Palladium Drive.
Cyclone Taylor Boulevard	Cyclone Taylor Boulevard is a municipal urban local road with a default speed limit of 50 km/h. The majority of the roadway has a four-lane cross-section, however, at the subject Site Access 1, the cross-section is reduced to a three-lane cross-section. Sidewalks are provided along both sides of Cyclone Taylor Boulevard. This roadway predominately services the Canadian Tire Centre as well as the existing office buildings at the corner of the Palladium Drive at Cyclone Taylor Boulevard intersection. The intersection with Palladium Drive is currently signalized and includes exclusive auxiliary turning lanes on the north, east, and west legs.
Private Shared Access	The private shared access road currently provides access to the existing office buildings located on the northeast quadrant of the Palladium Drive at Cyclone Taylor Boulevard intersection. This road is a private road and does not have a posted speed limit, therefore, the default speed limit if assumed to be 50 km/hr. There is currently a sidewalk along the western / northern edges of the road from Palladium Drive to Cyclone Taylor Boulevard. The intersection of the Private Shared Access and Palladium Drive is currently an uncontrolled right-in / right-out intersection due to the centre median along Palladium Drive. The intersection of the Private Shared Access and Cyclone Taylor Boulevard is currently an uncontrolled intersection with no turning restrictions. Both Site Access 1 and Site Access 2 intersections with the Private Shared Road are currently uncontrolled intersections with a shared left / right lane out of the subject development and no exclusive turning lanes into the subject development.

Along Cyclone Taylor Boulevard, approximately 90m north of Palladium Drive, there is an access to parking lot 6 for the Canadian Tire Centre on the west side of Cyclone Taylor Boulevard. There is also an access to the existing office development on the east side of Cyclone Taylor Boulevard approximately 200m north of Palladium Drive.

Figure 3 illustrates the existing lane configuration and traffic control.

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 Palladium Drive and Cyclone Taylor Boulevard. Huntmar Drive is currently the only road with cycling facilities within close proximity to the subject site. This cycling facility consists of a paved shoulder with a concrete barrier curb between the shoulder and the vehicle lane. The City of Ottawa's Cycling Plan includes Palladium Drive as an ultimate local cycling route.

Figure 4 illustrates the existing and planned cycling and pedestrian facilities in the vicinity of the subject site.

Figure 4 - Cycling and Pedestrian Facilities

(Source: geoOttawa, accessed January 7th, 2019)

2.1.2.3 Transit

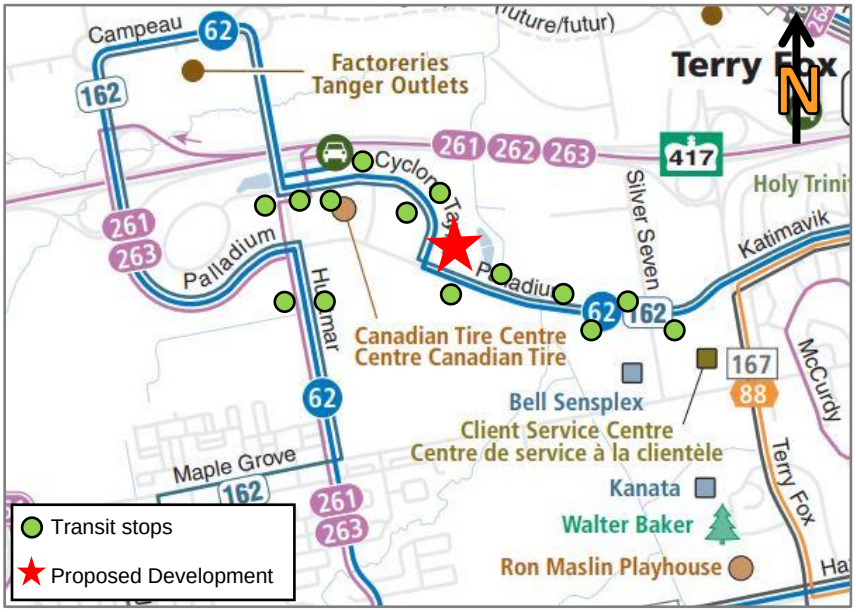
Transit service is currently provided in the immediate vicinity of the proposed development via the following routes:

Route 62	is a local route that runs between the Goulbourn Recreation Centre and St. Laurent Station
Route 162	is a local route that runs between Stittsville and Terry Fox Station
Route 261	is a Connexion peak directional route that runs between Stittsville and Mackenzie King station
Route 263	is a Connexion peak directional route that runs between Fallowfield and Mackenzie King station

There are four transit stops that are dedicated to routes 62 and 162 that are provided within 400 meters of the subject site; two along Palladium Drive and two along Cycling Taylor Boulevard.

Figure 5 illustrates nearby transit routes and bus stop shelter locations.

Figure 5 - Study Area Transit Routes and Stops



(Source: OC Transpo System Map, accessed December 21st, 2018)

2.1.2.4 Traffic Management Measures

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

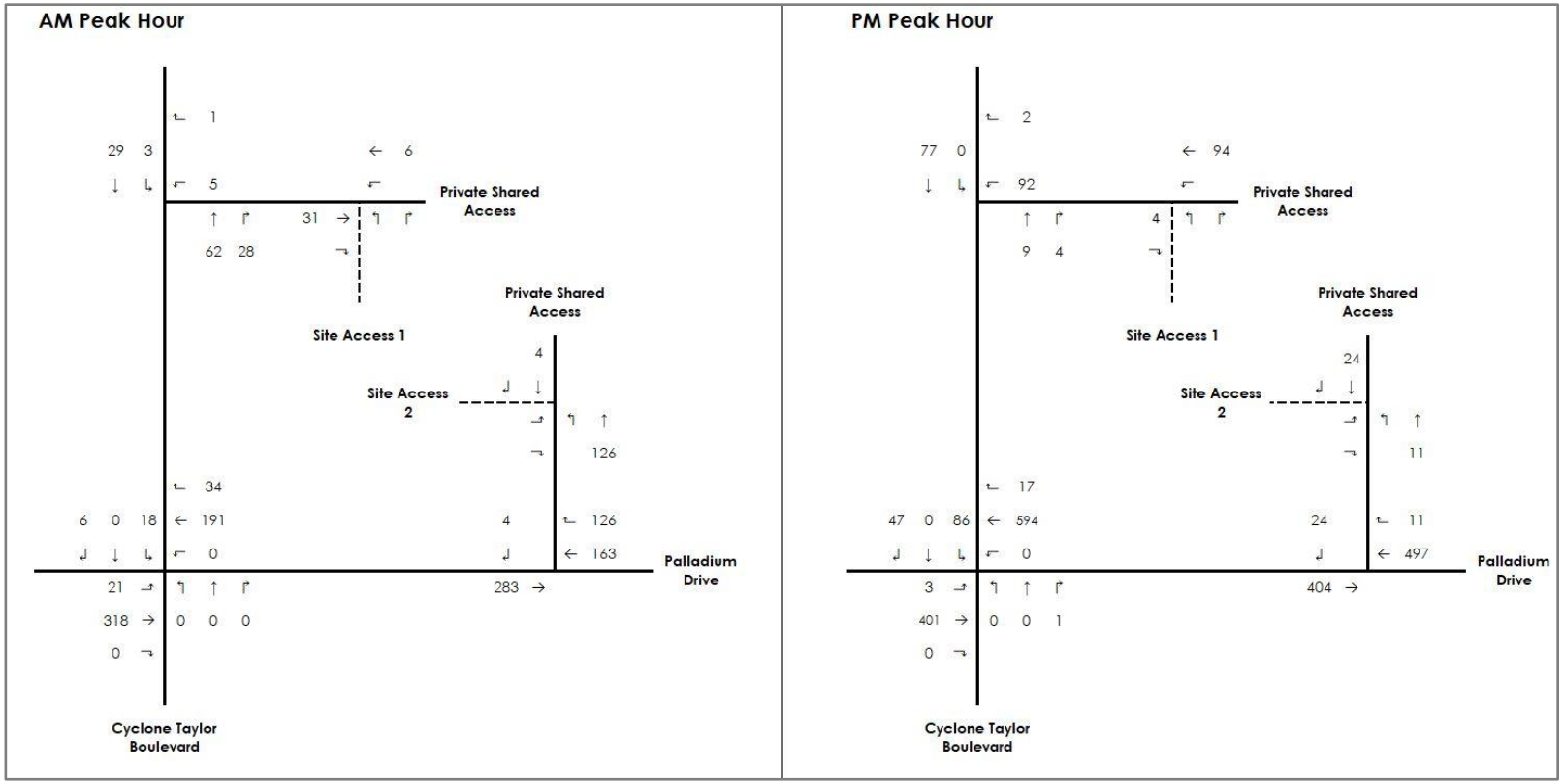
2.1.2.5 Traffic Volumes

2016 turning movement counts for the Palladium Drive at Cyclone Taylor Boulevard intersection were obtained from the City of Ottawa. A 2% annual growth rate was applied to these traffic volumes to bring them to 2019 existing volumes. The traffic volumes at the two Private Shared Access intersections were obtained by Stantec in January 2019.

Figure 6 illustrates the 2019 traffic volumes at the study area intersections.

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

Figure 6 - 2019 Existing Traffic Volumes



2.1.2.6 Collision History

Collision data was provided by the City of Ottawa for the period January 2013 to December 2017 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 summarizes the collision class and impact types for each road segment and intersection in the study area.

Table 2 - Collision Summary for 800 Palladium Drive

LOCATION	CLASS	IMPACT TYPE				
		Sideswipe	**Angle / Turning**	**Rear End**	**Single Vehicle**	**Other**
Palladium Drive between Huntmar Drive and Frank Finnigan Way	Property Damage		2			
	Non-Fatal					
Palladium Drive at Frank Finnigan Way	Property Damage	1				
	Non-Fatal			1		
Cyclone Taylor Boulevard between Frank Finnigan Way and Palladium Drive	Property Damage	1	3			1
	Non-Fatal				2	
Palladium Drive between Frank Finnigan Way and Cyclone Taylor Boulevard	Property Damage			1		
	Non-Fatal					
Palladium Drive at Cyclone Taylor Boulevard	Property Damage	2	3	2		
	Non-Fatal		1			
Palladium Drive between Cyclone Taylor Boulevard and Silver Seven Road	Property Damage	1		1		
	Non-Fatal			1		
Total	**Property Damage**	**5**	**8**	**4**		**1**
	Non-Fatal		**1**	**2**	**2**	

As outlined in **Table 2** above, the intersection of Palladium Drive at Cyclone Taylor Boulevard experienced a total of 8 collisions (35%) and the roadway segment along Cyclone Taylor Boulevard between Frank Finnigan Way and Palladium Drive experienced a total of 7 collisions (30%).

The “angle / turning” type impacts had the most occurrences (40%) of all five impact types. The angle / turning impacts were further reviewed to determine if there are any other notable collision patterns.

Table 3 below includes the breakdown of the angle / turning impact collision types. The vast majority (89%) of the angle / turning type impact collisions occurred during clear environmental conditions. Of these collisions that occurred during clear environmental conditions, 88% of them occurred on dry surface conditions.

No discernable pattern of collisions was identified within the vicinity of the subject site.

Table 3 - Angle / Turning Impact Collisions

SURFACE CONDITIONS	ENVIRONMENT		
	Clear	Rain	Snow
Dry	7		
Wet	1		
Slush			1

2.1.3 Planned Conditions

2.1.3.1 Road Network Modifications

A number of roadway and transit improvements are 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 4** below.

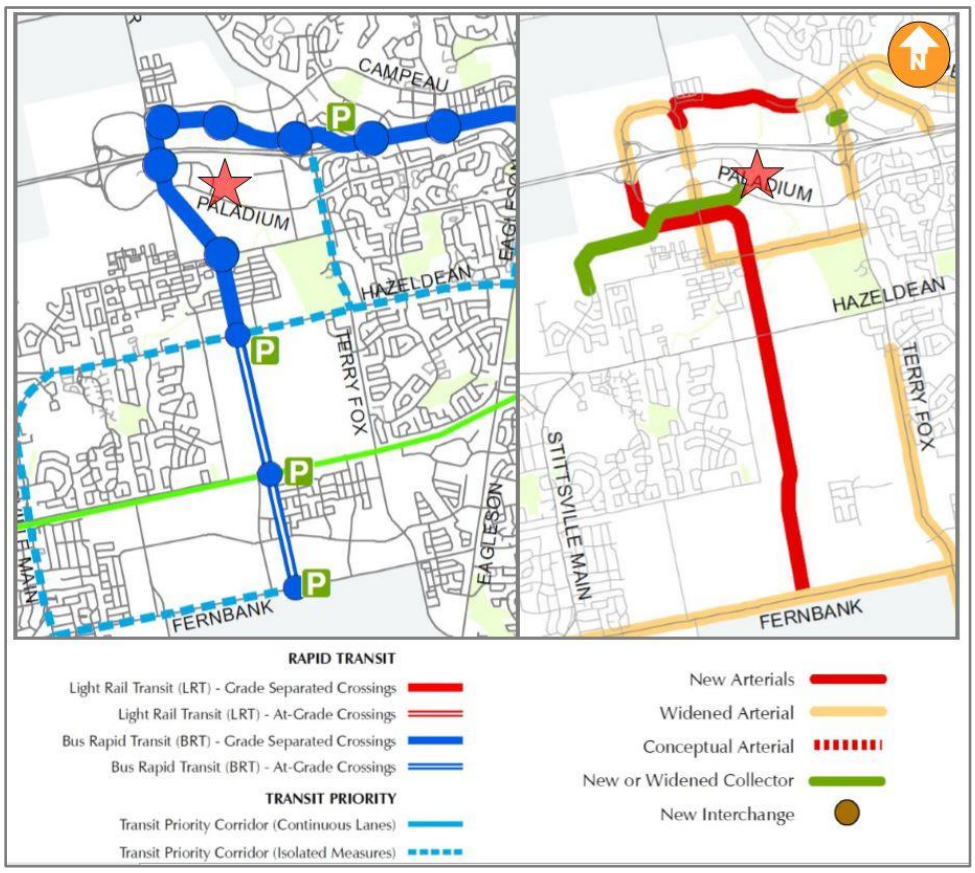
Table 4 - City of Ottawa Transportation Master Plan Projects

Project	Description	TMP Phase
Hazeldean Road	Transit signal priority and queue jump lanes between Stittsville Main Street and Eagleson Road.	Affordable Network (2031) and Network Concept
Stittsville Main Street	Transit signal priority and queue jump lanes between Fernbank Road and Hazeldean Road.	Network Concept (post 2031)
Stittsville North-South Arterial	New two-lane road between Palladium Drive and Fernbank Road.	Between Fernbank Road and Iber Road (already constructed) Between Palladium and Iber Road - Phase 2 (2020 – 2025)
	Transit signal priority and queue jump lanes at selected intersections.	Affordable Network (before 2031)
West Transitway Extension	Exclusive and at-grade BRT between Terry Fox and Eagleson Station.	Affordable Network (before 2031)
	Exclusive BRT between Fernbank Road and Eagleson Station.	Network Concept (post 2031)
Huntmar Drive	Widen from two to four lanes between Campeau Drive extension and Cyclone Taylor Boulevard. Widen from two to four lanes between Palladium Drive and Maple Grove Road.	Phase 3 (2026 – 2031)
Stittsville Main Street Extension	New two-lane road between Palladium Drive and Maple Grove Road.	Phase 3 (2026 – 2031)

Palladium Drive Realignment	Realignment of roadway within the vicinity of Huntmar Road to new North-South Arterial.	Phase 2 (2020 – 2025)
Maple Grove Road	Widen from two to four lanes between Terry Fox Drive and Huntmar Drive.	Network Concept (post-2031)

Figure 7 illustrates roadway and transit improvements as outlined in the TMP.

Figure 7 - TMP Roadway and Transit Improvements



Source: City of Ottawa's Transportation Master Plan, November 2013.

Contrary to the above **Figure 7**, the section of the Stittsville Main Street Extension between the Stittsville North-South Arterial and Palladium Drive was included in the City's TMP in error. This section of roadway is not planned to be included in the future roadway network.

Although the City's TMP calls for Bus Rapid Transit between Eagleson Station and Fernbank Road, based on the recently completed *Kanata Light Rail Transit Planning and Environmental Assessment Study (August 30, 2018)*, the West Transitway Extension will now include Light Rail Transit in place of Bus Rapid Transit. The alignment of the LRT, as outlined in the completed EA, is located on the north side of Highway 417 and includes stations at March Road,

Kanata Town Centre, Terry Fox Drive, Didsbury Road, Campeau Drive, Palladium Drive, Maple Grove Road, and Hazeldean Road. The LRT will cross Highway 417 at Huntmar Drive and will continue south until Hazeldean Road.

Figure 8 illustrates the proposed alignment for the Kanata Light Rail Transitway Extension within the vicinity of the subject site.

Figure 8 - Recommended LRT Alignment from Terry Fox Drive to Palladium Drive

Source: Kanata Light Rail Transit Planning and Environmental Assessment Study, Aug. 30, 2018

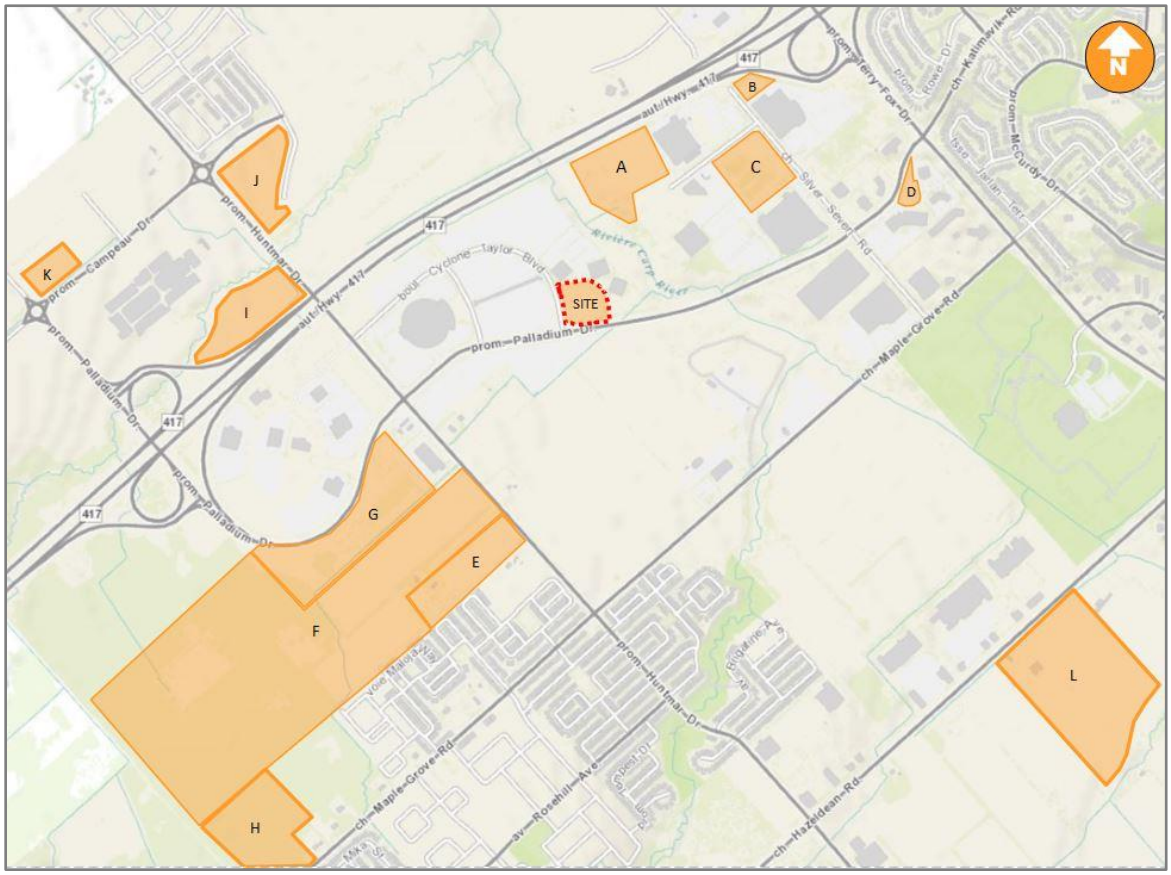
2.1.3.2 Future Background Developments

There are numerous developments scheduled to occur in the vicinity of the subject site as illustrated in **Figure 9** and described in **Table 5**.

Table 5 - Background Developments

Key Plan Reference	Development	Location	Description
A	20 and 30 Frank Neighbor Place	South of Highway 417 and east of Carp River Corridor.	A single-story RV and trailer dealership
B	770 Silver Seven Road	Southwest corner of Terry Fox Drive and Highway 417.	A 16-pump accessory gas bar at the north end of the existing Costco.
C	15 / 19 Frank Neighbor Place and 777 / 737 Silver Seven Road	South-west corner of Frank Neighbor Place and Silver Seven Road, within the Terry Fox Business Park.	An expansion of an existing commercial building, the construction of a one-storey medical building, and a two-storey light industrial building.
D	301 Palladium Drive	South of Palladium Drive and west of Terry Fox Drive.	A 4950 m^2-storey mixed-use commercial building.
E	173 Huntmar Drive	West of Huntmar Drive and north of Maple Grove in Ottawa's western community of Kanata.	A mixed-use subdivision with 206 residential dwelling units and approximately 65,000 ft^2 of commercial office / retail.
F	195 Huntmar Drive	West of Huntmar Drive and South of Highway 417.	Mixed-use subdivision comprising of a 2.5-hectare commercial block, a 5.98-hectare district park, and 691 residential units.
G	2499 Palladium Drive	Southwest quadrant of Highway 417 and Palladium Drive interchange in Kanata West.	Rezoning of 7.8-hectares of land to accommodate luxury auto dealerships.
H	1981 Maple Grove Road	Northeast quadrant of Stittsville Main Street, north of Maple Grove Road.	196 mixed type residential units.
I	333 Huntmar Drive	Huntmar Drive to the East, Highway 417 to the south and Feedmill Creek to the north and west.	A 6-storey hotel with approximately 134 rooms and six restaurants.
J	340 Huntmar Drive	East of Huntmar Drive and north of Highway 417 within the Arcadia commercial / retail complex.	A 4-storey hotel development of approximately 108 rooms.
K	8600 Campeau Drive	Northeast quadrant of Campeau Drive/ Palladium Drive roundabout.	A 4-storey hotel which includes 20 hotel units.
L	590 Hazeldean Road	West of the City of Ottawa and south of Hazeldean Road within the Fernbank Community.	748 residential dwelling units consisting of a mix of dwelling types, as well as approximately 3.7 hectares of mixed-use commercial areas.

Figure 9 - 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. Palladium Drive at Cyclone Taylor Boulevard;
2. Cyclone Taylor Boulevard at Private Access Road; and
3. Palladium Drive at Private Access Road.

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;
- 2019 total future conditions (site build-out); and
- 2024 total future conditions (5 years beyond build-out).

2.3 EXEMPTIONS REVIEW

Table 6 summarizes the Exemptions Review table from the City of Ottawa's *2017 Transportation Impact Assessment Guidelines*.

Table 6 - 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

3.0 FORECASTING

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 development. Land use codes 710 – General Office, 820 – Shopping Centre, and 932 – High-Turnover Restaurant were thought to be the most representative of the proposed land uses.

Table 7 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 proposed land uses were converted to person trips using a conversion factor of 1.28.

Table 8 outlines development-generated person trips for each land use.

Table 7 - Land Uses and Trip Generation Rates

LUC	Land Use	Size (1000's GFA)	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
710	General Office	80	1.51	0.23	1.73	0.27	1.54	1.82
820	Shopping Centre	11	0.58	0.36	0.94	1.83	1.98	3.81
932	High-Turnover Restaurant	5	5.47	4.47	9.94	6.06	3.71	9.77

Table 8 - 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
710	General Office	Auto Trips	121	18	139	22	124	145
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	155	24	178	28	159	186
820	Shopping Centre	Auto Trips	6	4	10	20	22	42
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	8	5	13	26	28	54
932	High-Turnover Restaurant	Auto Trips	27	22	49	30	19	49
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	35	28	63	38	24	62
Total		**Auto Trips**	**154**	**44**	**199**	**72**	**165**	**236**
		Person Trips	**198**	**57**	**255**	**92**	**211**	**303**

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 Kanata / Stittsville District. Due to the nature of the proposed land uses and the limited availability of transit, the transit modal share was decreased from approximately 15% (as per the OD survey) to 10%, which increased the auto modal share from 65% (as per the OD survey) to 70%. As per direction from the City of Ottawa, the auto mode share for the general office space was further reduced to account for the trips 'within the district'. The resulting auto mode

share for the general office space was therefore decreased to 60% and the walk / bike mode share was increased to 15%.

Table 9 outlines the anticipated trip generation potential of the proposed development by travel mode based on assumed mode share targets.

Table 9 - Trips Generated by Travel Mode

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
710	General Office	Auto	60%	93	14	107	17	95	112
		Passenger	15%	23	4	27	4	24	28
		Transit	10%	16	2	18	3	16	19
		Walk / Bike	15%	23	4	27	4	24	28
820	Shopping Centre	Auto	70%	6	4	10	18	20	38
		Passenger	15%	1	1	2	4	4	8
		Transit	10%	1	1	2	3	3	6
		Walk / Bike	5%	0	0	0	1	1	2
932	High-Turnover Restaurant	Auto	70%	25	20	45	27	17	44
		Passenger	15%	5	4	9	6	4	10
		Transit	10%	4	3	7	4	2	6
		Walk / Bike	5%	2	1	3	2	1	3
Total		**Auto Trips**		**124**	**38**	**162**	**62**	**132**	**194**
		Passenger		**29**	**9**	**38**	**14**	**32**	**46**
		Transit		**21**	**6**	**27**	**10**	**21**	**31**
		Walk / Bike		**29**	**9**	**38**	**14**	**32**	**46**

3.1.2 Pass-By and Internal Capture

A portion of the auto trips generated by the proposed restaurant and commercial spaces will be 'pass-by' in nature. Pass-by trips are considered intermediate stops between an origin and a destination. They are site trips that are drawn from existing traffic volumes on the road network that are "passing-by" the site. While the total number of trips generated by a given development remains the same, the turning movements at study area intersections and site accesses require adjustments to reflect pass-by traffic. The rate of pass-by traffic is based on the specific land use and the various pass-by rates were obtained from the *ITE Trip Generation Manual*. A pass-by rate of 43% was used for the restaurant land use and a pass-by rate of 34% was used for the commercial land use. Due to the nature of the proposed land uses, these pass-by rates were applied to the PM peak hour only.

When predicting trips that are associated with different land use types the interaction between those land use types must be accounted for by applying the principals of internal capture adjustments. Internal capture trips are trips which are shared between two or more uses on the same site. A portion of the generated trips for each individual land use is therefore drawn from the adjacent land uses. Internal capture adjustments were made to account for vehicles that visit more than one land use within the subject commercial development. Since these trips are contained within the subject site, accounting for each trip separately on the roadway network would result in "double-counting". For this reason, land uses that may have associated internal capture trips between one another ultimately had their net new trips adjusted consistent with typical industry standards. In the subject development, the land uses that are subject to internal capture reductions are the commercial and restaurant land uses. Due to the nature of the proposed land uses, the internal capture rates were applied to the PM peak hour only.

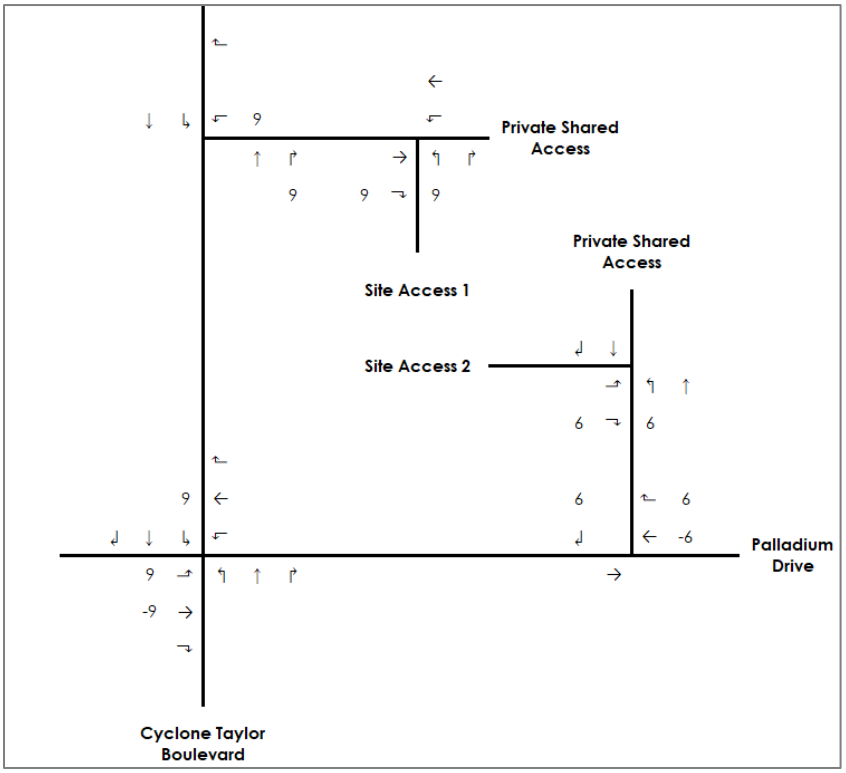
Table 10 outlines the pass-by, internal capture, and net new trips anticipated for the proposed development.

Figure 10 illustrates the pass-by trips the proposed development is anticipated to generate in the PM peak hour.

Table 10 - Pass-By and Internal Capture Trips

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
710	General Office	Auto Trips		93	14	107	17	95	112
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		93	14	107	17	95	112
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		93	14	107	17	95	112
820	Shopping Centre	Auto Trips		6	4	10	18	20	38
		Internal Capture	10%	0	0	0	2	2	4
		Net Auto Trips		6	4	10	16	18	34
		Pass-By	34%	0	0	0	6	6	12
		Net New Auto Trips		6	4	10	10	12	22
932	High Turn-Over Restaurant	Auto Trips		25	20	45	27	17	44
		Internal Capture	10%	0	0	0	2	2	4
		Net Auto Trips		25	20	45	25	15	40
		Pass-By	43%	0	0	0	9	9	18
		New Auto Trips		25	20	45	16	6	22
	Total	Auto Trips		124	38	162	62	132	194
		Internal Capture		0	0	0	4	4	8
		Net Auto Trips		124	38	162	58	128	186
		Pass-By		0	0	0	15	15	30
		Net New Auto Trips		**124**	**38**	**162**	**43**	**113**	**156**

Figure 10 - Pass-By Trips (PM Peak Hour)



3.1.3 Trip Distribution

The distribution of traffic to / from the study area was determined through examination of the TRANS Committee's 2011 Origin-Destination (O-D) Survey for the Kanata / Stittsville District. The percentage of traffic at both Private Shared Access intersections from the 2019 existing traffic volumes was used to determine the distribution of site traffic through both study area intersections.

Table 11 provides a summary of the estimated distribution for the traffic generated by the proposed development.

Table 11 - Traffic Distribution Assumptions

Cardinal Direction		Via (to / from)		
		Cyclone Taylor Boulevard	Palladium Drive	Palladium Drive
		(North)	(East)	(West)
North	2%	2%		
East	40%		32%	8%
South	3%			3%
West	0%			
Internal (Kanata / Stittsville)	55%		44%	11%
Total	**100%**	**2%**	**76%**	**22%**

3.1.4 Trip Assignment

Site generated trips were assigned to the study area road network based on the trip distribution assumptions outlined in **Table 11**. New site trips are assigned to the road network and pass-by trips (outline in **Figure 10**) were then added to develop the net new site trips generated by the proposed development.

Figure 11 outlines the site assignment assumptions.

Figure 12 illustrates the net site generated trips for the proposed development after accounting for pass-by trips, during the AM and PM peak hours.

Figure 11 - Site Traffic Assignment

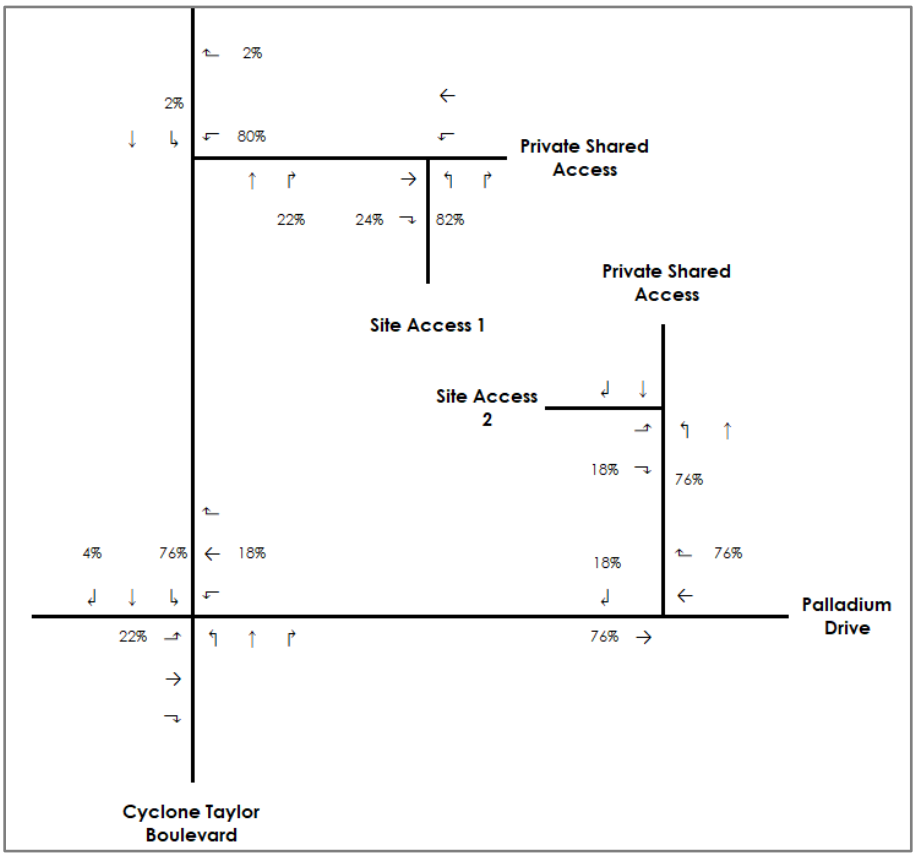
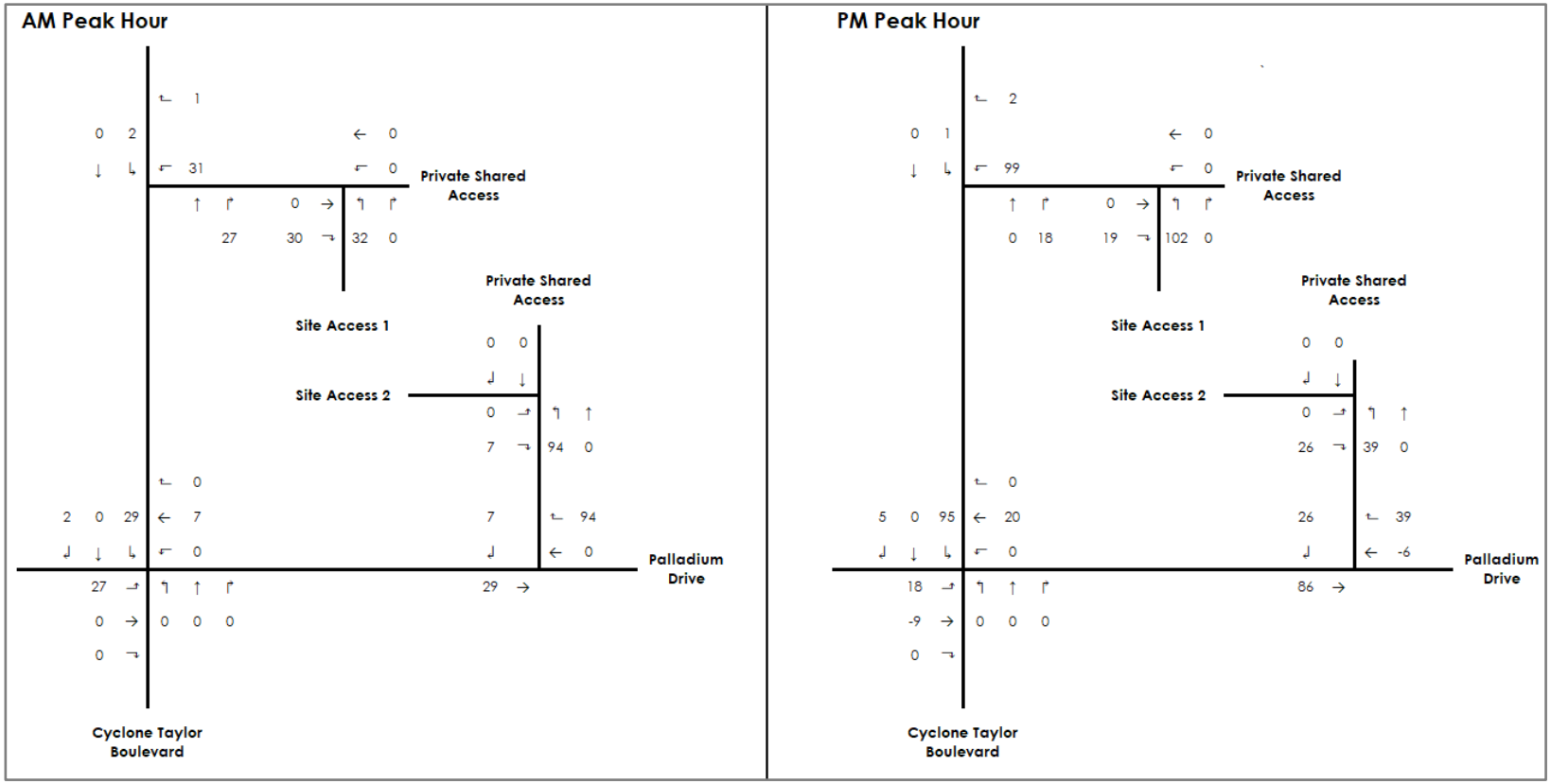


Figure 12 - Net Site Generated Traffic Volumes



3.2 BACKGROUND NETWORK TRAVEL DEMAND

3.2.1 Transportation Network Plans

As outlined in **Table 4** in **section 2.1.3.1**, a number of road network projects are expected to occur within the vicinity of the proposed development. Through recent discussions with City of Ottawa staff, it is understood that the timelines for the roadway projects outlined in the City of Ottawa's *2013 Transportation Master Plan* have been pushed back one Phase (i.e. Phase 2 (2020 – 2025) projects are now Phase 3 (2026 -2031) projects, etc.). For this reason, it was assumed that there will not be any improvements to the roadway network in the vicinity of the subject site prior to the 2024 ultimate (+5 year) horizon.

3.2.2 Background Growth

The existing traffic counts were grown at a rate of 2% annually, non-compounding, to represent 2024 background traffic volumes.

3.2.3 Other Developments

As outlined in **Section 2.1.3.2**, a number of background developments are planned surrounding the subject site. The two background developments that will impact the traffic volumes at the study area intersections are the developments located at 173 Huntmar Drive and 195 Huntmar Drive. The traffic generated by the 173 Huntmar Drive development was obtained from the *173 Huntmar Drive Mixed-Use Development Community Transportation Study* (Parsons 2014). The build-out year of this development is not outlined in the CTS; therefore, to remain conservative, it was assumed that it will be built by the 2024 ultimate horizon. The traffic generated by the 195 Huntmar Drive development was obtained from the *Shenkman / Cavanagh Kanata West Community Transportation Study* (Parsons 2016). The build-out year of this development is also not outlined in the CTS; therefore, to remain conservative, it was also assumed that it will be built by the 2024 ultimate horizon.

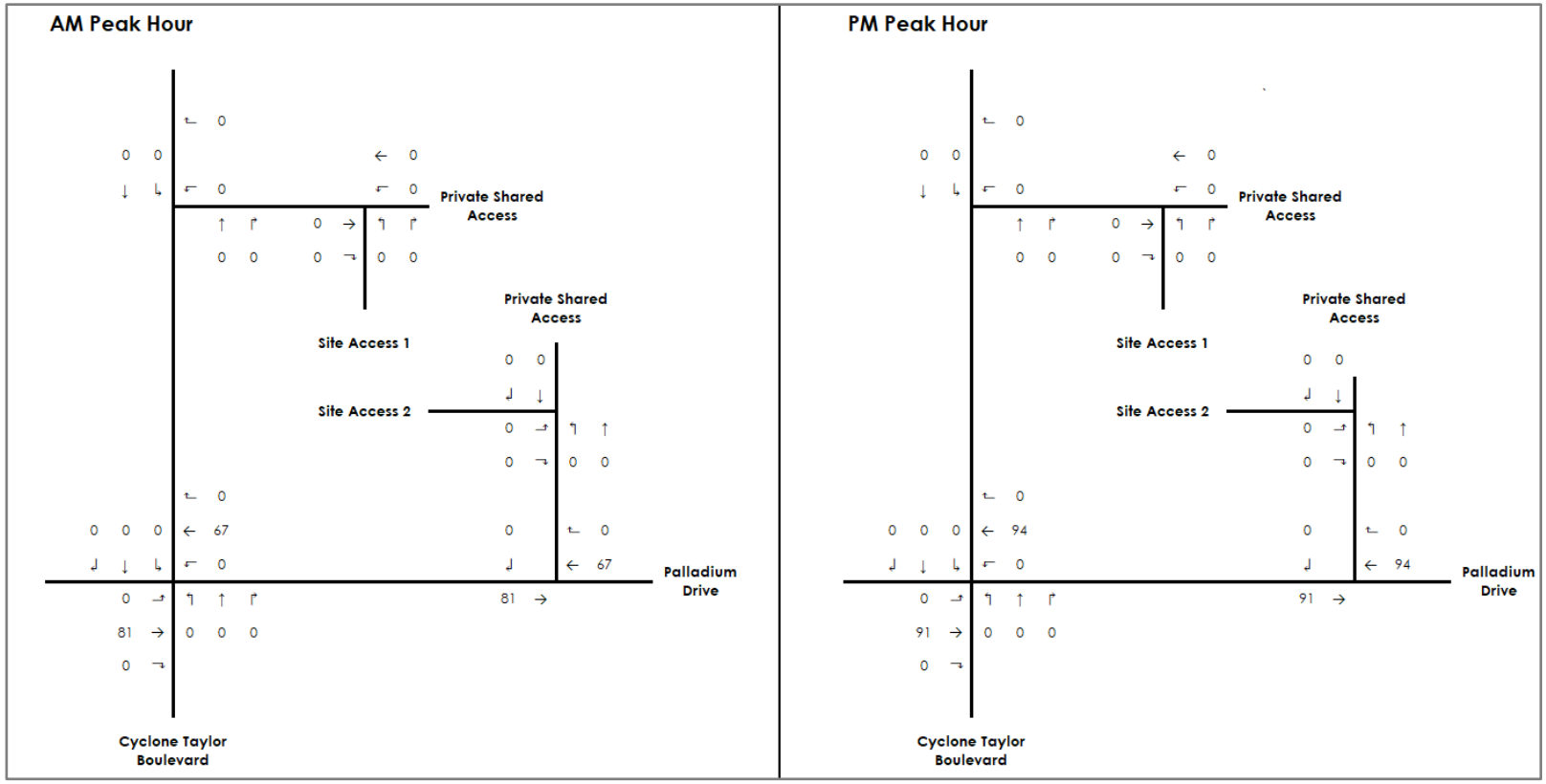
Figure 13 below illustrates the traffic generated by the two background developments at the study area intersections.

Appendix C contains the excerpts from the two aforementioned Community Transportation Studies in which the background traffic data was obtained.

3.3 DEMAND RATIONALIZATION

The proposed development is not anticipated to encounter any capacity restrictions that cannot be resolved through roadway improvements and therefore no demand rationalization is required.

Figure 13 - Background Developments



4.0 STRATEGY

4.1 DEVELOPMENT DESIGN

4.1.1 Design for Sustainable Modes

Bicycle facilities: A total of 36 bicycle parking spaces are provided for the proposed development. These bicycle parking spaces are provided at the main entrances to the building, on the western and eastern sides.

Pedestrian facilities: Pedestrian connections are included on the site plan which will connect the proposed building to the existing sidewalks along Palladium Drive and Cyclone Taylor Boulevard.

Parking areas: A total of 267 vehicle parking spaces are provided. This consists of 245 regular vehicle parking spaces, 8 accessible parking spaces, and 14 electric car charging spaces.

The accessible parking spaces are provided adjacent to the entrances to the building. The majority of the electric car charging spaces (10) are provided on the north side of the building and the remaining 4 electric car charging spaces are provided on the east side of the building.

Transit facilities: Transit stops for OC Transpo routes 62 and 162 are currently located at the intersection of Palladium Drive and Cyclone Taylor Boulevard. There are sidewalks along both sides of Palladium Drive and Cyclone Taylor Boulevard as well as pedestrian crosswalks at the intersection of Palladium Drive at Cyclone Taylor Boulevard for pedestrians to access these transit stops.

4.1.2 Circulation and Access

Two site accesses are proposed along the Private Shared Access. Site Access 1 is located 20m east of Cyclone Taylor Boulevard and Site Access 2 is located 40m north of Palladium Drive. Both site accesses will be full movements accesses with no turning restrictions and they will be stop controlled along the Site Access approach.

Within the vicinity of the subject site, pedestrian access is facilitated through the existing sidewalks along Palladium Drive, Cyclone Taylor Boulevard, and the Private Shared Access. Sidewalk connections are proposed between Palladium Drive, Cyclone Taylor Boulevard, and the proposed building to facilitate pedestrian access to and from the building.

4.1.3 New Street Networks

Not applicable; exempted during screening and scoping.

4.2 PARKING

4.2.1 Parking Supply

Auto Parking - As per City of Ottawa Zoning By-law 2008-250 (Sections 101 and 102), the minimum parking space requirement is 2.3 spaces per 100m^2 of office space (gross floor area), 3.4 spaces per 100m^2 of retail space (gross floor area), and 10 spaces per 100m^2 of restaurant space (gross floor area).

Based on the proposed land uses, a minimum of 171 vehicle spaces are required for the office component, 35 vehicle spaces are required for the retail component, and 47 vehicle spaces are required for the restaurant component, for a total of 253 vehicle parking spaces for the proposed development.

The proposed site plan indicates there will be a total of 267 parking spaces provided, which meets the minimum requirements.

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

Based on the proposed land uses, a minimum of 30 bicycle spaces are required for the office component, 4 bicycle spaces are required for the retail component, and 2 bicycle spaces are required for the restaurant component, for a total of 36 bicycle spaces for the proposed development.

The proposed site plan indicates there will be 36 bicycle spaces provided, which meets the minimum requirements.

4.2.2 Spillover Parking

Not applicable; exempted during screening and scoping.

4.3 BOUNDARY STREET DESIGN

4.3.1 Design Concept

As outlined in the City of Ottawa's *Official Plan* Schedule B, both Palladium Drive and Cyclone Taylor Boulevard are within the 'Mixed Use Centre' designation. With this designation, the MMLOS targets are prescribed in the City of Ottawa's *Multi-Modal Level of Service (MMLOS) Guidelines*.

Based on the aforementioned, the Pedestrian Level of Service (PLOS) target is C for both Palladium Drive and Cyclone Taylor Boulevard. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master Plan* (2013) designates Palladium Drive as a local cycling route, therefore the Bicycle Level of Service (BLOS) target for this facility is B. As Cyclone Taylor Boulevard does not have a cycling designation, the BLOS target for this facility is D. Transit service travelling along both Palladium Drive and Cyclone Taylor Boulevard currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Palladium Drive is designated as full truck route and therefore has a Truck Level of Service (TkLOS) target of D. Cyclone Taylor Boulevard is not a designated truck route, therefore, the TkLOS does not apply for this facility.

Table 12 presents the MMLOS conditions for both roadway segments.

Due to the high operating speed along Palladium Drive and the lack of boulevard across the frontage of the subject site, the Pedestrian Level of Service (PLOS) target of C is not currently being met. Reducing the posted speed limit to 60 km/hr along Palladium Drive would allow this segment to meet the PLOS target of C. Alternatively, implementing a 0.5 – 2.0m boulevard along Palladium Drive across the frontage of the subject site (i.e. between the road and sidewalk) would also allow the PLOS target to be met. Cyclone Taylor Boulevard currently meets the PLOS target of C.

Due to the posted speed limit and the lack of dedicated cycling facilities along Palladium Drive, this roadway segment currently does not meet the Bicycle Level of Service (BLOS) target of B Implementing a physically separated bicycle facility would allow the BLOS target to be met, however, this this would have financial and property impacts. Another potential solution to meet the BLOS target would be to implement dedicated on-street bicycle lanes while reducing the posted speed limit to 60 km/hr. If bicycle lanes are not feasible, reducing the speed limit to 40 km/hr while maintaining the mixed-use lanes would also allow the BLOS target to be met, however, reducing the speed limit by this amount would be unrealistic as this roadway is classified as an arterial.

As Cyclone Taylor Boulevard does not have a posted speed limit, the default speed limit is 50 km/hr. Based on this speed limit, the BLOS target of D is currently being met along Cyclone Taylor Boulevard.

In terms of Transit Level of Service (TLOS), both Palladium Drive and Cyclone Taylor Boulevard meet the TLOS target of D.

Palladium Drive currently has >3.7m curb lane widths, and therefore, this roadway segment meets the TkLOS target of D.

Table 12 - MMLOS Conditions (Segments)

Segment		Palladium Drive		Cyclone Taylor Boulevard		Target
		Existing	Build-out	Existing	Build-out	
Pedestrian	Sidewalk width (m)	2	**	2	**	C
	Boulevard width (m)	0[1]	**	0[1]	**	
	AADT > 3000?	No	**	No	**	
	On-Street parking	No	**	No	**	
	Operating speed (kph)	80	**	60	**	
	Level of Service	**D**	****	**C**	****	
Bicycle	Type of facility	Mixed Traffic	**	Mixed Traffic	**	B / D
	Number of travel lanes (both directions)	4	**	3	**	
	Raised Median?	Yes	**	No	**	
	Bike lane width (m)	N/A	**	N/A	**	
	Operating speed (kph)	70	**	50	**	
	Bike lane blockage freq.	Rare	**	Rare	**	
	Level of Service	**F**	****	**D**	****	
Transit	Type of facility	Mixed	**	Mixed	**	D
	Parking/driveway friction	Limited	**	Limited	**	
	Level of Service	**D**	****	**D**	****	
Truck	Curb lane width (m)	> 3.7m	**	Not Applicable		D / N/A
	Number of travel lanes (both directions)	> 2	**			
	Level of Service	**A**	****			

Notes:
1. Across the frontages of the subject site, there are no boulevards along both road segments
** Indicates there are no changes between horizons or scenarios
The target of B / D indicates that the target is B for Palladium Drive and D for Cyclone Taylor Boulevard

4.4 ACCESS INTERSECTIONS DESIGN

4.4.1 Location and Design of Access

Site Access 1 is located 20m east of Cyclone Taylor Boulevard and Site Access 2 is located 40m north of Palladium Drive. Both site accesses will be full movements accesses with no turning restrictions and they will be stop-controlled along the Site Access approaches.

4.4.2 Intersection Control

The site accesses are low-volume driveways located on a Private Shared Access and therefore stop control on the minor site access approach is appropriate for both site accesses.

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 Cominar Real Estate Investing Trust. Ford General Motors will eventually move into the office space, however, the tenants for the retail and restaurant components are not yet known. 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 65%. Based on the availability of transit service and the lack of bicycle facilities, the auto mode share for the restaurant and retail land uses was increased to 70%. At the direction of the City of Ottawa, the auto mode share for the office land use was decreased to 60% to account for the lower auto mode share for trips 'within the district' (i.e., within the TAZ).

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, these 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 9**, 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.

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 10% was adopted for all three land uses contained within the proposed development. The forecasted transit trips for the proposed development is 27 and 31 total transit trips during the AM and PM peak hours, respectively.

There are two OC Transpo transit routes within a 400m walking distance of the proposed site; routes 62 and 162. Route 162 operates during the afternoon and night between Stittsville and Terry Fox Station, and therefore will not likely be the primary route for transit users destined to the proposed site. OC Transpo route 62 is a regular route that operates at 30-minute headways during the weekday morning and afternoon peak periods and will likely be the primary route for transit users destined to the proposed site.

Standard and articulated buses have seated capacities of 40 and 70 people; respectively. With the 30-minute headways for route 62, the combined hourly transit capacity is estimated at 80 - 140 people per hour during the weekday AM and PM peak periods. The proposed development is therefore anticipated to occupy between 20% and 40% of transit capacity.

4.7.2 Transit Priority

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.

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 three existing study area intersections. Any intersection improvements triggered through the intersection level of service analysis will be highlighted and adopted accordingly. The signal timing plan for the Palladium Drive at Cyclone Taylor Boulevard was obtained from the City of Ottawa. It was noted that the total splits included in the signal timing plan truncate the decimal places, and therefore, in the Synchro analysis, the total splits were adjusted to equate to the minimum splits for the eastbound, westbound, and northbound directions. This methodology was vetted by the City of Ottawa at the time that the analysis was being undertaken (i.e. March 2019).

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.

4.9.2.1 2019 Existing Conditions

Figure 6 illustrates 2019 Existing AM and PM peak hour traffic volumes at the study area intersections.

Table 13 summarizes the results of the Synchro analysis under 2019 existing conditions. All study area intersections currently operate acceptably and therefore no improvements are required to supplement existing conditions.

Appendix E contains detailed intersection performance worksheets.

Table 13 - 2019 Existing Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Palladium Drive at Cyclone Taylor Boulevard	Traffic Signals	EB	Left	A (A)	0.03 (0.01)	2.1 (5.9)	2.3 (1.4)
			Through	A (A)	0.14 (0.23)	2.3 (7.0)	9.2 (23.7)
			Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
		WB	Left	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
			Through	A (A)	0.08 (0.35)	2.2 (7.8)	5.8 (35.9)
			Right	A (A)	0.03 (0.01)	2.1 (5.9)	0.0 (0.0)
		NB	Left	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
			Through / Right	A (A)	0.00 (0.00)	0.0 (28.9)	0.0 (0.0)
		SB	Left	A (A)	0.13 (0.28)	26.7 (25.4)	3.3 (10.0)
			Through / Right	A (A)	0.00 (0.03)	26.2 (24.4)	0.0 (0.0)
		Overall Intersection		**A (A)**	**0.16 (0.32)**	**3.3 (9.5)**	**-**
Cyclone Taylor Boulevard at Private Shared Access	Minor Stop	WB	Left / Right	A (A)	0.01 (0.12)	9.3 (9.9)	0.2 (2.9)
		NB	Through / Right	A (A)	0.03 (0.00)	0.0 (0.0)	0.0 (0.0)
		SB	Left / Through	A (A)	0.00 (0.00)	0.6 (0.0)	0.0 (0.0)
		Overall Intersection		**A (A)**	**-**	**0.6 (0.0)**	**-**
Palladium Drive at Private Shared Access (right-in / right-out)	Minor Stop	WB	Through / Right	A (A)	0.07 (0.22)	0.0 (0.0)	0.0 (0.0)
		SB	Right	A (B)	0.00 (0.04)	9.2 (10.2)	0.1 (0.8)
		Overall Intersection		**A (A)**	**-**	**0.1 (0.3)**	**-**

Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity

MMLOS – Palladium Drive at Cyclone Taylor Boulevard Intersection (2019 Existing):

Based on the Land-Use Designations for Palladium Drive and Cyclone Taylor Boulevard, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa *Transportation Master Plan* (2013) designates Palladium Drive as a future local cycling route, therefore the Bicycle Level of Service (BLOS) target is B. Transit service travelling on Palladium Drive and Cyclone Taylor Boulevard currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Palladium Drive is designated as full truck route and therefore has a Truck Level of Service (TkLOS) target of D. As Palladium Drive is an arterial road, it is subject to a Vehicle Level of Service (VLOS) target of D.

Table 14 outlines the MMLOS conditions for the signalized intersection of Palladium Drive at Cyclone Taylor Boulevard under 2019 existing conditions.

The Pedestrian Level of Service (PLOS) at the intersection of Palladium Drive at Cyclone Taylor Boulevard is currently operating with a PLOS of F, which is below 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 along Palladium Drive is not a feasible option. Incorporating pedestrian refuge areas by means of wide medians (i.e. > 2.4m) is also not a feasible option due to spatial constraints.

The Bicycle Level of Service (BLOS) at the intersection is currently operating with a BLOS of F, which is below 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. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. The combination of dedicated bicycle lanes along with the reduction in speed limit to 40 km/hr would allow the BLOS target of B to be met. Another possibility would be to implement a separated bicycle facility along Palladium Drive, which would also allow the BLOS target to be met.

The transit level of service at the intersection 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. The signal timing plan that was obtained from the City of Ottawa indicates that this intersection operates with a split phase, with the northbound and southbound vehicles operating on separate phases. It also indicates that there is only one signal timing plan, which means that this intersection is always operating with a split phase. It is assumed that during major events at the adjacent Canadian Tire Centre, the intersection of Palladium Drive at Cyclone Taylor Boulevard needs to operate as a split phase to allow traffic to exit the parking lot on the south leg of this intersection. Removing the split phase, at least during the AM and PM peak, would reduce the amount of delay experienced at the intersection, thus allowing the TLOS to meet the target of D.

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

The Vehicular Level of Service (VLOS) at this intersection is currently operating with a VLOS of C, which meets the target of D.

Table 14 - 2019 Existing Intersection MMLOS (Palladium / Cyclone Taylor)

Segment		2019 Existing				Target
		East Leg	West Leg	North Leg	South Leg	
PLOS	Lanes crossed	6	6	5	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Permissive	Permissive	Protected	Protected	
	Right turn conflict	Protected / Permissive	Protected / Permissive	Protected / Permissive	Protected / Permissive	
	RTOR (yes/no)	Yes	Yes	Yes	Yes	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	> 10m to 15m	> 10m to 15m	> 10m to 15m	> 10m to 15m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	90	90	90	90	
	Effective walk time (s)	7	7	7	7	
	PETSI Points	20	20	37	53	
	PETSI Points LOS	F	F	E	D	
	Average Pedestrian Delay (s)	38.3	38.2	38.2	38.2	
	Ped Delay LOS	D	D	D	D	
	Level of Service	F	F	E	D	
	Level of Service	**F**				
BLOS	Type of bike lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	B
	Left-turn - lanes crossed	1	1	1	0	
	Left-turn - vehicle operating speed (km/hr)	> 60	> 60	50	< 50	
	Right-turn - number of turn lanes	1	1	1	0	
	Right-turn - turn lane length (m)	> 50	25 – 50	> 50	N/A	
	Right-turn - turning speed (km/hr)	> 25	> 25	> 25	> 25	
	Right-turn - location of bike lane	N/A	N/A	N/A	N/A	
	Level of Service	F	F	F	B	
	Level of Service	**F**				
TLOS	Intersection Average Delay (s)	≤ 40				D
	Level of Service	**E**				
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	10 to 15	10 to 15	D
	Number of receiving lanes	2	2	2	2	
	Level of Service	B	B	B	B	
	Level of Service	**B**				
VLOS	Maximum Volume-to-capacity (v/c)	0.78	0.61	0.18	0.00	D
	Level of Service	C	B	A	A	
	Level of Service	**C**				

4.9.2.2 2019 Total Future Conditions

Figure 14 illustrates 2019 Total Future AM and PM peak hour traffic volumes at the study area intersections.

Table 15 summarizes the results of the Synchro analysis for the 2019 total future horizon. All study area intersections are anticipated to operate satisfactorily under 2019 total future conditions.

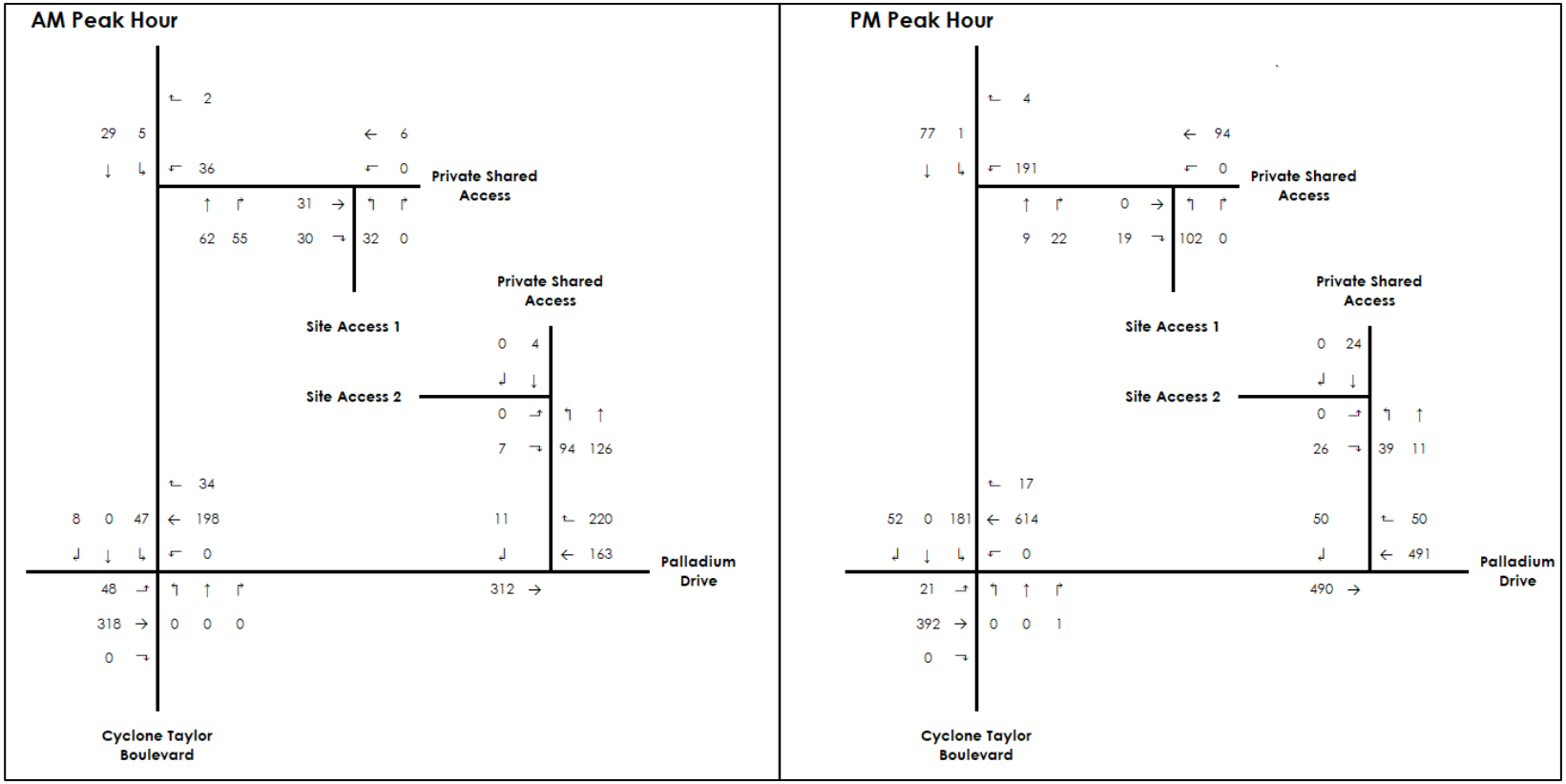
Appendix E contains detailed intersection performance worksheets.

Table 15 - 2019 Total Future Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Palladium Drive at Cyclone Taylor Boulevard	Traffic Signals	EB	Left	A (A)	0.07 (0.07)	2.8 (7.8)	4.4 (5.2)
			Through	A (A)	0.15 (0.25)	2.9 (8.5)	9.4 (25.1)
			Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
		WB	Left	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
			Through	A (A)	0.09 (0.40)	2.8 (9.6)	6.2 (40.4)
			Right	A (A)	0.02 (0.01)	2.6 (7.2)	0.0 (0.0)
		NB	Left	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
			Through / Right	A (A)	0.00 (0.00)	0.0 (28.4)	0.0 (0.0)
		SB	Left	A (A)	0.20 (0.40)	24.9 (23.3)	5.3 (17.9)
			Through / Right	A (A)	0.01 (0.04)	24.2 (21.5)	0.0 (0.0)
		Overall Intersection		**A (A)**	**0.18 (0.38)**	**4.7 (11.7)**	**-**
Cyclone Taylor Boulevard at Private Shared Access	Minor Stop	WB	Left / Right	A (B)	0.05 (0.26)	9.6 (10.8)	1.1 (7.2)
		NB	Through / Right	A (A)	0.05 (0.02)	0.0 (0.0)	0.0 (0.0)
		SB	Left / Through	A (A)	0.00 (0.00)	1.4 (0.1)	0.1 (0.0)
		Overall Intersection		**A (A)**	**-**	**2.1 (7.0)**	**-**
Palladium Drive at Private Shared Access (right-in / right-out)	Minor Stop	WB	Through / Right	A (A)	0.18 (0.21)	0.0 (0.0)	0.0 (0.0)
		SB	Right	A (B)	0.02 (0.08)	9.6 (10.6)	0.3 (1.8)
		Overall Intersection		**A (A)**	**-**	**0.1 (0.5)**	**-**

Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity

Figure 14 - 2019 Total Future Traffic Volumes



MMLOS – Palladium Drive at Cyclone Taylor Boulevard Intersection (2019 Total Future):

Table 16 outlines the MMLOS conditions for the signalized intersection of Palladium Drive at Cyclone Taylor Boulevard under 2019 total future conditions.

The Pedestrian Level of Service (PLOS) at the intersection of Palladium Drive at Cyclone Taylor Boulevard is projected to continue to operate with a PLOS of F, which is below 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 along Palladium Drive is not a feasible option. Incorporating pedestrian refuge areas by means of wide medians is also not a feasible option due to spatial constraints.

The Bicycle Level of Service (BLOS) at the intersection is projected to continue to operate with a BLOS of F, which is below 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. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential BLOS at signalized arterial intersections. The combination of dedicated bicycle lanes along with the reduction in speed limit to 40 km/hr would allow the BLOS target of B to be met. Another possibility would be to implement a separated bicycle facility along Palladium Drive, which would also allow the BLOS target to be met.

The transit level of service at the intersection is projected to continue to operate 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. The signal timing plan that was obtained from the City of Ottawa indicates that this intersection operates with a split phase, with the northbound and southbound vehicles operating on separate phases. It also indicates that there is only one signal timing plan, which means that this intersection is always operating with a split phase. It is assumed that during major events at the adjacent Canadian Tire Centre, the intersection of Palladium Drive at Cyclone Taylor Boulevard needs to operate as a split phase to allow traffic to exit the parking lot on the south leg of this intersection. Removing the split phase, at least during the AM and PM peak, would reduce the amount of delay experienced at the intersection, thus allowing the TLOS to meet the target of D.

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

The Vehicular Level of Service (VLOS) at this intersection is projected to continue to operate with a VLOS of C, which meets the target of D.

Table 16 - 2019 Total Future Intersection MMLOS (Palladium / Cyclone Taylor)

Segment		2019 Existing				Target
		East Leg	West Leg	North Leg	South Leg	
PLOS	Lanes crossed	6	6	5	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Permissive	Permissive	Protected	Protected	
	Right turn conflict	Protected / Permissive	Protected / Permissive	Protected / Permissive	Protected / Permissive	
	RTOR (yes/no)	Yes	Yes	Yes	Yes	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	> 10m to 15m	> 10m to 15m	> 10m to 15m	> 10m to 15m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	90	90	90	90	
	Effective walk time (s)	7	7	7	7	
	PETSI Points	20	20	37	53	
	PETSI Points LOS	F	F	E	D	
	Average Pedestrian Delay (s)	38.3	38.2	38.2	38.2	
	Ped Delay LOS	D	D	D	D	
	Level of Service	F	F	E	D	
	Level of Service	**F**				
BLOS	Type of bike lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	B
	Left-turn - lanes crossed	1	1	1	0	
	Left-turn - vehicle operating speed (km/hr)	> 60	> 60	50	< 50	
	Right-turn - number of turn lanes	1	1	1	0	
	Right-turn - turn lane length (m)	> 50	25 – 50	> 50	N/A	
	Right-turn - turning speed (km/hr)	> 25	> 25	> 25	> 25	
	Right-turn - location of bike lane	N/A	N/A	N/A	N/A	
	Level of Service	F	F	F	B	
	Level of Service	**F**				
TLOS	Intersection Average Delay (s)	≤ 40				D
	Level of Service	**E**				
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	10 to 15	10 to 15	D
	Number of receiving lanes	2	2	2	2	
	Level of Service	B	B	B	B	
	Level of Service	**B**				
VLOS	Maximum Volume-to-capacity (v/c)	0.78	0.61	0.18	0.00	D
	Level of Service	C	B	A	A	
	Level of Service	**C**				

4.9.2.3 2024 Ultimate Conditions

Figure 15 illustrates 2024 Ultimate AM and PM peak hour traffic volumes at the study area intersections.

Table 17 summarizes the results of the Synchro analysis for the 2024 ultimate horizon. All study area intersections are anticipated to operate satisfactorily under 2024 ultimate conditions.

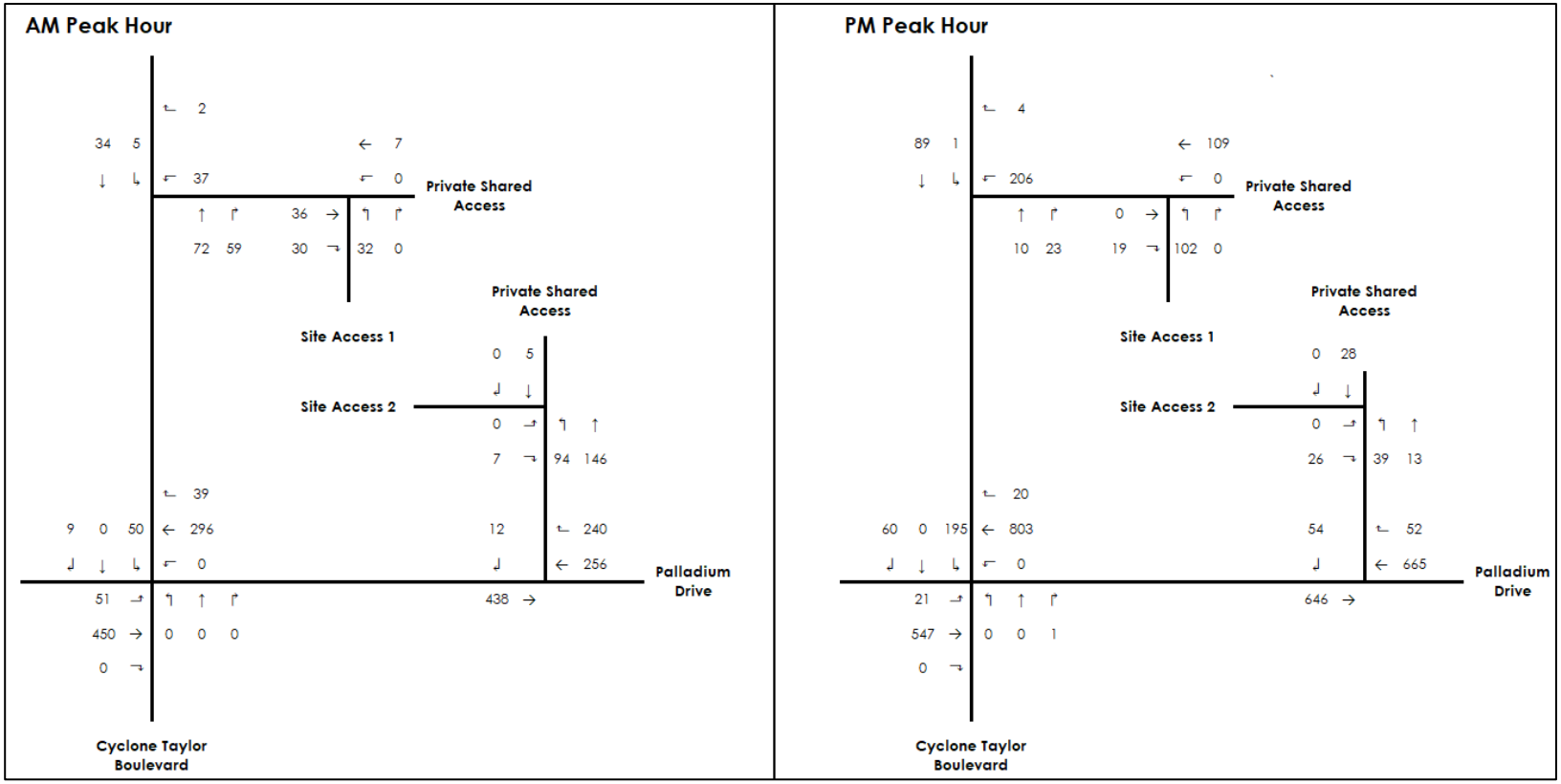
Appendix E contains detailed intersection performance worksheets.

Table 17 – 2024 Ultimate Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Palladium Drive at Cyclone Taylor Boulevard	Traffic Signals	EB	Left	A (A)	0.07 (0.07)	2.8 (7.9)	4.9 (5.6)
			Through	A (A)	0.19 (0.32)	3.1 (9.0)	14.0 (36.3)
			Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
		WB	Left	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
			Through	A (A)	0.12 (0.46)	2.8 (10.2)	9.2 (57.1)
			Right	A (A)	0.03 (0.01)	2.6 (7.2)	0.3 (0.0)
		NB	Left	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
			Through / Right	A (A)	0.00 (0.00)	0.0 (28.3)	0.0 (0.0)
		SB	Left	A (A)	0.19 (0.39)	25.0 (23.2)	5.8 (19.7)
			Through / Right	A (A)	0.01 (0.04)	24.3 (21.6)	0.0 (0.0)
		Overall Intersection		**A (A)**	**0.22 (0.43)**	**4.4 (11.7)**	**-**
Cyclone Taylor Boulevard at Private Shared Access	Minor Stop	WB	Left / Right	A (B)	0.05 (0.25)	9.7 (10.8)	1.1 (7.1)
		NB	Through / Right	A (A)	0.05 (0.02)	0.0 (0.0)	0.0 (0.0)
		SB	Left / Through	A (A)	0.00 (0.00)	1.0 (0.1)	0.1 (0.0)
		Overall Intersection		**A (A)**	**-**	**2.0 (6.8)**	**-**
Palladium Drive at Private Shared Access (right-in / right-out)	Minor Stop	WB	Through / Right	A (A)	0.19 (0.26)	0.0 (0.0)	0.0 (0.0)
		SB	Right	B (B)	0.02 (0.08)	9.9 (11.2)	0.3 (1.9)
		Overall Intersection		**A (A)**	**-**	**0.1 (0.4)**	**-**

Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity
3. # - 95th percentile volume exceeds capacity, queue may be longer

Figure 15 - 2024 Ultimate Traffic Volumes



MMLOS – Palladium Drive at Cyclone Taylor Boulevard Intersection (2024 Ultimate):

Table 18 outlines the MMLOS conditions for the signalized intersection of Palladium Drive at Cyclone Taylor Boulevard under 2019 total future conditions.

The Pedestrian Level of Service (PLOS) at the intersection of Palladium Drive at Cyclone Taylor Boulevard is projected to continue to operate with a PLOS of F, which is below 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 along Palladium Drive is not a feasible option. Incorporating pedestrian refuge areas by means of wide medians is also not a feasible option due to spatial constraints.

The Bicycle Level of Service (BLOS) at the intersection is projected to continue to operate with a BLOS of F, which is below 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. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential BLOS at signalized arterial intersections. The combination of dedicated bicycle lanes along with the reduction in speed limit to 40 km/hr would allow the BLOS target of B to be met. Another possibility would be to implement a separated bicycle facility along Palladium Drive, which would also allow the BLOS target to be met.

The transit level of service at the intersection is projected to continue to operate 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. The signal timing plan that was obtained from the City of Ottawa indicates that this intersection operates with a split phase, with the northbound and southbound vehicles operating on separate phases. It also indicates that there is only one signal timing plan, which means that this intersection is always operating with a split phase. It is assumed that during major events at the adjacent Canadian Tire Centre, the intersection of Palladium Drive at Cyclone Taylor Boulevard needs to operate as a split phase to allow traffic to exit the parking lot on the south leg of this intersection. Removing the split phase, at least during the AM and PM peak, would reduce the amount of delay experienced at the intersection, thus allowing the TLOS to meet the target of D.

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

The Vehicular Level of Service (VLOS) at this intersection is projected to continue to operate with a VLOS of C, which meets the target of D.

Table 18 – 2024 Ultimate Intersection MMLOS (Palladium / Cyclone Taylor)

Segment		2019 Existing				Target
		East Leg	West Leg	North Leg	South Leg	
PLOS	Lanes crossed	6	6	5	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Permissive	Permissive	Protected	Protected	
	Right turn conflict	Protected / Permissive	Protected / Permissive	Protected / Permissive	Protected / Permissive	
	RTOR (yes/no)	Yes	Yes	Yes	Yes	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	> 10m to 15m	> 10m to 15m	> 10m to 15m	> 10m to 15m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	90	90	90	90	
	Effective walk time (s)	7	7	7	7	
	PETSI Points	20	20	37	53	
	PETSI Points LOS	F	F	E	D	
	Average Pedestrian Delay (s)	38.3	38.2	38.2	38.2	
	Ped Delay LOS	D	D	D	D	
	Level of Service	F	F	E	D	
	Level of Service	**F**				
BLOS	Type of bike lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	B
	Left-turn - lanes crossed	1	1	1	0	
	Left-turn - vehicle operating speed (km/hr)	> 60	> 60	50	< 50	
	Right-turn - number of turn lanes	1	1	1	0	
	Right-turn - turn lane length (m)	> 50	25 – 50	> 50	N/A	
	Right-turn - turning speed (km/hr)	> 25	> 25	> 25	> 25	
	Right-turn - location of bike lane	N/A	N/A	N/A	N/A	
	Level of Service	F	F	F	B	
	Level of Service	**F**				
TLOS	Intersection Average Delay (s)	≤ 40				D
	Level of Service	**E**				
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	10 to 15	10 to 15	D
	Number of receiving lanes	2	2	2	2	
	Level of Service	B	B	B	B	
	Level of Service	**B**				
VLOS	Maximum Volume-to-capacity (v/c)	0.78	0.61	0.18	0.00	D
	Level of Service	C	B	A	A	
	Level of Service	**C**				

5.0 CONCLUSION

This Transportation Impact Assessment (TIA) was prepared in support of a Site Plan application for a proposed development located at 800 Palladium Drive. The proposed site is located at the northeast corner of the Palladium Drive at Cyclone Taylor Boulevard intersection in the Kanata community of Ottawa, Ontario. The site features two full movement site accesses, both along a Private Shared Access road.

Development generated site trips are not anticipated to adversely impact traffic operations at all three study area intersections. All study area intersections are projected to operate acceptably under all horizons.

The Multi-Modal Level of Service (MMLOS) assessment for roadway segments found that the following improvements would allow the MMLOS targets to be met along Palladium Drive:

- Reducing the speed limit of Palladium Drive to 60 km/hr would allow the PLOS target to be met;
- Implementing a 0.5 – 2.0m boulevard along Palladium Drive across the frontage of the subject site would also allow the PLOS target to be met;
- Implementing a physically separated bicycle facility along Palladium Drive would allow the BLOS target to be met, however, this would have significant financial and spatial constraints;
- Implementing dedicated on-street bicycle lanes along Palladium Drive and reducing the speed limit to 60 km/hr would allow the BLOS target to be met, however, this would have spatial constraints; and
- Reducing the speed limit along Palladium Drive to 40 km/hr while maintaining the existing mixed-use bicycle lanes would allow the BLOS target to be met, however, this reduction in speed limit is not feasible as it is an arterial roadway.

The MMLOS assessment for the signalized intersection of Palladium Drive at Cyclone Taylor found that the following improvements would allow the MMLOS targets to be met:

- Reducing the number of lanes along Palladium Drive would improve both the PLOS and BLOS, however, this is not a feasible solution as it would adversely affect the operations of motor vehicles as well as transit operations;
- Incorporating pedestrian refuge areas by means of wide medians (i.e. > 2.4m) would improve the PLOS, however, due to spatial constraints, this is not a feasible solution;
- Reducing the speed along Palladium Drive to 40 km/hr along with the implementation of dedicated bicycle lanes would allow the BLOS target to be met, however, this reduction in speed limit is not a feasible option as it is an arterial roadway;
- Implementing a physically separated bicycle facility along Palladium Drive would allow the BLOS target to be met at the intersection; and

- Removing the split phase from the signal timing plan, at least during the morning and afternoon peaks, would improve the transit level of service as it would decrease the overall delay experienced at the intersection.

Based on the transportation evaluation presented in this study, the proposed development located at 800 Palladium Drive can be supported and should be permitted to proceed from a transportation perspective.

APPENDICES

Appendix A COMMENT RESPONSE MEMO

Stantec

Memo

To:	Rosanna Baggs 110 Laurier Avenue West, 4th Floor Ottawa, ON K1P 1J1	From:	Lauren O'Grady, P.Eng. 400 – 1331 Clyde Avenue Ottawa, ON K2C 3G4
File:	800 Palladium Drive	Date:	May 14, 2019

Reference: 163601264 – 800 Palladium Drive

In March 2019 Stantec Consulting Ltd. (Stantec) prepared the *800 Palladium Drive Transportation Impact Assessment* on behalf of Cominar for a proposed development located in Kanata in the City of Ottawa. In April 2019 Stantec received comments from the City of Ottawa.

Table 1 below includes the comments from the City of Ottawa along with the accompanying responses by Stantec.

	City of Ottawa Comment	Stantec Response
Transportation Engineering Services		
1	The previous comments provided following the Forecasting Report submission were not addressed • The auto trips (Table 8) for general office is overly estimated. • Provide justification for using 2% background growth. The "Shenkman/Cavanagh Kanata West Community Transportation Study" from 2016 for instance (which was referenced in the report) shows a historical growth at the nearby Huntmar Drive/Palladium Drive intersection that is much higher than 2%.	Due to the minimal transit service currently provided in the vicinity of the subject development, an auto mode share of 70% was assumed for the office land use as part of the Step 3 Forecasting Report. Based on the comment we received from TES on the Step 3 report, we decreased the auto mode share to 60% as part of the Step 4 report. It is not recommended to decrease this auto mode share any lower than 60% as there is limited transit service in the area and there are no plans to provide additional transit service within the horizons of the subject study. It is recommended that we keep the auto mode share for the office land use at 60%. To clarify, the Shenkman / Cavanagh report outlines that the growth that the Huntmar / Palladium intersection experienced between 2006 and 2014 was significant, however, this was mainly due to the developing Fairwinds lands to the south. Based on the current development applications in the vicinity of the subject study, this growth trend will not continue at this rate into the future. As outlined in Section 2.1.3.2 and Section 3.2.3 of the TIA, there are numerous background development that were accounted for as part of the subject traffic study. These background developments were explicitly added to the roadway network as background traffic. As outlined in Section 3.2.2, an additional 2% annual growth was applied on top of these background developments to account for growth outside the study area. In total, the background developments that were explicitly added plus the 2% nominal annual growth amounts to an annual growth rate of 7%.
2	Different operating speeds were used to calculate the PLOS and BLOS for Palladium Drive and Cyclone Taylor Boulevard. In the future, the consultant should be consistent with this review.	In the City's MMLOS Guidelines, both the PLOS and BLOS for roadway segments use the 'operating speed' as a criterion for determining the MMLOS. The Guidelines do not go into detail about how this operating speed should be determined in the absence of speed surveys, therefore, it is understood that the posted speed limit could be used. The

Reference: **163601264 – 800 Palladium Drive**

		City issued an Addendum to the MMLOS Guidelines, and in it, Section 2.5 states that the operating speed for PLOS segment evaluation can be the posted speed limit plus 10km/h. This addendum provided no reference to the operating speed for BLOS, therefore, it is understood that the operating speed for BLOS can still be the posted speed limit. If the BLOS for roadway segments should be based on the posted speed plus 10km/h to make it consistent with the PLOS, a second Addendum to the MMLOS Guidelines should be issued. We have received direction from TES to leave the PLOS and BLOS as is for this study.
3	The distance from the accesses to the nearest intersections do not meet by-law requirements (60 m). However, the accesses are on a private road.	Noted.
Traffic Signal Operations		
4	The signal operation in the Synchro analysis is incorrect. Northbound is the leading phase and southbound is the lagging phase	Noted. The Synchro files were adjusted and will be included with the Final TIA submission.
5	Recommendations to reach intersection MMLOS targets included removing the split phasing, however, split phasing for the northbound/southbound movements is required during special events, so must remain in place for day-to-day operations as well.	To clarify, this was included in the TIA for information purposes only and not as a recommendation. Based on direction from the City, as part of the MMLOS assessment, consultants are required to list the various ways in which the MMLOS targets can theoretically be met, even if they are not feasible. As outlined in Section 4.9.2 of the TIA, it was noted that the split phase at this intersection is required to accommodate the traffic during special events. The TIA simply noted that removing the split phase during the AM and PM peak hours would reduce the delay at this intersection, thus allowing the TLOS target to be met.
6	Widening center medians on Palladium Drive (at Cyclone Taylor Boulevard) as listed in the recommendations as an alternative to address MMLOS shortfalls may cause the opposing left-turn lanes to be off-set excessively and trigger implementation of fully- protected left-turn phases.	To clarify, this was included in the TIA for information purposes only and not as a recommendation. Based on direction from the City, as part of the MMLOS assessment, consultants are required to list the various ways in which the MMLOS targets can theoretically be met, even if they are not feasible. Including pedestrian refuge areas was included in the TIA as a potential solution to addressing the MMLOS at the intersection of Palladium / Cyclone Taylor. However, it was stated in Section 5.0 of the TIA that it is not a feasible solution.
Traffic Signal Design		
7	There is existing underground and above ground traffic signal infrastructure around proposed modifications	This will be addressed by those preparing the Site Plan.
8	No comments to this TIA circulation. Traffic Signal Design and Specification reserves the right to make future comments based on subsequent submissions.	Noted.

Reference: **163601264 – 800 Palladium Drive**

9	Future considerations: • If there are any future proposed changes in the existing roadway geometry to construction of a new TCS(s) or modifications to existing TCS(s), the City of Ottawa Traffic Signal Design and Specification Unit is required to complete a review for traffic signal plant re-design and provide the actual re-design	Noted.
Street Lighting		
10	No comments regarding this TIA submission. Street Lighting reserves the right to make future comment on subsequent submissions for this project.	Noted.
Development Review - Transportation Engineering Services		
11	AODA legislation is now in effect. Please ensure that any exterior paths of travel for pedestrian conforms to these requirements. Please reference the AODA legislation and/or the City's AODA Guidelines for reference. a. The aisle for the accessible parking requires depressed curbs and TWSIs. b. It is recommended that the sidewalk along the front of the building be a minimum 1.8m wide.	This will be addressed by those preparing the Site Plan.

We trust that the above addresses the City's outstanding comments and concerns.

Should you have any further questions or concerns related to the above please feel free to contact the undersigned at your earliest convenience.

Regards,

Stantec Consulting Ltd.

Lauren O'Grady P.Eng.
Transportation Engineer

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

Appendix B TRAFFIC DATA

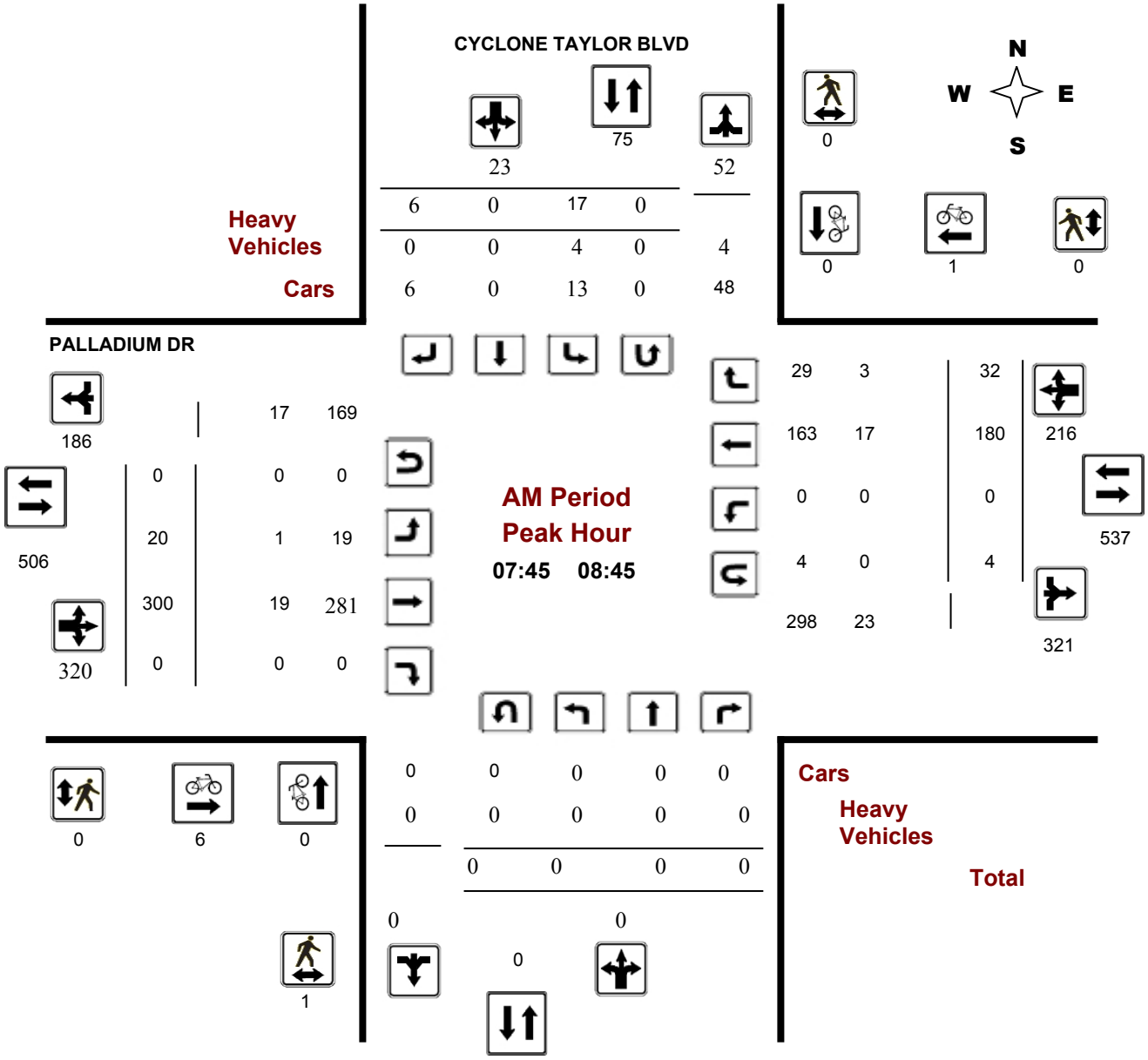
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CYCLONE TAYLOR BLVD @ PALLADIUM DR

Survey Date: Wednesday, August 17, 2016 **WO No:** 36188

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



Comments

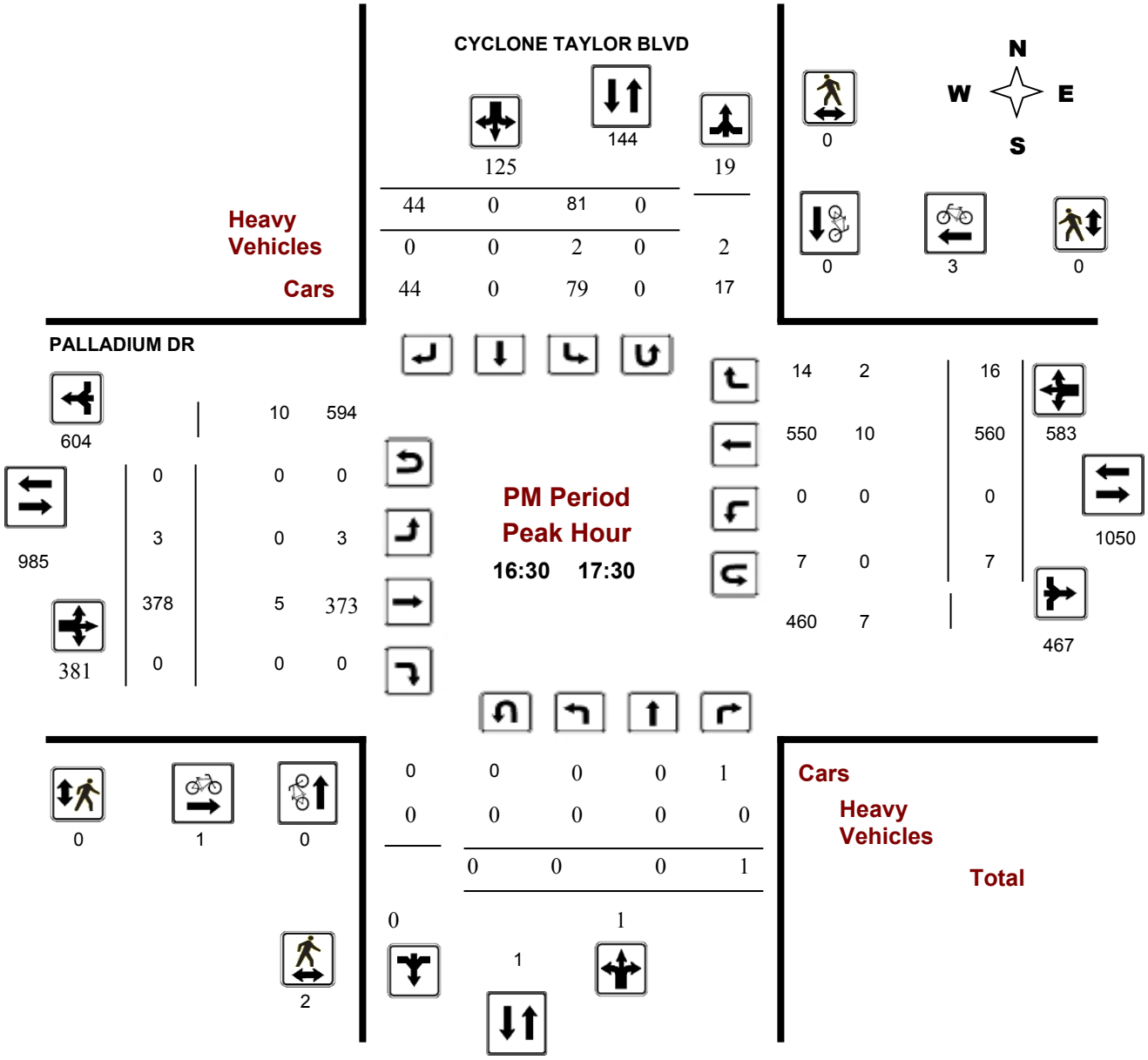
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CYCLONE TAYLOR BLVD @ PALLADIUM DR

Survey Date: Wednesday, August 17, 2016 **WO No:** 36188

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



Comments

Intersection **Cyclone Taylor Blvd at Private Access Road**
Date: **30-Jan-19**

AM Counts	NBT	NBR	SBT	SBL	WBL	WBR	Total
7:30 - 7:45	13	3	3	0	0	1	20
7:45 - 8:00	17	4	6	2	1	1	31
8:00 - 8:15	16	10	6	1	2	0	35
8:15 - 8:30	12	5	7	0	1	0	25
8:30 - 8:45	17	9	10	0	1	0	37

PM Counts	NBT	NBR	SBT	SBL	WBL	WBR	Total
4:30 - 4:45	3	3	25	0	33	1	65
4:45 - 5:00	4	1	15	0	22	0	42
5:00 - 5:15	2	0	20	0	15	0	37
5:15 - 5:30	0	0	17	0	22	1	40

Intersection **Palladium Drive and Private Access Road**
Date: **31-Jan-19**

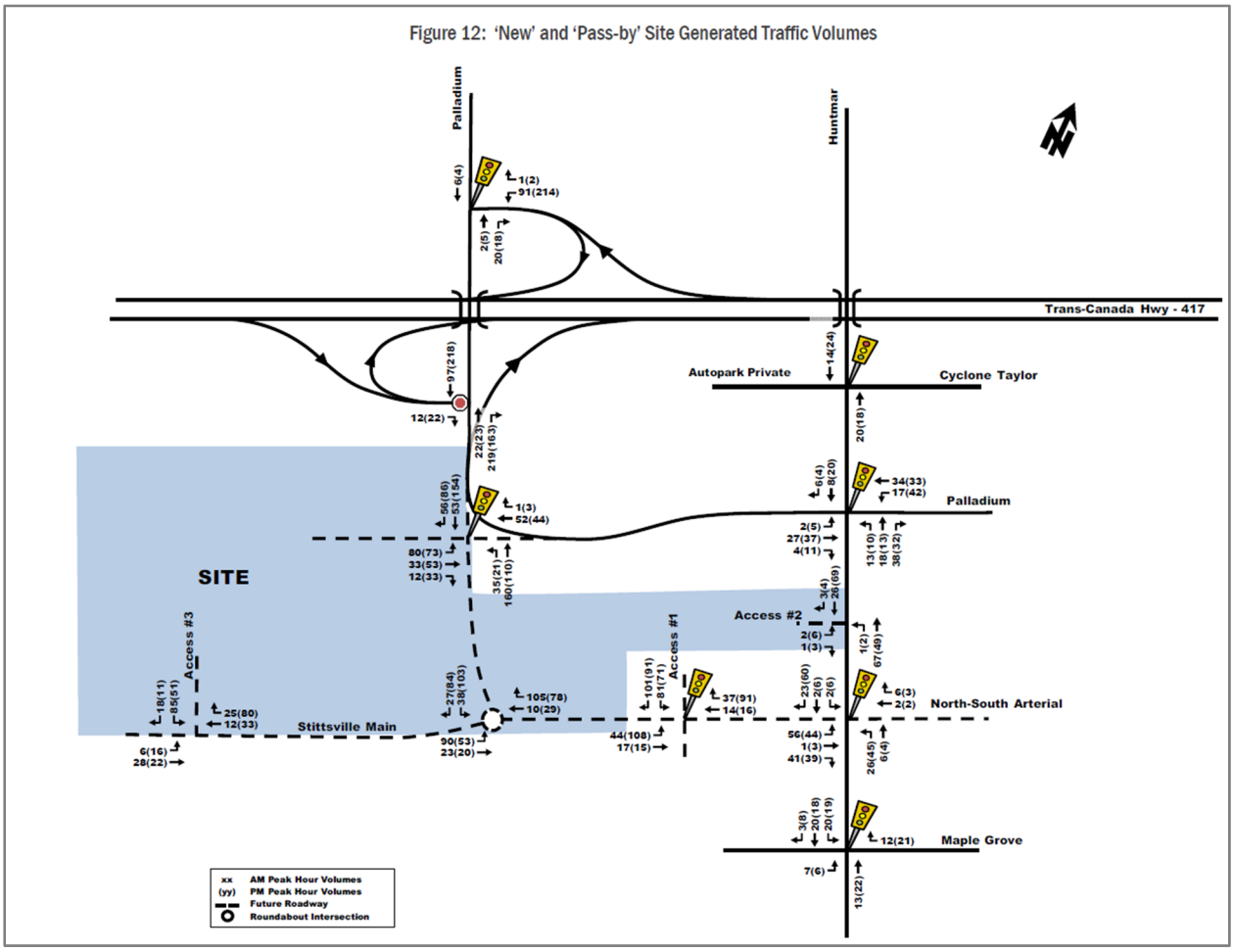
AM Counts	SBR	EBT	WBT	WBR	Total
7:45 - 8:00	1	70	31	29	131
8:00 - 8:15	1	77	44	24	146
8:15 - 8:30	2	68	43	25	138
8:30 - 8:45	0	68	45	48	161
Total	4	283	163	126	576

PM Peak Hour	SBR	EBT	WBT	WBR	Total
4:30 - 4:45	2	86	138	2	228
4:45 - 5:00	3	83	105	5	196
5:00 - 5:15	10	122	119	4	255
5:15 - 5:30	9	113	135	0	257
Total	24	404	497	11	936

Appendix C BACKGROUND TRAFFIC VOLUMES

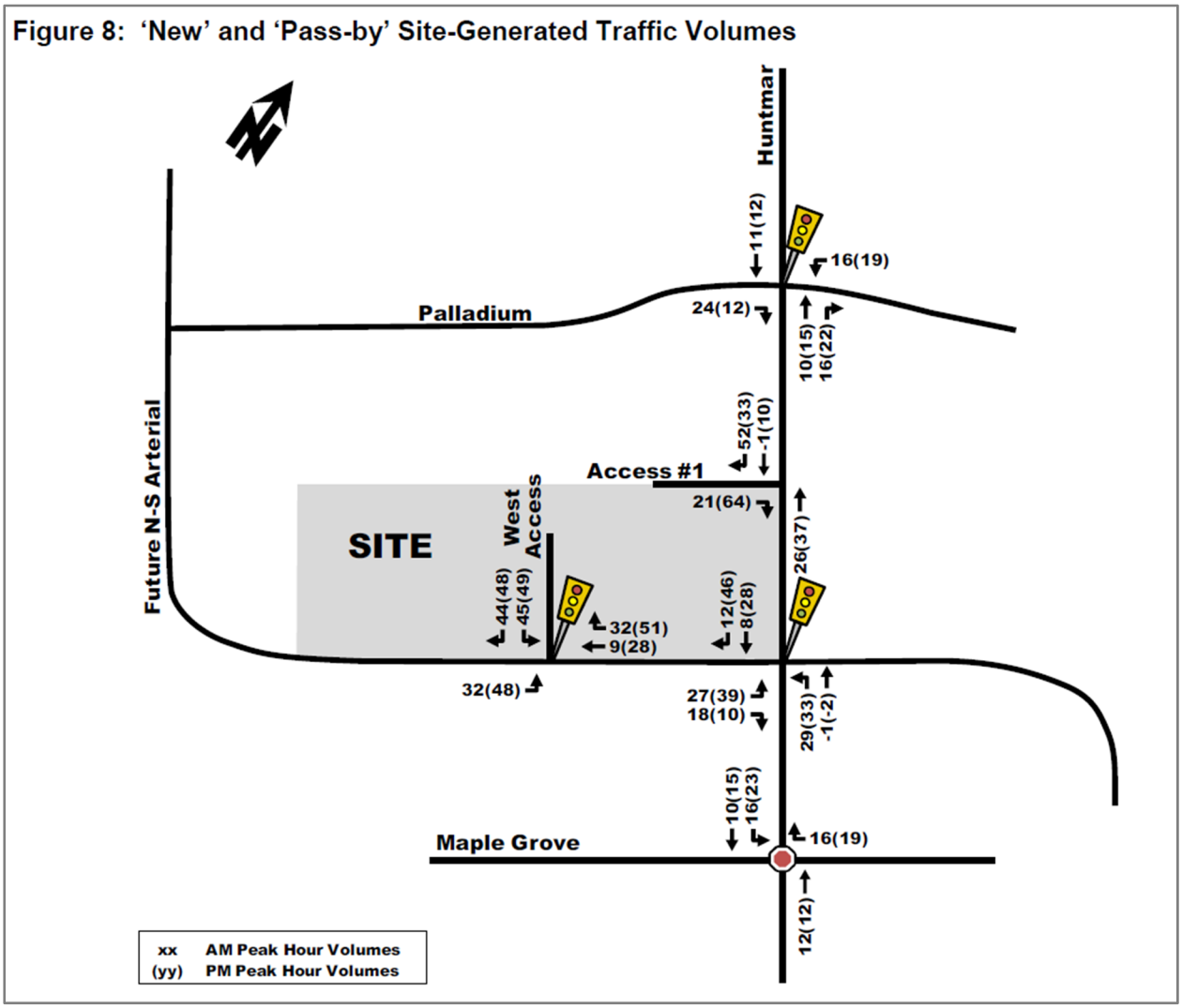
195 Huntmar Drive

Shenkman / Cavanagh Kanata West Transportation Study, Parsons July 2016



173 Huntmar Drive

173 Huntmar Drive Mixed-Use Development Community Transportation Study, Parsons June 2014



Appendix D TRANSPORTATION DEMAND MANAGEMENT CHECKLISTS

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)*	☐ N/A - not near rapid transit
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)	☐ N/A

		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)*	☐ N/A
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	☐ N/A
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	☐ N/A
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	☐

Appendix E INTERSECTION PERFORMANCE WORKSHEETS

Appendix E Intersection Performance Worksheets
May 14, 2019

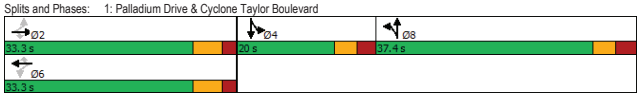
2019 Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	318	0	0	191	34	0	0	0	18	0	6
Future Volume (vph)	21	318	0	0	191	34	0	0	0	18	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		30.0	50.0		50.0	0.0		0.0	70.0		0.0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt						0.850					0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1695	3390	1784	1784	3390	1517	1784	1784	0	3288	1517	0
Flt Permitted	0.619									0.950		
Satd. Flow (perm)	1104	3390	1784	1784	3390	1517	1784	1784	0	3288	1517	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						114					786	
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		92.8			134.4			58.9			135.4	
Travel Time (s)		4.8			6.9			4.2			9.7	
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	0.90
Adj. Flow (vph)	23	353	0	0	212	38	0	0	0	20	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	353	0	0	212	38	0	0	0	20	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1	1	1	1	1	1	1		0	0	
Detector Template							Left					
Leading Detector (m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		0.0	0.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split			Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0		8.0	8.0	
Minimum Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		14.1	14.1	
Total Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		20.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%	36.7%	41.2%	41.2%		22.1%	22.1%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	31.0	31.0		13.9	13.9	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	3.1	3.1		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4		6.1	6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0				
Flash Dont Walk (s)	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0				
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0				
Act Effct Green (s)	46.9	46.9			46.9	46.9				8.1	8.1	
Actuated g/C Ratio	0.87	0.87			0.87	0.87				0.15	0.15	
v/c Ratio	0.02	0.12			0.07	0.03				0.04	0.01	
Control Delay	3.0	2.3			2.3	0.0				23.1	0.0	
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	
Total Delay	3.0	2.3			2.3	0.0				23.1	0.0	
LOS	A	A			A	A				C	A	
Approach Delay		2.3			1.9						17.1	
Approach LOS		A			A						B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90.7			
Actuated Cycle Length: 53.9			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.12			
Intersection Signal Delay: 2.8		Intersection LOS: A	
Intersection Capacity Utilization 35.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Palladium Drive & Cyclone Taylor Boulevard



Lane Group	EBL	EBT	WBT	WBR	SBL	SBT
Lane Group Flow (vph)	23	353	212	38	20	7
v/c Ratio	0.02	0.12	0.07	0.03	0.04	0.01
Control Delay	3.0	2.3	2.3	0.0	23.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.0	2.3	2.3	0.0	23.1	0.0
Queue Length 50th (m)	0.0	0.0	0.0	0.0	0.7	0.0
Queue Length 95th (m)	2.3	9.2	5.8	0.0	3.3	0.0
Internal Link Dist (m)		68.8	110.4			111.4
Turn Bay Length (m)	100.0			50.0	70.0	
Base Capacity (vph)	960	2946	2946	1333	860	977
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.12	0.07	0.03	0.02	0.01

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	318	0	0	191	34	0	0	0	18	0	6
Future Volume (vph)	21	318	0	0	191	34	0	0	0	18	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3			6.3	6.3				6.1	6.1	
Lane Util. Factor	1.00	0.95			0.95	1.00				0.97	1.00	
Frt	1.00	1.00			1.00	0.85				1.00	0.85	
Flt Protected	0.95	1.00			1.00	1.00				0.95	1.00	
Satd. Flow (prot)	1695	3390			3390	1517				3288	1517	
Flt Permitted	0.62	1.00			1.00	1.00				0.95	1.00	
Satd. Flow (perm)	1104	3390			3390	1517				3288	1517	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	353	0	0	212	38	0	0	0	20	0	7
RTOR Reduction (vph)	0	0	0	0	0	10	0	0	0	0	7	0
Lane Group Flow (vph)	23	353	0	0	212	28	0	0	0	20	0	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split			Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Actuated Green, G (s)	42.7	42.7			42.7	42.7				2.8	2.8	
Effective Green, g (s)	42.7	42.7			42.7	42.7				2.8	2.8	
Actuated g/C Ratio	0.74	0.74			0.74	0.74				0.05	0.05	
Clearance Time (s)	6.3	6.3			6.3	6.3				6.1	6.1	
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	
Lane Grp Cap (vph)	814	2500			2500	1118				159	73	
v/s Ratio Prot		c0.10			0.06					c0.01	0.00	
v/s Ratio Perm	0.02					0.02						
v/c Ratio	0.03	0.14			0.08	0.03				0.13	0.00	
Uniform Delay, d1	2.0	2.2			2.1	2.0				26.4	26.2	
Progression Factor	1.00	1.00			1.00	1.00				1.00	1.00	
Incremental Delay, d2	0.1	0.1			0.1	0.0				0.4	0.0	
Delay (s)	2.1	2.3			2.2	2.1				26.7	26.2	
Level of Service	A	A			A	A				C	C	
Approach Delay (s)		2.3			2.2			0.0			26.6	
Approach LOS		A			A			A			C	

Intersection Summary					
HCM 2000 Control Delay		3.3	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.16			
Actuated Cycle Length (s)		57.9	Sum of lost time (s)		18.8
Intersection Capacity Utilization		35.4%	ICU Level of Service		A
Analysis Period (min)		15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 2: Cyclone Taylor Boulevard & Private Shared Access
800 Palladium Drive — 2019 Existing AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	1	62	28	3	29
Future Volume (Veh/h)	5	1	62	28	3	29
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	1	69	31	3	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			Raised			Raised
Median storage veh)			1			1
Upstream signal (m)			135			
pX, platoon unblocked						
vC, conflicting volume	122	50			100	
vC1, stage 1 conf vol	84					
vC2, stage 2 conf vol	38					
vCu, unblocked vol	122	50			100	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	824	1008			1490	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	7	46	54	35
Volume Left	6	0	0	3
Volume Right	1	0	31	0
cSH	846	1700	1700	1490
Volume to Capacity	0.01	0.03	0.03	0.00
Queue Length 95th (m)	0.2	0.0	0.0	0.0
Control Delay (s)	9.3	0.0	0.0	0.6
Lane LOS	A			A
Approach Delay (s)	9.3	0.0		0.6
Approach LOS	A			

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	14.2%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis 3: Palladium Drive & Private Shared Access
800 Palladium Drive — 2019 Existing AM

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	283	163	126	0	4
Future Volume (Veh/h)	0	283	163	126	0	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	314	181	140	0	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		134				
pX, platoon unblocked						
vC, conflicting volume	321				408	160
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	321				408	160
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1236				571	856

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	157	157	121	200	4
Volume Left	0	0	0	0	0
Volume Right	0	0	0	140	4
cSH	1700	1700	1700	1700	856
Volume to Capacity	0.09	0.09	0.07	0.12	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	0.0	0.0	9.2
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.2
Approach LOS					A

Intersection Summary				
Average Delay	0.1			
Intersection Capacity Utilization	19.0%	ICU Level of Service		A
Analysis Period (min)	15			

Lanes, Volumes, Timings — 1: Palladium Drive & Cyclone Taylor Boulevard
800 Palladium Drive — 2019 Existing PM

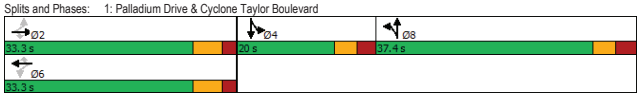
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	401	0	0	594	17	0	0	1	86	0	47
Future Volume (vph)	3	401	0	0	594	17	0	0	1	86	0	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		30.0	50.0		50.0	0.0		0.0	70.0		0.0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt						0.850		0.850			0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1695	3390	1784	1784	3390	1517	1784	1517	0	3288	1517	0
Flt Permitted	0.399									0.950		
Satd. Flow (perm)	712	3390	1784	1784	3390	1517	1784	1517	0	3288	1517	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						114		266			609	
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		92.8			134.4			58.9			135.4	
Travel Time (s)		4.8			6.9			4.2			9.7	
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	0.90
Adj. Flow (vph)	3	446	0	0	660	19	0	0	1	96	0	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	446	0	0	660	19	0	1	0	96	52	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1	1	1	1	1	1	1		0	0	
Detector Template							Left					
Leading Detector (m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		0.0	0.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0		8.0	8.0	
Minimum Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		14.1	14.1	
Total Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		20.0	20.0	

Lanes, Volumes, Timings — 1: Palladium Drive & Cyclone Taylor Boulevard
800 Palladium Drive — 2019 Existing PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%	36.7%	41.2%	41.2%		22.1%	22.1%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	31.0	31.0		13.9	13.9	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	3.1	3.1		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4		6.1	6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0				
Flash Dont Walk (s)	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0				
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0				
Act Effct Green (s)	35.5	35.5			35.5	35.5		10.2		8.2	8.2	
Actuated g/C Ratio	0.65	0.65			0.65	0.65		0.19		0.15	0.15	
v/c Ratio	0.01	0.20			0.30	0.02		0.00		0.19	0.07	
Control Delay	8.3	7.0			7.5	0.1		0.0		22.4	0.2	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	8.3	7.0			7.5	0.1		0.0		22.4	0.2	
LOS	A	A			A	A		A		C	A	
Approach Delay		7.0			7.3						14.6	
Approach LOS		A			A						B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90.7			
Actuated Cycle Length: 54.5			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.30			
Intersection Signal Delay: 8.0		Intersection LOS: A	
Intersection Capacity Utilization 36.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Palladium Drive & Cyclone Taylor Boulevard



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	3	446	660	19	1	96	52
v/c Ratio	0.01	0.20	0.30	0.02	0.00	0.19	0.07
Control Delay	8.3	7.0	7.5	0.1	0.0	22.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.3	7.0	7.5	0.1	0.0	22.4	0.2
Queue Length 50th (m)	0.1	7.5	12.1	0.0	0.0	3.6	0.0
Queue Length 95th (m)	1.4	25.2	38.2	0.0	0.0	10.2	0.0
Internal Link Dist (m)		68.8	110.4		34.9		111.4
Turn Bay Length (m)	100.0			50.0		70.0	
Base Capacity (vph)	463	2207	2207	1027	989	852	844
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.20	0.30	0.02	0.00	0.11	0.06

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	401	0	0	594	17	0	0	1	86	0	47
Future Volume (vph)	3	401	0	0	594	17	0	0	1	86	0	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3			6.3	6.3		6.4		6.1	6.1	
Lane Util. Factor	1.00	0.95			0.95	1.00		1.00		0.97	1.00	
Frt	1.00	1.00			1.00	0.85		0.85		1.00	0.85	
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1695	3390			3390	1517		1517		3288	1517	
Flt Permitted	0.40	1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (perm)	713	3390			3390	1517		1517		3288	1517	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	3	446	0	0	660	19	0	0	1	96	0	52
RTOR Reduction (vph)	0	0	0	0	0	8	0	1	0	0	47	0
Lane Group Flow (vph)	3	446	0	0	660	11	0	0	0	96	5	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Actuated Green, G (s)	34.1	34.1			34.1	34.1		1.7		6.4	6.4	
Effective Green, g (s)	34.1	34.1			34.1	34.1		1.7		6.4	6.4	
Actuated g/C Ratio	0.56	0.56			0.56	0.56		0.03		0.10	0.10	
Clearance Time (s)	6.3	6.3			6.3	6.3		6.4		6.1	6.1	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	398	1895			1895	848		42		344	159	
v/s Ratio Prot		0.13			c0.19			c0.00		c0.03	0.00	
v/s Ratio Perm	0.00					0.01						
v/c Ratio	0.01	0.24			0.35	0.01		0.00		0.28	0.03	
Uniform Delay, d1	6.0	6.8			7.4	6.0		28.8		25.2	24.5	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3			0.5	0.0		0.0		0.4	0.1	
Delay (s)	6.0	7.1			7.9	6.0		28.8		25.6	24.6	
Level of Service	A	A			A	A		C		C	C	
Approach Delay (s)		7.1			7.8			28.8			25.3	
Approach LOS		A			A			C			C	

Intersection Summary				
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.32			
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	18.8	
Intersection Capacity Utilization	36.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	92	2	9	4	0	77
Future Volume (Veh/h)	92	2	9	4	0	77
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	102	2	10	4	0	86
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			Raised			Raised
Median storage veh)			1			1
Upstream signal (m)			135			
pX, platoon unblocked						
vC, conflicting volume	98	7			14	
vC1, stage 1 conf vol	12					
vC2, stage 2 conf vol	86					
vCu, unblocked vol	98	7			14	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	100			100	
cM capacity (veh/h)	838	1073			1603	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	104	7	7	86
Volume Left	102	0	0	0
Volume Right	2	0	4	0
cSH	842	1700	1700	1603
Volume to Capacity	0.12	0.00	0.00	0.00
Queue Length 95th (m)	2.9	0.0	0.0	0.0
Control Delay (s)	9.9	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	9.9	0.0		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	16.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	404	497	11	0	24
Future Volume (Veh/h)	0	404	497	11	0	24
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	449	552	12	0	27
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		134				
pX, platoon unblocked					0.99	
vC, conflicting volume	564				782	282
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	564				771	282
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	96
cM capacity (veh/h)	1004				335	715

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	224	224	368	196	27
Volume Left	0	0	0	0	0
Volume Right	0	0	0	12	27
cSH	1700	1700	1700	1700	715
Volume to Capacity	0.13	0.13	0.22	0.12	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.8
Control Delay (s)	0.0	0.0	0.0	0.0	10.2
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.2
Approach LOS					B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		

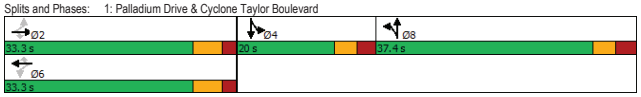
2019 Total Future Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	318	0	0	198	34	0	0	0	47	0	8
Future Volume (vph)	48	318	0	0	198	34	0	0	0	47	0	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		30.0	50.0		50.0	0.0		0.0	70.0		0.0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt						0.850					0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1695	3390	1784	1784	3390	1517	1784	1784	0	3288	1517	0
Flt Permitted	0.617									0.950		
Satd. Flow (perm)	1101	3390	1784	1784	3390	1517	1784	1784	0	3288	1517	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						114					783	
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		92.8			134.4			58.9			135.4	
Travel Time (s)		4.8			6.9			4.2			9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	346	0	0	215	37	0	0	0	51	0	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	346	0	0	215	37	0	0	0	51	9	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1	1	1	1	1	1	1		0	0	
Detector Template							Left					
Leading Detector (m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		0.0	0.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split			Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0		8.0	8.0	
Minimum Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		14.1	14.1	
Total Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		20.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%	36.7%	41.2%	41.2%		22.1%	22.1%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	31.0	31.0		13.9	13.9	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	3.1	3.1		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4		6.1	6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0				
Flash Dont Walk (s)	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0				
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0				
Act Effct Green (s)	42.8	42.8			42.8	42.8				8.1	8.1	
Actuated g/C Ratio	0.79	0.79			0.79	0.79				0.15	0.15	
v/c Ratio	0.06	0.13			0.08	0.03				0.10	0.01	
Control Delay	3.9	3.3			3.3	0.1				21.6	0.0	
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	
Total Delay	3.9	3.3			3.3	0.1				21.6	0.0	
LOS	A	A			A	A				C	A	
Approach Delay		3.4			2.8						18.3	
Approach LOS		A			A						B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90.7			
Actuated Cycle Length: 54.3			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.13			
Intersection Signal Delay: 4.5		Intersection LOS: A	
Intersection Capacity Utilization 37.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Palladium Drive & Cyclone Taylor Boulevard



Lane Group	EBL	EBT	WBT	WBR	SBL	SBT
Lane Group Flow (vph)	52	346	215	37	51	9
v/c Ratio	0.06	0.13	0.08	0.03	0.10	0.01
Control Delay	3.9	3.3	3.3	0.1	21.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.9	3.3	3.3	0.1	21.6	0.0
Queue Length 50th (m)	1.5	5.6	3.3	0.0	2.5	0.0
Queue Length 95th (m)	4.4	9.4	6.2	0.0	5.3	0.0
Internal Link Dist (m)		68.8	110.4			111.4
Turn Bay Length (m)	100.0			50.0	70.0	
Base Capacity (vph)	868	2673	2673	1220	852	973
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.13	0.08	0.03	0.06	0.01

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	318	0	0	198	34	0	0	0	47	0	8
Future Volume (vph)	48	318	0	0	198	34	0	0	0	47	0	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3			6.3	6.3				6.1	6.1	
Lane Util. Factor	1.00	0.95			0.95	1.00				0.97	1.00	
Frt	1.00	1.00			1.00	0.85				1.00	0.85	
Flt Protected	0.95	1.00			1.00	1.00				0.95	1.00	
Satd. Flow (prot)	1695	3390			3390	1517				3288	1517	
Flt Permitted	0.62	1.00			1.00	1.00				0.95	1.00	
Satd. Flow (perm)	1101	3390			3390	1517				3288	1517	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	346	0	0	215	37	0	0	0	51	0	9
RTOR Reduction (vph)	0	0	0	0	0	11	0	0	0	0	8	0
Lane Group Flow (vph)	52	346	0	0	215	26	0	0	0	51	1	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split			Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Actuated Green, G (s)	40.0	40.0			40.0	40.0				4.5	4.5	
Effective Green, g (s)	40.0	40.0			40.0	40.0				4.5	4.5	
Actuated g/C Ratio	0.70	0.70			0.70	0.70				0.08	0.08	
Clearance Time (s)	6.3	6.3			6.3	6.3				6.1	6.1	
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	
Lane Grp Cap (vph)	773	2383			2383	1066				260	119	
v/s Ratio Prot		c0.10			0.06					c0.02	0.00	
v/s Ratio Perm	0.05					0.02						
v/c Ratio	0.07	0.15			0.09	0.02				0.20	0.01	
Uniform Delay, d1	2.6	2.8			2.7	2.6				24.5	24.1	
Progression Factor	1.00	1.00			1.00	1.00				1.00	1.00	
Incremental Delay, d2	0.2	0.1			0.1	0.0				0.4	0.0	
Delay (s)	2.8	2.9			2.8	2.6				24.9	24.2	
Level of Service	A	A			A	A				C	C	
Approach Delay (s)		2.9			2.7			0.0			24.8	
Approach LOS		A			A			A			C	

Intersection Summary					
HCM 2000 Control Delay		4.7	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.18			
Actuated Cycle Length (s)		56.9	Sum of lost time (s)		18.8
Intersection Capacity Utilization		37.4%	ICU Level of Service		A
Analysis Period (min)		15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 2: Cyclone Taylor Boulevard & Private Shared Access
800 Palladium Drive — 2019 Total AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	36	2	62	55	5	29
Future Volume (Veh/h)	36	2	62	55	5	29
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	2	67	60	5	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			Raised			Raised
Median storage veh)			1			1
Upstream signal (m)			135			
pX, platoon unblocked						
vC, conflicting volume	139	64			127	
vC1, stage 1 conf vol	97					
vC2, stage 2 conf vol	42					
vCu, unblocked vol	139	64			127	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	809	988			1457	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	41	45	82	37
Volume Left	39	0	0	5
Volume Right	2	0	60	0
cSH	817	1700	1700	1457
Volume to Capacity	0.05	0.03	0.05	0.00
Queue Length 95th (m)	1.1	0.0	0.0	0.1
Control Delay (s)	9.6	0.0	0.0	1.0
Lane LOS	A			A
Approach Delay (s)	9.6	0.0		1.0
Approach LOS	A			

Intersection Summary				
Average Delay		2.1		
Intersection Capacity Utilization		16.1%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis 3: Palladium Drive & Private Shared Access
800 Palladium Drive — 2019 Total AM

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	312	163	220	0	11
Future Volume (Veh/h)	0	312	163	220	0	11
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	339	177	239	0	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		134				
pX, platoon unblocked						
vC, conflicting volume	416				466	208
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	416				466	208
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	1139				525	798

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	170	170	118	298	12
Volume Left	0	0	0	0	0
Volume Right	0	0	0	239	12
cSH	1700	1700	1700	1700	798
Volume to Capacity	0.10	0.10	0.07	0.18	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	0.0	0.0	9.6
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.6
Approach LOS					A

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		22.2%	ICU Level of Service	A
Analysis Period (min)		15		

Lanes, Volumes, Timings — 1: Palladium Drive & Cyclone Taylor Boulevard
800 Palladium Drive — 2019 Total PM

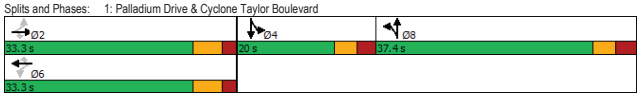
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	392	0	0	614	17	0	0	1	181	0	52
Future Volume (vph)	21	392	0	0	614	17	0	0	1	181	0	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		30.0	50.0		50.0	0.0		0.0	70.0		0.0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt						0.850		0.850			0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1695	3390	1784	1784	3390	1517	1784	1517	0	3288	1517	0
Flt Permitted	0.379									0.950		
Satd. Flow (perm)	676	3390	1784	1784	3390	1517	1784	1517	0	3288	1517	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						114		171			607	
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		92.8			134.4			58.9			135.4	
Travel Time (s)		4.8			6.9			4.2			9.7	
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	0.90
Adj. Flow (vph)	23	436	0	0	682	19	0	0	1	201	0	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	436	0	0	682	19	0	1	0	201	58	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1	1	1	1	1	1	1		0	0	
Detector Template							Left					
Leading Detector (m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		0.0	0.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0		8.0	8.0	
Minimum Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		14.1	14.1	
Total Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		20.0	20.0	

Lanes, Volumes, Timings — 1: Palladium Drive & Cyclone Taylor Boulevard
800 Palladium Drive — 2019 Total PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%	36.7%	41.2%	41.2%		22.1%	22.1%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	31.0	31.0		13.9	13.9	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	3.1	3.1		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4		6.1	6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0				
Flash Dont Walk (s)	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0				
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0				
Act Effct Green (s)	30.3	30.3			30.3	30.3		10.2		9.0	9.0	
Actuated g/C Ratio	0.55	0.55			0.55	0.55		0.19		0.16	0.16	
v/c Ratio	0.06	0.23			0.36	0.02		0.00		0.37	0.08	
Control Delay	9.4	8.1			9.0	0.1		0.0		22.5	0.2	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	9.4	8.1			9.0	0.1		0.0		22.5	0.2	
LOS	A	A			A	A		A		C	A	
Approach Delay		8.2			8.8						17.5	
Approach LOS		A			A						B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90.7			
Actuated Cycle Length: 54.6			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.37			
Intersection Signal Delay: 10.2		Intersection LOS: B	
Intersection Capacity Utilization 40.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Palladium Drive & Cyclone Taylor Boulevard



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	23	436	682	19	1	201	58
v/c Ratio	0.06	0.23	0.36	0.02	0.00	0.37	0.08
Control Delay	9.4	8.1	9.0	0.1	0.0	22.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	8.1	9.0	0.1	0.0	22.5	0.2
Queue Length 50th (m)	0.7	7.4	12.7	0.0	0.0	7.1	0.0
Queue Length 95th (m)	5.5	26.6	42.9	0.0	0.0	18.5	0.0
Internal Link Dist (m)		68.8	110.4		34.9		111.4
Turn Bay Length (m)	100.0			50.0		70.0	
Base Capacity (vph)	374	1878	1878	891	952	856	843
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.23	0.36	0.02	0.00	0.23	0.07

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	392	0	0	614	17	0	0	1	181	0	52
Future Volume (vph)	21	392	0	0	614	17	0	0	1	181	0	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3			6.3	6.3		6.4		6.1	6.1	
Lane Util. Factor	1.00	0.95			0.95	1.00		1.00		0.97	1.00	
Frt	1.00	1.00			1.00	0.85		0.85		1.00	0.85	
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1695	3390			3390	1517		1517		3288	1517	
Flt Permitted	0.38	1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (perm)	676	3390			3390	1517		1517		3288	1517	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	436	0	0	682	19	0	0	1	201	0	58
RTOR Reduction (vph)	0	0	0	0	0	9	0	1	0	0	49	0
Lane Group Flow (vph)	23	436	0	0	682	10	0	0	0	201	9	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Actuated Green, G (s)	30.3	30.3			30.3	30.3		1.6		9.0	9.0	
Effective Green, g (s)	30.3	30.3			30.3	30.3		1.6		9.0	9.0	
Actuated g/C Ratio	0.51	0.51			0.51	0.51		0.03		0.15	0.15	
Clearance Time (s)	6.3	6.3			6.3	6.3		6.4		6.1	6.1	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	343	1720			1720	769		40		495	228	
v/s Ratio Prot		0.13			c0.20			c0.00		c0.06	0.01	
v/s Ratio Perm	0.03					0.01						
v/c Ratio	0.07	0.25			0.40	0.01		0.00		0.41	0.04	
Uniform Delay, d1	7.5	8.3			9.1	7.3		28.3		22.9	21.7	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.4			0.7	0.0		0.0		0.5	0.1	
Delay (s)	7.9	8.7			9.7	7.3		28.3		23.5	21.7	
Level of Service	A	A			A	A		C		C	C	
Approach Delay (s)		8.6			9.7			28.3			23.1	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	18.8
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	191	4	9	22	1	77
Future Volume (Veh/h)	191	4	9	22	1	77
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	212	4	10	24	1	86
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			Raised			Raised
Median storage veh)			1			1
Upstream signal (m)			135			
pX, platoon unblocked						
vC, conflicting volume	110	17			34	
vC1, stage 1 conf vol	22					
vC2, stage 2 conf vol	88					
vCu, unblocked vol	110	17			34	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	74	100			100	
cM capacity (veh/h)	831	1058			1576	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	216	7	27	87
Volume Left	212	0	0	1
Volume Right	4	0	24	0
cSH	834	1700	1700	1576
Volume to Capacity	0.26	0.00	0.02	0.00
Queue Length 95th (m)	7.2	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.1
Lane LOS	B			A
Approach Delay (s)	10.8	0.0		0.1
Approach LOS	B			

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	490	491	50	0	50
Future Volume (Veh/h)	0	490	491	50	0	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	544	546	56	0	56
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		134				
pX, platoon unblocked					0.98	
vC, conflicting volume	602				846	301
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	602				808	301
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	92
cM capacity (veh/h)	971				313	695

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	272	272	364	238	56
Volume Left	0	0	0	0	0
Volume Right	0	0	0	56	56
cSH	1700	1700	1700	1700	695
Volume to Capacity	0.16	0.16	0.21	0.14	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.8
Control Delay (s)	0.0	0.0	0.0	0.0	10.6
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.6
Approach LOS					B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

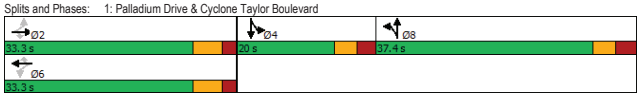
2024 Ultimate Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	450	0	0	296	39	0	0	0	50	0	9
Future Volume (vph)	51	450	0	0	296	39	0	0	0	50	0	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		30.0	50.0		50.0	0.0		0.0	70.0		0.0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt						0.850					0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1695	3390	1784	1784	3390	1517	1784	1784	0	3288	1517	0
Flt Permitted	0.571									0.950		
Satd. Flow (perm)	1019	3390	1784	1784	3390	1517	1784	1784	0	3288	1517	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						114					723	
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		92.8			134.4			58.9			135.4	
Travel Time (s)		4.8			6.9			4.2			9.7	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	51	450	0	0	296	39	0	0	0	50	0	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	450	0	0	296	39	0	0	0	50	9	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1	1	1	1	1	1	1		0	0	
Detector Template							Left					
Leading Detector (m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		0.0	0.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split			Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0		8.0	8.0	
Minimum Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		14.1	14.1	
Total Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		20.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%	36.7%	41.2%	41.2%		22.1%	22.1%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	31.0	31.0		13.9	13.9	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	3.1	3.1		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4		6.1	6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0				
Flash Dont Walk (s)	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0				
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0				
Act Effct Green (s)	43.0	43.0			43.0	43.0				8.1	8.1	
Actuated g/C Ratio	0.79	0.79			0.79	0.79				0.15	0.15	
v/c Ratio	0.06	0.17			0.11	0.03				0.10	0.01	
Control Delay	3.9	3.4			3.3	0.1				21.7	0.0	
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	
Total Delay	3.9	3.4			3.3	0.1				21.7	0.0	
LOS	A	A			A	A				C	A	
Approach Delay		3.4			2.9						18.4	
Approach LOS		A			A						B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90.7			
Actuated Cycle Length: 54.5			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.17			
Intersection Signal Delay: 4.2		Intersection LOS: A	
Intersection Capacity Utilization 41.2%		ICU Level of Service A	
Analysis Period (min) 60			

Splits and Phases: 1: Palladium Drive & Cyclone Taylor Boulevard



Lane Group	EBL	EBT	WBT	WBR	SBL	SBT
Lane Group Flow (vph)	51	450	296	39	50	9
v/c Ratio	0.06	0.17	0.11	0.03	0.10	0.01
Control Delay	3.9	3.4	3.3	0.1	21.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.9	3.4	3.3	0.1	21.7	0.0
Queue Length 50th (m)	1.5	7.6	4.7	0.0	2.4	0.0
Queue Length 95th (m)	4.9	14.0	9.2	0.3	5.8	0.0
Internal Link Dist (m)		68.8	110.4			111.4
Turn Bay Length (m)	100.0			50.0	70.0	
Base Capacity (vph)	804	2676	2676	1222	849	928
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.17	0.11	0.03	0.06	0.01

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	450	0	0	296	39	0	0	0	50	0	9
Future Volume (vph)	51	450	0	0	296	39	0	0	0	50	0	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3			6.3	6.3				6.1	6.1	
Lane Util. Factor	1.00	0.95			0.95	1.00				0.97	1.00	
Frt	1.00	1.00			1.00	0.85				1.00	0.85	
Flt Protected	0.95	1.00			1.00	1.00				0.95	1.00	
Satd. Flow (prot)	1695	3390			3390	1517				3288	1517	
Flt Permitted	0.57	1.00			1.00	1.00				0.95	1.00	
Satd. Flow (perm)	1019	3390			3390	1517				3288	1517	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	51	450	0	0	296	39	0	0	0	50	0	9
RTOR Reduction (vph)	0	0	0	0	0	12	0	0	0	0	8	0
Lane Group Flow (vph)	51	450	0	0	296	27	0	0	0	50	1	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split			Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Actuated Green, G (s)	40.2	40.2			40.2	40.2				4.5	4.5	
Effective Green, g (s)	40.2	40.2			40.2	40.2				4.5	4.5	
Actuated g/C Ratio	0.70	0.70			0.70	0.70				0.08	0.08	
Clearance Time (s)	6.3	6.3			6.3	6.3				6.1	6.1	
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	
Lane Grp Cap (vph)	717	2386			2386	1068				259	119	
v/s Ratio Prot		c0.13			0.09					c0.02	0.00	
v/s Ratio Perm	0.05					0.02						
v/c Ratio	0.07	0.19			0.12	0.03				0.19	0.01	
Uniform Delay, d1	2.6	2.9			2.7	2.5				24.6	24.2	
Progression Factor	1.00	1.00			1.00	1.00				1.00	1.00	
Incremental Delay, d2	0.2	0.2			0.1	0.0				0.4	0.0	
Delay (s)	2.8	3.1			2.8	2.6				25.0	24.3	
Level of Service	A	A			A	A				C	C	
Approach Delay (s)		3.0			2.8			0.0			24.9	
Approach LOS		A			A			A			C	

Intersection Summary					
HCM 2000 Control Delay		4.4	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.22			
Actuated Cycle Length (s)		57.1	Sum of lost time (s)		18.8
Intersection Capacity Utilization		41.2%	ICU Level of Service		A
Analysis Period (min)		60			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 2: Cyclone Taylor Boulevard & Private Shared Access
800 Palladium Drive — 2024 Ultimate AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	37	2	72	59	5	34
Future Volume (Veh/h)	37	2	72	59	5	34
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	37	2	72	59	5	34
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			Raised			Raised
Median storage veh)			1			1
Upstream signal (m)			135			
pX, platoon unblocked						
vC, conflicting volume	146	66			131	
vC1, stage 1 conf vol	102					
vC2, stage 2 conf vol	44					
vCu, unblocked vol	146	66			131	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	804	985			1452	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	39	48	83	39
Volume Left	37	0	0	5
Volume Right	2	0	59	0
cSH	812	1700	1700	1452
Volume to Capacity	0.05	0.03	0.05	0.00
Queue Length 95th (m)	1.1	0.0	0.0	0.1
Control Delay (s)	9.7	0.0	0.0	1.0
Lane LOS	A			A
Approach Delay (s)	9.7	0.0		1.0
Approach LOS	A			

Intersection Summary				
Average Delay			2.0	
Intersection Capacity Utilization			16.3%	ICU Level of Service
Analysis Period (min)			60	

HCM Unsignalized Intersection Capacity Analysis 3: Palladium Drive & Private Shared Access
800 Palladium Drive — 2024 Ultimate AM

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	438	256	240	0	12
Future Volume (Veh/h)	0	438	256	240	0	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	438	256	240	0	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		134				
pX, platoon unblocked						
vC, conflicting volume	496				595	248
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	496				595	248
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	1064				436	752

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	219	219	171	325	12
Volume Left	0	0	0	0	0
Volume Right	0	0	0	240	12
cSH	1700	1700	1700	1700	752
Volume to Capacity	0.13	0.13	0.10	0.19	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	0.0	0.0	9.9
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.9
Approach LOS					A

Intersection Summary				
Average Delay			0.1	
Intersection Capacity Utilization			25.6%	ICU Level of Service
Analysis Period (min)			60	

Lanes, Volumes, Timings — 1: Palladium Drive & Cyclone Taylor Boulevard
800 Palladium Drive — 2024 Ultimate PM

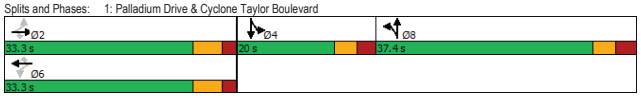
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	547	0	0	803	20	0	0	1	195	0	60
Future Volume (vph)	21	547	0	0	803	20	0	0	1	195	0	60
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		30.0	50.0		50.0	0.0		0.0	70.0		0.0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt						0.850		0.850			0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1695	3390	1784	1784	3390	1517	1784	1517	0	3288	1517	0
Flt Permitted	0.317									0.950		
Satd. Flow (perm)	566	3390	1784	1784	3390	1517	1784	1517	0	3288	1517	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						114		133			596	
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		92.8			134.4			58.9			135.4	
Travel Time (s)		4.8			6.9			4.2			9.7	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	21	547	0	0	803	20	0	0	1	195	0	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	547	0	0	803	20	0	1	0	195	60	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1	1	1	1	1	1	1		0	0	
Detector Template							Left					
Leading Detector (m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		0.0	0.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	1.8	1.8	1.8	1.8	1.8	1.8	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0		8.0	8.0	
Minimum Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		14.1	14.1	
Total Split (s)	33.3	33.3	33.3	33.3	33.3	33.3	37.4	37.4		20.0	20.0	

Lanes, Volumes, Timings — 1: Palladium Drive & Cyclone Taylor Boulevard
800 Palladium Drive — 2024 Ultimate PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%	36.7%	41.2%	41.2%		22.1%	22.1%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	31.0	31.0		13.9	13.9	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	3.1	3.1		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4		6.1	6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0				
Flash Dont Walk (s)	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0				
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0				
Act Effct Green (s)	30.3	30.3			30.3	30.3		10.2		8.9	8.9	
Actuated g/C Ratio	0.55	0.55			0.55	0.55		0.19		0.16	0.16	
v/c Ratio	0.07	0.29			0.43	0.02		0.00		0.36	0.08	
Control Delay	9.7	8.4			9.5	0.1		0.0		22.5	0.2	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	9.7	8.4			9.5	0.1		0.0		22.5	0.2	
LOS	A	A			A	A		A		C	A	
Approach Delay		8.5			9.3						17.2	
Approach LOS		A			A						B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90.7			
Actuated Cycle Length: 54.6			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.43			
Intersection Signal Delay: 10.2		Intersection LOS: B	
Intersection Capacity Utilization 46.3%		ICU Level of Service A	
Analysis Period (min) 60			

Splits and Phases: 1: Palladium Drive & Cyclone Taylor Boulevard



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	21	547	803	20	1	195	60
v/c Ratio	0.07	0.29	0.43	0.02	0.00	0.36	0.08
Control Delay	9.7	8.4	9.5	0.1	0.0	22.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	8.4	9.5	0.1	0.0	22.5	0.2
Queue Length 50th (m)	0.6	9.7	15.6	0.0	0.0	6.9	0.0
Queue Length 95th (m)	5.9	38.5	60.7	0.0	0.0	20.4	0.0
Internal Link Dist (m)		68.8	110.4		34.9		111.4
Turn Bay Length (m)	100.0			50.0		70.0	
Base Capacity (vph)	314	1882	1882	892	936	855	835
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.29	0.43	0.02	0.00	0.23	0.07

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	547	0	0	803	20	0	0	1	195	0	60
Future Volume (vph)	21	547	0	0	803	20	0	0	1	195	0	60
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3			6.3	6.3		6.4		6.1	6.1	
Lane Util. Factor	1.00	0.95			0.95	1.00		1.00		0.97	1.00	
Frt	1.00	1.00			1.00	0.85		0.85		1.00	0.85	
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1695	3390			3390	1517		1517		3288	1517	
Flt Permitted	0.32	1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (perm)	566	3390			3390	1517		1517		3288	1517	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	21	547	0	0	803	20	0	0	1	195	0	60
RTOR Reduction (vph)	0	0	0	0	0	10	0	1	0	0	51	0
Lane Group Flow (vph)	21	547	0	0	803	10	0	0	0	195	9	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6						
Actuated Green, G (s)	30.3	30.3			30.3	30.3		1.6		9.0	9.0	
Effective Green, g (s)	30.3	30.3			30.3	30.3		1.6		9.0	9.0	
Actuated g/C Ratio	0.51	0.51			0.51	0.51		0.03		0.15	0.15	
Clearance Time (s)	6.3	6.3			6.3	6.3		6.4		6.1	6.1	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	287	1720			1720	769		40		495	228	
v/s Ratio Prot		0.16			c0.24			c0.00		c0.06	0.01	
v/s Ratio Perm	0.04					0.01						
v/c Ratio	0.07	0.32			0.47	0.01		0.00		0.39	0.04	
Uniform Delay, d1	7.5	8.6			9.5	7.3		28.3		22.9	21.7	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.5			0.9	0.0		0.0		0.5	0.1	
Delay (s)	8.0	9.1			10.4	7.3		28.3		23.4	21.7	
Level of Service	A	A			B	A		C		C	C	
Approach Delay (s)		9.1			10.3			28.3			23.0	
Approach LOS		A			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	18.8	
Intersection Capacity Utilization	46.3%	ICU Level of Service	A	
Analysis Period (min)	60			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	206	4	10	23	1	89
Future Volume (Veh/h)	206	4	10	23	1	89
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	206	4	10	23	1	89
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			Raised			Raised
Median storage veh)			1			1
Upstream signal (m)			135			
pX, platoon unblocked						
vC, conflicting volume	112	16			33	
vC1, stage 1 conf vol	22					
vC2, stage 2 conf vol	91					
vCu, unblocked vol	112	16			33	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	100			100	
cM capacity (veh/h)	828	1058			1577	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	210	7	26	90
Volume Left	206	0	0	1
Volume Right	4	0	23	0
cSH	832	1700	1700	1577
Volume to Capacity	0.25	0.00	0.02	0.00
Queue Length 95th (m)	7.1	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.1
Lane LOS	B			A
Approach Delay (s)	10.8	0.0		0.1
Approach LOS	B			

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	24.8%	ICU Level of Service	A
Analysis Period (min)	60		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	646	665	52	0	54
Future Volume (Veh/h)	0	646	665	52	0	54
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	646	665	52	0	54
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		134				
pX, platoon unblocked					0.95	
vC, conflicting volume	717				1014	358
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	717				909	358
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	92
cM capacity (veh/h)	880				261	638

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	323	323	443	274	54
Volume Left	0	0	0	0	0
Volume Right	0	0	0	52	54
cSH	1700	1700	1700	1700	638
Volume to Capacity	0.19	0.19	0.26	0.16	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.9
Control Delay (s)	0.0	0.0	0.0	0.0	11.2
Lane LOS					B
Approach Delay (s)	0.0		0.0		11.2
Approach LOS					B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	31.3%	ICU Level of Service	A
Analysis Period (min)	60		