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Metro Grocery Store No. 145

TRAFFIC IMPACT BRIEF

Metro Ontario Inc.

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	 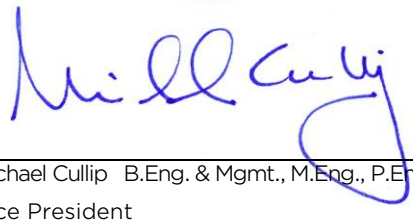
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1	December 7, 2022	Issued for Site Plan Approval

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1 Introduction

Tatham Engineering Limited was retained by Metro Ontario Inc. to address traffic impacts associated with the proposed Metro grocery store to be located at the corner of Mapleview Drive and Goodwin Drive in the City of Barrie (refer to in Figure 1 for a location map).

The purpose of this study is to review the proposed development from a transportation perspective, addressing site traffic volumes, on-site circulation, parking requirements and potential impacts to the adjacent road system. Recognizing that the subject site is part of a larger development (Barrie West) for which a traffic impact study[1] has been prepared, the scope of this study has been reduced to a traffic impact brief with a focus on the following:

- existing conditions, including a description of the study area road network, traffic volumes and traffic operations;
- details of the proposed development and anticipated trip generation;
- on-site circulation and site access;
- parking provision; and
- transportation impacts associated with the proposed development.

[1] *Barrie West Development Traffic Impact Study*. Tatham Engineering. December 7, 2022.

2 Existing Conditions

This chapter will discuss the road network, traffic volumes, and operations for the existing conditions.

2.1 ROAD NETWORK

The road network to be addressed by this study consists of Mapleview Drive, Goodwin Drive and Yonge Street. Aerial imagery and photographs of the road network are illustrated in Figure 2, with additional details provided below.

2.1.1 Roads

A summary of each road section is provided below. The functional classification of each road has been based on *Schedule D – Roads Plan* of the *City of Barrie Official Plan*[2], whereas the planning capacity is based on information contained within the *City of Barrie Transportation Master Plan*[3] (TMP). It is noted that the functional road classifications identified in the current *Official Plan* are consistent with those proposed in the draft *City of Barrie Official Plan 2051*[4] *(Map 4B: Mobility Network)* for the study area road network (the draft *Official Plan* has been approved by City Council and has been sent to the Ministry of Municipal Affairs and Housing for approval).

Goodwin Drive

Goodwin Drive has the following configuration/characteristics:

- 2-lane local road, oriented north-south through the study area
- urban cross-section with curb, gutter and a sidewalk on the east side of the road;
- as a local road, a planning capacity of 400 vphpl has been assumed; and
- the speed limit is unposted thus a speed limit of 50 km/h has been assigned as is standard within the City limits.

Mapleview Drive

Mapleview Drive has the following configuration/characteristics:

[2] *City of Barrie Official Plan*. City of Barrie. April 2010 (Office consolidated January 2018).
[3] *City of Barrie Transportation Master Plan*. WSP. June 2019.
[4] *The City of Barrie Official Plan 2051.* City of Barrie. January 2022.

- 2-lane, east-west arterial road, providing one lane of travel per direction within the study area;
- rural cross-section with gravel shoulders and open ditches;
- as a major arterial road, a planning capacity of 750 vphpl has been assumed (the absence of a two-way left turn lane decreases the planning capacity of the road somewhat); and
- a posted speed limit of 50 km/h and a design speed of 60 km/h (posted speed limit + 10 km/h for lower-speed roads).

Yonge Street

Yonge Street has the following configuration/characteristics:

- 5-lane arterial road, providing 2 lanes of travel per direction plus a centre two-way left turn lane (TWLTL);
- urban cross-section (curb & gutter, sidewalks, streetlights) with a sidewalk present on each side of the road;
- oriented northwest-southeast through the study area (for the purpose of this report the road is assumed to be oriented north-south)
- as a major arterial road, a planning capacity of 850 vehicles per hour per lane (vphpl) has been assumed; and
- a posted speed limit of 60 km/h and thus a design speed of 80 km/h has been assumed (posted speed + 20km/h per City standards for a 60km/h arterial road)

2.1.2 Intersections

Mapleview Drive & Goodwin Drive

The intersection of Mapleview Drive and Goodwin Drive is a 3-leg, unsignalized intersection with Goodwin Drive operating as the minor road under stop control. The north approach (Goodwin Drive) consists of a single shared left-right turn lane. The east approach (Mapleview Drive) consists of a through lane and a right turn lane. The west approach (Mapleview Drive) consists of a shared left-through lane and a bypass lane for through traffic.

Yonge Street & Barrie South GO Access

The intersection of Yonge Street and the Barrie South GO access is a 3-leg, signalized intersection, with Yonge Street being the through road. The north approach (Yonge Street) consists of a left turn lane and two through lanes. The south approach consists of a through lane and a shared through-right turn lane. The east approach (GO access) consists of two left turn

lanes and a right turn lane. An advanced left turn signal is present on the north approach (i.e. southbound left).

2.2 TRAFFIC VOLUMES

To determine existing traffic volumes, traffic counts were conducted at the key intersections noted above. Detailed count sheets are provided in Appendix A with a summary of count details provided in Table 1. The counts at the intersection of Mapleview Drive with Goodwin Drive were obtained from the *673 Mapleview Drive East*[5] report.

The 2022 volumes are illustrated in Figure 3.

Table 1: Count Details

INTERSECTION	WEEKDAY		SATURDAY	
	Date	Time	Date	Time
Mapleview Drive & Goodwin Drive	February 10, 2022	7:30AM to 9:30AM 4:00PM to 6:00PM	February 12, 2022	12:00PM to 4:00PM
Yonge Street & Barrie South GO	September 29, 2022	5:00AM to 9:00AM 4:00PM to 8:00PM	October 1, 2022	11:00AM to 2:00PM

2.3 TRAFFIC OPERATIONS

The assessment of existing conditions provides the baseline from which the future traffic operations (both with and without the subject development) can be assessed from. The capacity, and hence operations, of a road system is effectively governed by its intersections. The analysis is based on the 2022 traffic volumes, the existing intersection configuration and control, and procedures outlined in the *2000 Highway Capacity Manual*[6] (using Synchro v.11 software). For each intersection, the analysis considers:

- the average delay (measured in seconds);
- level of service (LOS); and
- volume to capacity (v/c) for each movement if signalized, or for critical movements only if unsignalized

[5] *673 Mapleview Drive East Proposed Commercial Development – Urban Transportation Considerations*. BA Group. April 12, 2022.
[6] *Highway Capacity Manual.* Transportation Research Board, Washington DC, 2000.

With respect to the noted metrics:

- level of service 'A' corresponds to the best operating condition with minimal delays whereas level of service 'F' corresponds to poor operations resulting from high intersection delays (additional details regarding Level of Service definitions are provided in Appendix B); and
- a v/c ratio of less than 1.0 indicates the intersection movement is operating at less than capacity while v/c of 1.0 indicates capacity has been reached.

It is noted that while the *Barrie West Development Traffic Impact Study* (Barrie West TIS) did not assess the Saturday mid-day peak hour (as the development and subsequent trip generation as a whole is largely residential in nature), this report will consider said peak as the subject development (see Section 3.2) is entirely commercial in nature and makes up the majority of commercial-generated trips within the Barrie West development.

Per City of Barrie guidelines, any individual movements operating at LOS F (LOS D or greater for an intersection overall) or v/c ≥ 0.85 are bolded in the summary tables. Signal timing plans for the intersection of Yonge Street with the Barrie South GO access were obtained from the City of Barrie and implemented into the traffic model to accurately reflect the existing traffic control.

A summary of the analysis is provided in Table 2 with detailed worksheets provided in Appendix C.

Table 2: Intersection Operations - 2022

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Yonge Street & Barrie South GO Access	WB L	signal	50	D	0.11	47	D	0.28	28	C	0.08
	WB R	signal	50	D	0.02	46	D	0.04	28	C	0.02
	NB TR	signal	5	A	0.21	5	A	0.27	6	A	0.24
	SB L	signal	2	A	0.04	3	A	0.05	3	A	0.06
	SB T	signal	3	A	0.18	3	A	0.20	3	A	0.19
	overall	signal	6	A	0.20	8	A	0.27	6	A	0.23
Mapleview Drive & Goodwin Drive	WB L	free	1	A	0.00	1	A	0.01	1	A	0.01
	SB LR	stop	11	B	0.02	11	B	0.02	11	B	0.02

As indicated, the key intersections currently provide excellent overall operations (LOS A) during each peak hour, with individual movements operating at LOS D or better with low to average delays. Each intersection operates at 23% capacity or lower overall (i.e. $v/c \leq 0.23$, overall), meaning significant reserve capacity remains available within the network to accommodate future growth. No improvements are required to accommodate the existing traffic volumes.

3 Proposed Development

3.1 SITE LOCATION

The location of the proposed development is at the northeast corner of the intersection of Mapleview Drive and Goodwin Drive. This site is part of the larger Barrie West development located on the north side of Mapleview Drive extending from Goodwin Drive to Yonge Street (consisting of the properties of 658 Mapleview Drive, 662 Mapleview Drive and 800 Yonge Street).

The location of the site is illustrated in Figure 1.

3.2 LAND USE

The proposed development will consist of a 4,064 m^2 (43,748 ft^2) Metro grocery store.

A site plan is illustrated in Figure 4.

3.3 SITE PARKING

Standard Parking

According to the City's *Zoning By-law*[7], the applicable parking rate is:

- 1 parking space per 30 m^2 of gross floor area (GFA) of retail use.

The minimum parking requirement is therefore:

- 4,064 m^2 x 1 space per 30 m^2 = 136 spaces.

As indicated on the site plan, the proposed development will provide 236 parking spaces, thus exceeding the City's requirements (the supply rate is 1 space per 17 m^2).

Barrier-Free Parking

As per the *Zoning By-law*, any site requiring more than 100 standard parking spaces must supply 1 barrier-free space plus 3% of the required standard parking spaces as barrier-free spaces. With the requirement of 136 standard spaces noted above, the barrier-free requirement is:

- 1 space + 136 x 3% = 6 spaces.

As indicated on the site plan, the development will provide 8 barrier-free spaces, thus satisfying the City's requirements.

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[7] *City of Barrie Comprehensive Zoning By-law 2009-141*.

Loading Spaces

As per the *Zoning By-law*, any commercial use with a GFA between 3,000 m^2 and 7,499 m^2 must provide 2 permanent loading spaces.

As indicated on the site plan, 3 loading spaces will be provided, thus satisfying the City's requirements.

3.4 SITE ACCESS & ON-SITE CIRCULATION

Site Access

As evident in the site plan of Figure 4, access to the site will be provided by three connections to the internal road network within the Barrie West development. Two accesses will connect to the Barrie West east-west driveway (Driveway A) – the westmost access (West Access) and the central access (Centre Access). Driveway A in turn connects to Goodwin Drive to the west and Yonge Street opposite the GO access to the east. The third access (East Access) connects to the Barrie-West north-south driveway (Driveway B) which in turn connects to Driveway A to the north and to Mapleview Drive to the south (via a right-in/right-out).

The Centre Access and East Access will each be configured as full-moves accesses to their respective internal driveway and will be designed in accordance with Transportation Association of Canada (TAC) standards for a commercial access, recognizing that they must accommodate truck traffic. The West Access, which is also a full moves access, will be 6.3 metres wide sufficient to accommodate automobile traffic.

Site Circulation

Internal aisles within the site providing access to the parking spaces (which are oriented perpendicular to the aisle) will be a minimum of 6.4 metres wide as required by the City's *Zoning By-law*.

A vehicle turning assessment was completed to ensure that sufficient room is provided on-site to accommodate the manoeuvring requirements of typical design vehicles, namely a tractor with semi-trailer, a fire truck, and a garbage truck. Results of the assessment are provided in Appendix D. As indicated, sufficient manoeuvring space is provided for the design vehicles.

3.5 SITE TRAFFIC

3.5.1 Trip Generation

The number of vehicle trips to be generated by the proposed development for the weekday AM and PM, and Saturday peak hours has been determined based on type of use, development size,

and trip generation rates per the *ITE Trip Generation Manual, 11th Edition*[8]. Based on the proposed development, trip rates for the *supermarket* (ITE land use code 850) land-use have been applied. Trip rates and trip estimates are summarized in Table 3.

Table 3: Trip Rates & Gross Trip Estimates

LAND USE	VARIABLE/ SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
		In	Out	Total	In	Out	Total	In	Out	Total
supermarket (ITE 850)	1000 ft^2 GFA	1.69	1.17	2.86	4.48	4.48	8.95	5.05	5.05	10.10
Metro	43,748 ft^2	74	51	125	196	196	392	221	221	442

As indicated, the site is expected to generate 125 trips during the weekday AM peak hour, 392 trips during the weekday PM peak hour, and 442 trips during the Saturday peak hour.

Given the commercial nature of the site, not all trips generated by the development will be new trips on the road network. A portion of the trips are expected to be internal trips (i.e. trips made between different land uses within the Barrie West development site) and/or pass-by trips (i.e. trips that stop at the grocery store as they drive by). To remain conservative, no internal trip reduction has been applied, recognizing that the proposed Metro store will be built out before any of the remaining developments within the Barrie West development. A pass-by rate of 36% (as detailed in the ITE *Trip Generation Handbook*[9] for the *supermarket* land use) has been applied to the weekday PM peak hour and Saturday peak hour trip generation (pass-by rates are not available for the AM peak hour). A summary of the trip estimates by type and the resulting net new trip estimates is provided in Table 4.

Table 4: Net Trip Estimates

TRIP TYPE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
	In	Out	Total	In	Out	Total	In	Out	Total
Gross Trips	74	51	125	196	196	392	221	221	442
Pass-by Trips	-	-	-	71	71	142	80	80	160
Net (New) Trips	**74**	**51**	**125**	**125**	**125**	**250**	**141**	**141**	**282**

[8] *Trip Generation Manual, 11th Edition.* Institute of Transportation Engineers. September 2021.
[9] *Trip Generation Handbook, 3rd Edition*. Institute of Transportation Engineers. September 2017.

As indicated, the site is expected to generate 125 new trips during the weekday AM peak hour, 250 new trips during the weekday PM peak hour, and 282 new trips during the Saturday peak hour.

3.5.2 Trip Modal Split

The City's *Transportation Master Plan* identifies a City-wide modal split target of 7% public transit and 12% active transportation by 2041 – resulting in a total non-automobile modal share of 19% of all trips city-wide. Based on the City's proposed transit improvements, expansion of the City's active transportation network (more sidewalks and bicycle infrastructure) and proximity of the subject site to a major transit hub (Barrie South GO), it is considered reasonable that the City's modal split targets can be achieved by the 2041 horizon.

For the interim horizon years (2024 and 2031), modal split proportions have been linearly interpolated between the current modal split (1.6% public transit, 4.8% active transportation and 93.6% automobile as per the 2016 *Transportation Tomorrow Survey* and further detailed in the Barrie West TIS) and target split values, as summarized in Table 5. Applying the noted rates to the trip generation determined in Section 3.5.1, the total automobile and non-automobile trips generated by the site was determined for each horizon, as summarized in Table 6

Table 5: Modal Splits by Horizon Year

YEAR	PUBLIC TRANSIT	ACTIVE TRANSPORTATION	AUTOMOBILE
2022	1.6%	4.8%	93.6%
2024	2.2%	5.6%	92.2%
2031	4.2%	8.2%	87.6%
2041	7%	12%	81%

Table 6: Modal Trip Estimates

YEAR	PUBLIC TRANSIT			ACTIVE TRANSPORTATION			AUTOMOBILE		
	AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
2024	3	5	5	6	12	14	106	203	229
2031	5	8	9	9	17	19	96	177	199

3.5.3 Trip Distribution & Assignment

The distribution of site-generated trips was considered from two perspectives: new trips and pass-by trips.

New Trips

New trips have been established based on the location of the proposed development in relation to nearby residential areas, including both existing neighbourhoods and new developments currently under construction. The Metro store is expected to predominantly attract local residents looking to purchase groceries; therefore, most trips can be expected to travel to/from the surrounding neighbourhoods. The following distribution has been applied:

- to/from the north – 35%;
- to/from the south – 10%;
- to/from the east – 25%; and
- to/from the west – 30%

Assignment of new trips is illustrated in Figure 5 (2024) and Figure 6 (2031).

Pass-by Trips

The pass-by distribution established in the Barrie West TIS has been applied to the site. The distribution is as follows:

- Yonge Street access – 47% from the north and 53% from the south (63% of all pass-by trips);
- Mapleview Drive access – 32% from the east (12% of all pass-by trips); and
- Goodwin Drive access – 68% from west (25% of all pass-by trips)

Assignment of pass-by trips is illustrated in Figure 7.

Total Trips

The resulting total site-generated trips (new trips + pass-by trips) assigned to the road network are illustrated in Figure 8 (2024) and Figure 9 (2031).

4 Future Conditions

This chapter will address the resulting impacts of the proposed development on the adjacent road network. For the purpose of this study, two horizons have been adopted. A 2-year horizon (2024) has been adopted to reflect full build-out of the subject development and a 9-year horizon (2031) has been adopted to reflect longer-term impacts of the subject development (which is consistent with one of the future horizon years adopted in the Barrie West TIS).

4.1 ROAD NETWORK

Two upgrades are proposed/underway within the study area road network. Details and timelines of each are provided below as described in the Barrie West TIS.

Mapleview Drive

Mapleview Drive is currently being reconstructed from the rural cross-section described in Section 2.1.1. When complete, the road will have a 5-lane urban cross-section providing 2 travel lanes per direction, a centre two-way left turn lane, a paved multi-use trail on the north side of the road, and a 1-metre paved boulevard on the south side. Completion is expected by the end of 2022.

Mapleview Drive & Goodwin Drive

The intersection of Mapleview Drive and Goodwin Drive is proposed to be upgraded to a signalized intersection. Additionally, a south leg will be constructed to connect to a new north-south minor collector road providing access to developments south of Mapleview Drive.

For the 2024 horizon, the intersection is assumed to remain a 3-leg intersection operating under stop control on Goodwin Avenue. The east approach will consist of a through lane and a shared through-right turn lane, whereas the west approach will consist of a left turn lane and two through lanes (reflective of the new cross-section of Mapleview Drive). The north approach will remain a single shared left-right turn lane as detailed in Section 0.

Given the significant development currently underway south of Mapleview Drive, the south leg and signalization works noted above are assumed to be complete by 2026, thus will be in place by the 2031 horizon. The east and west approaches will consist of a left turn lane, a through lane, and a shared through-right turn lane. The north and south approaches will consist of a left turn lane and a shared through-right turn lane. Advanced left turn signals are assumed to be present in the eastbound and westbound direction (as are found at similarly configured intersections along Yonge Street).

4.2 TRAFFIC VOLUMES

4.2.1 Background Growth

As determined in the Barrie West TIS, growth along Mapleview Drive and Yonge Street is expected to be in excess of 10% per annum on each road between 2022 and 2031. As the growth rates were identified to be in excess of the growth predicted in the City of Barrie's EMME traffic model, no additional growth has been applied to either corridor through the 2031 horizon.

4.2.2 Background Development

Hewitt Secondary Area & GO Village

Significant growth is expected within the study area by the 2031 horizon due to the build-out of Hewitt Secondary Area developments (including the 673 Mapleview Drive East development) and the GO Village development, details of which are provided in the Barrie West TIS. Full build-out of these developments is expected by the 2031 horizon, with volumes generated by each development provided in Appendix E (representative of full build-out volumes).

Barrie West

As noted in Section 3.1, the subject site is part of a larger development known as Barrie West. In addition to the subject site, Barrie West contains 2 other parcels of land which are expected to be built-out by 2026, with construction starting in 2024. Table 7 summarizes the new trip generation expected for each parcel (as determined in the Barrie West TIS) at the 2031 horizon.

Table 7: Trip Generation - North & Southeast Parcels (2031, New Trips)

PARCEL & DEVELOPER	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
	In	Out	Total	In	Out	Total
North Parcel	85	94	179	103	115	218
Southeast Parcel	91	142	233	160	133	293
New Trips	**176**	**236**	**412**	**263**	**248**	**511**

Volumes generated by each development are provided in Appendix E (representative of full build-out volumes).

4.2.3 Traffic Volumes

The future weekday volumes are based on the 2024 and 2031 background volume projections contained within the Barrie West TIS, weekday peak volumes generated by the adjacent parcels within the Barrie West development, plus additional weekday peak volumes generated by the subject development. As noted in Section 3.5.1, no internal trip reduction was applied to the Metro site, thus the future volumes (and subsequently, future operations) may differ slightly from those contained within the Barrie West TIS.

While the 2022 Saturday counts indicate peak volumes closer in magnitude to weekday AM peak volumes, the Saturday peak volumes at each future horizon were established based on the weekday PM peak volumes to ensure a conservative estimate (the same methodology was also employed in the *673 Mapleview Drive East* report). Therefore, the Saturday peak volumes are based on the 2024 and 2031 weekday PM peak background projections contained within the Barrie West TIS, weekday peak volumes generated by the adjacent parcels within the Barrie West development, plus additional Saturday peak volumes generated by the subject development.

The future traffic volumes for the 2024 and 2031 horizons are illustrated in Figure 10 and Figure 11.

4.3 TRAFFIC OPERATIONS

The key intersections were assessed again under future conditions to determine the impact of the proposed development. Signal timings at each signalized intersection were optimized to ensure peak performance of each intersection is maintained. Additionally, the site accesses on Goodwin Drive and Mapleview Drive were assessed to ensure they will provide adequate operations during peak times. Operations at each horizon year are summarized in Table 8 and Table 9. It is noted that the eastbound and westbound through movements at the intersection of Yonge Street with the Barrie South GO access have not been included in the summary tables, as no volumes have been assigned to those movements.

As indicated, each key intersection will continue to provide good overall operations (LOS C or better) with average delays through the 2031 horizon. Individual movements are expected to provide good operations (LOS D or better) with low to average delays through the 2031 horizon.

The site access points on Goodwin Drive and Mapleview Drive are expected to provide good operations (LOS C or better) through the 2031 horizon.

Based on the results of the operational assessment, no improvements are required at any of the noted intersections to support the proposed development through the 2031 horizon.

Table 8: Intersection Operations – 2024 Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Yonge Street & Barrie South GO Access	EB L	signal	27	C	0.08	24	C	0.27	25	C	0.31
	EB R	signal	26	C	0.01	23	C	0.05	23	C	0.06
	WB L	signal	27	C	0.15	24	C	0.26	23	C	0.10
	WB R	signal	26	C	0.02	23	C	0.05	23	C	0.03
	NB L	signal	8	A	0.01	9	A	0.17	8	A	0.18
	NB TR	signal	12	B	0.44	14	B	0.51	14	B	0.46
	SB L	signal	5	A	0.06	9	A	0.12	9	A	0.15
	SB TR	signal	8	A	0.38	14	B	0.46	15	B	0.48
	overall	signal	11	B	0.35	15	B	0.42	15	B	0.41
Mapleview Drive & Goodwin Drive	WB L	free	9	A	0.03	9	A	0.09	9	A	0.10
	SB LR	stop	12	B	0.06	16	C	0.21	16	C	0.23
Goodwin Drive & Goodwin Access	WB LR	stop	9	A	0.01	9	A	0.07	9	A	0.08
Mapleview Drive & Mapleview Access	SB R	stop	9	A	0.01	9	A	0.05	9	A	0.06

Table 9: Intersection Operations – 2031 Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Yonge Street & Barrie South GO Access	EB L	signal	30	C	0.35	30	C	0.50	30	C	0.53
	EB R	signal	27	C	0.05	26	C	0.09	26	C	0.10
	WB L	signal	28	C	0.18	28	C	0.35	26	C	0.15
	WB R	signal	27	C	0.05	26	C	0.09	25	C	0.05
	NB L	signal	9	A	0.15	18	B	0.57	21	C	0.61
	NB TR	signal	19	B	0.79	28	C	**0.88**	28	C	**0.88**
	SB L	signal	13	B	0.28	17	B	0.30	18	B	0.46
	SB TR	signal	26	B	0.69	24	C	0.79	28	C	**0.87**
	overall	signal	19	B	0.65	26	C	0.75	27	C	0.76
Mapleview Drive & Goodwin Drive	EB L	signal	12	B	0.41	15	B	0.65	16	B	0.67
	EB TR	signal	7	A	0.37	17	B	0.75	18	B	0.78
	WB L	signal	7	A	0.01	12	B	0.18	13	B	0.19
	WB TR	signal	15	B	0.76	19	B	0.67	19	B	0.68
	NB L	signal	34	C	0.43	48	D	0.76	39	D	0.66
	NB TR	signal	32	C	0.24	30	C	0.41	30	C	0.41
	SB L	signal	33	C	0.38	45	D	0.75	45	D	0.76
	SB TR	signal	33	C	0.41	32	C	0.55	32	C	0.54
	overall	signal	15	B	0.67	22	C	0.77	22	C	0.78
Goodwin Drive & Goodwin Access	WB LR	stop	11	B	0.08	16	C	0.25	16	C	0.27
Mapleview Drive & Mapleview Access	SB R	stop	11	B	0.13	9	A	0.15	9	A	0.15

4.4 CONSTRUCTION ACCESS & PARKING

A preliminary construction access and parking plan has been prepared to illustrate how the construction of the proposed development will temporarily impact the road network. The plan considers trades parking and how the site will be accessed prior to completion of the primary access driveways serving the Barrie West site. Conceptual trades parking and temporary construction access points are illustrated in Appendix G.

All reasonable efforts will be made to accommodate trades parking on-site. Any off-site parking will be restricted to Goodwin Drive and may be provided through an agreement with the City.

Temporary construction access will be provided via Goodwin Drive.

5 Summary

Proposed Development

This study has addressed the transportation impacts associated with the proposed development to be located at 658 Mapleview Drive East in the City of Barrie. The proposed development consists of a 43,748 ft^2 (4,063 m^2) Metro grocery store. Upon completion in 2024, the Metro store is expected to generate 125 new vehicle trips during the weekday AM peak hour, 250 new vehicle trips during the weekday PM peak hour, and 282 new vehicle trips during the Saturday peak hour.

Transportation Impacts

To assess the impact of the proposed development, the operations of the key intersections within the study area were assessed under existing conditions (2022) and future (2024 and 2031) horizon periods, with conditions as defined within the *Barrie West Development Traffic Impact Study* report.

Results of the operational analyses indicate that the key intersections provide excellent operations (LOS B or better) overall under existing conditions.

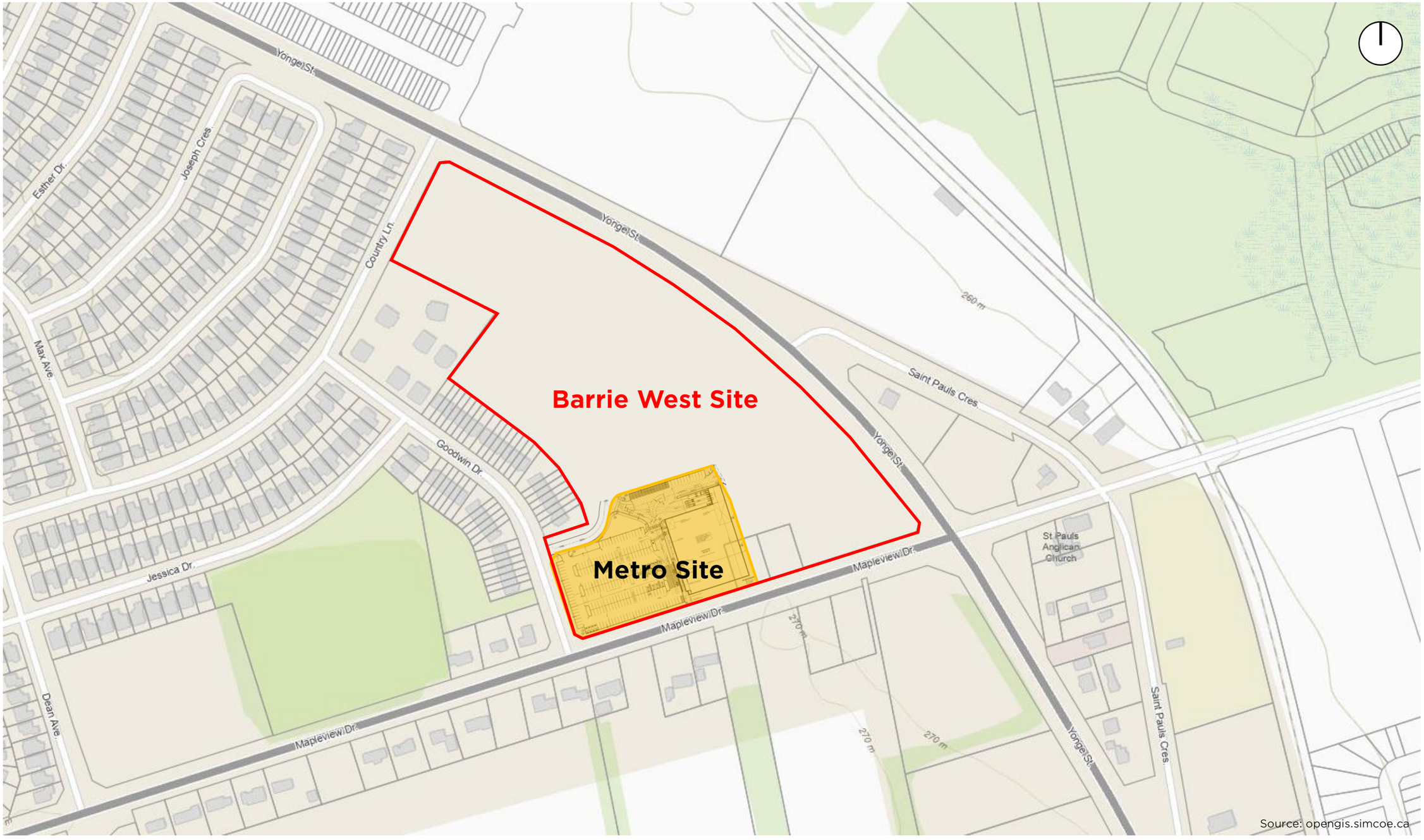
Under future conditions, each key intersection is expected to provide excellent overall operations (LOS C or better) through the 2031 horizon. No improvements are required to accommodate the future conditions.

Each site access point to the external road network was also assessed under future conditions. Results of the assessment indicate that each access is expected to provide excellent operations (LOS C or better) through the 2031 horizon.

Site Access & Circulation

Access to the subject site from the internal road network was reviewed in context of TAC requirements for commercial access points. Based on the review, the proposed access dimensions were found to be sufficient.

Circulation within the site was reviewed in context of City of Barrie requirements for off-street parking lots and the manoeuvring requirements of typical design vehicles. Based on the review, the site layout was found to be sufficient.



METRO GROCERY STORE NO. 145

Figure 1: Site Location

Intersection of Mapleview Drive East & Goodwin Drive – north and east approaches

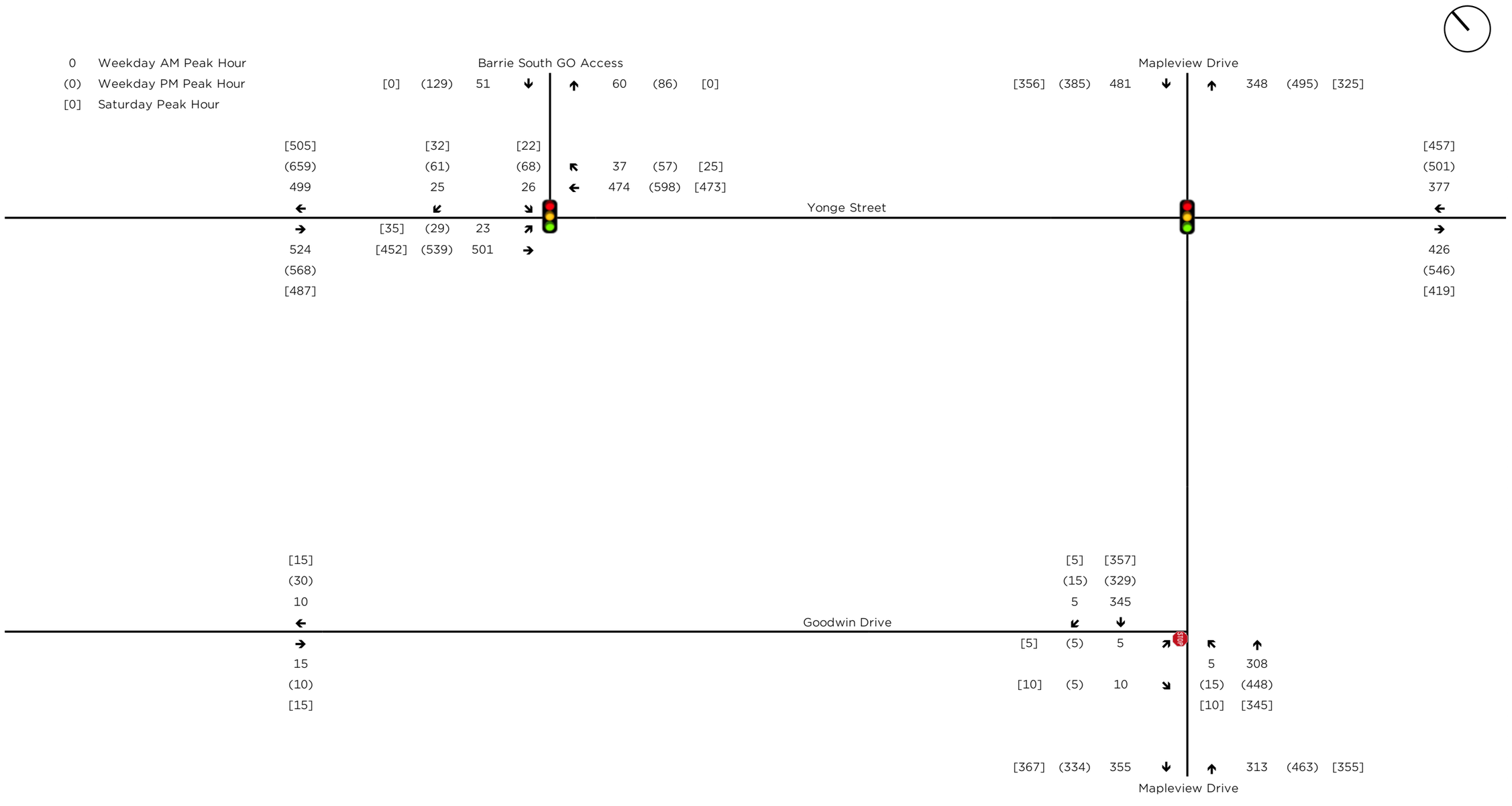
Intersection of Yonge Street & Barrie South GO access – north approach

Intersection of Mapleview Drive East & Goodwin Drive – south approach

Intersection of Yonge Street & Barrie South GO access – south and east approaches

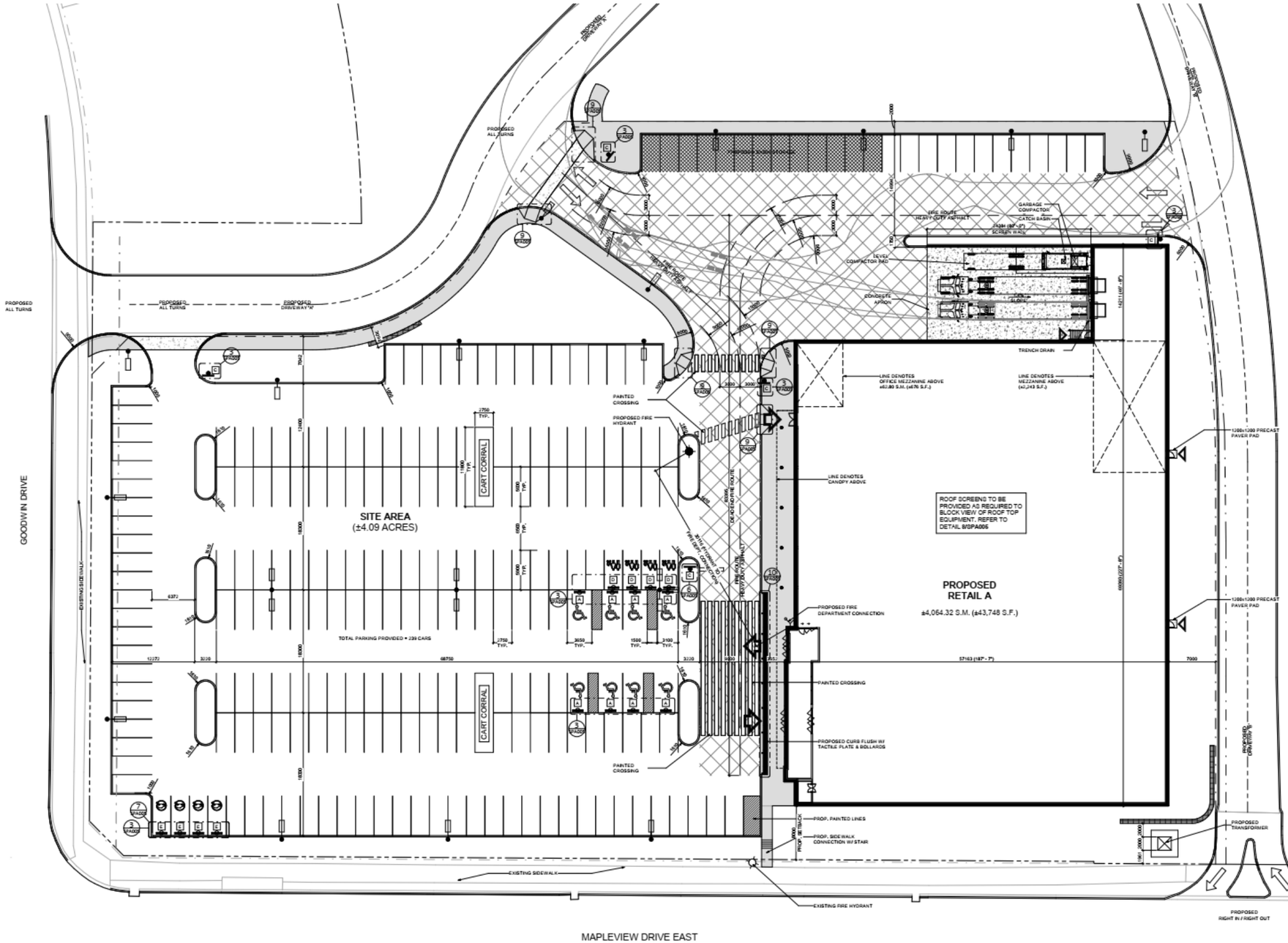
METRO GROCERY STORE NO. 145

Figure 2: Road Network



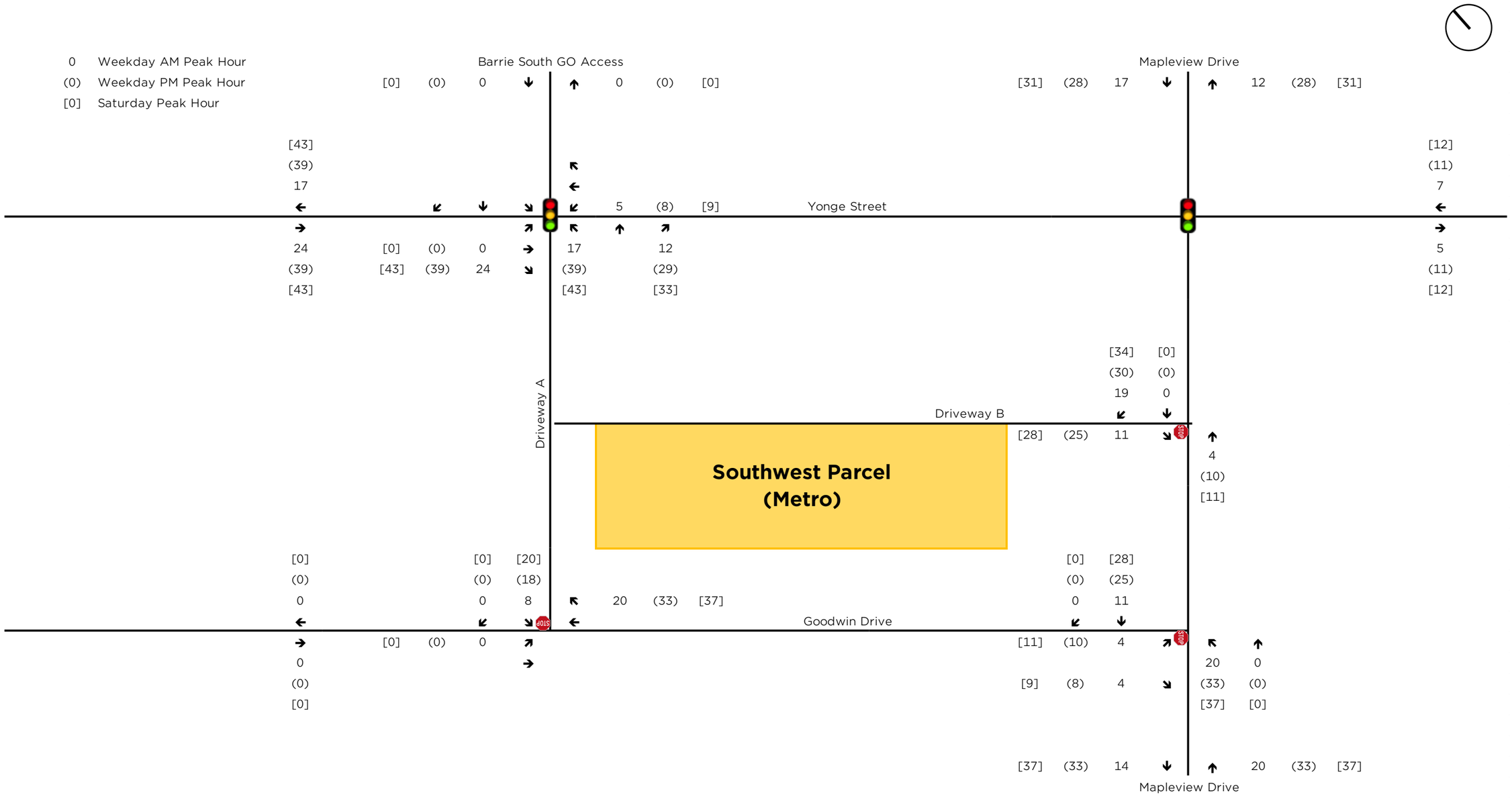
METRO GROCERY STORE NO. 145

Figure 3: Traffic Volumes – 2022



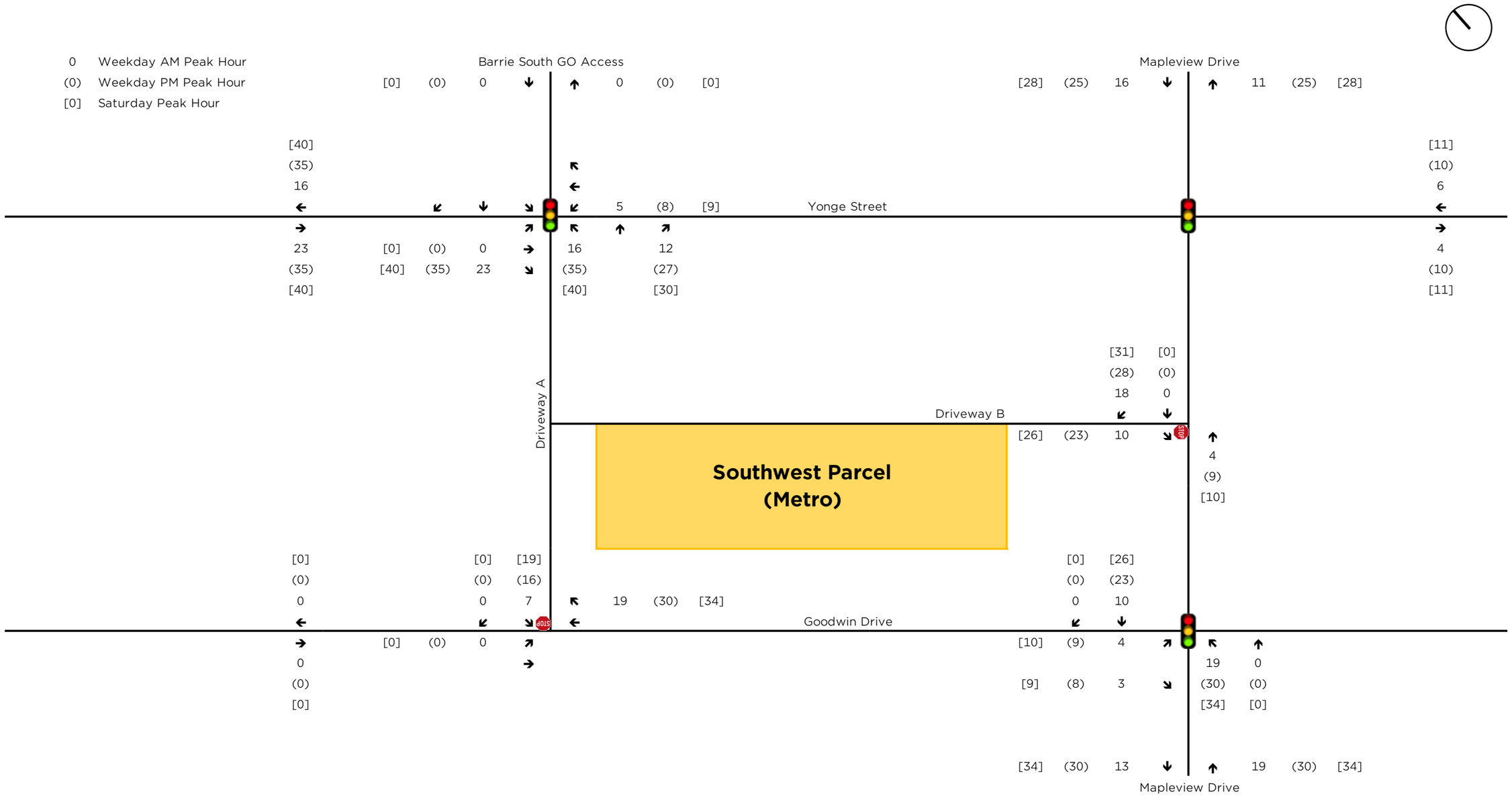
METRO GROCERY STORE NO. 145

Figure 4: Site Plan



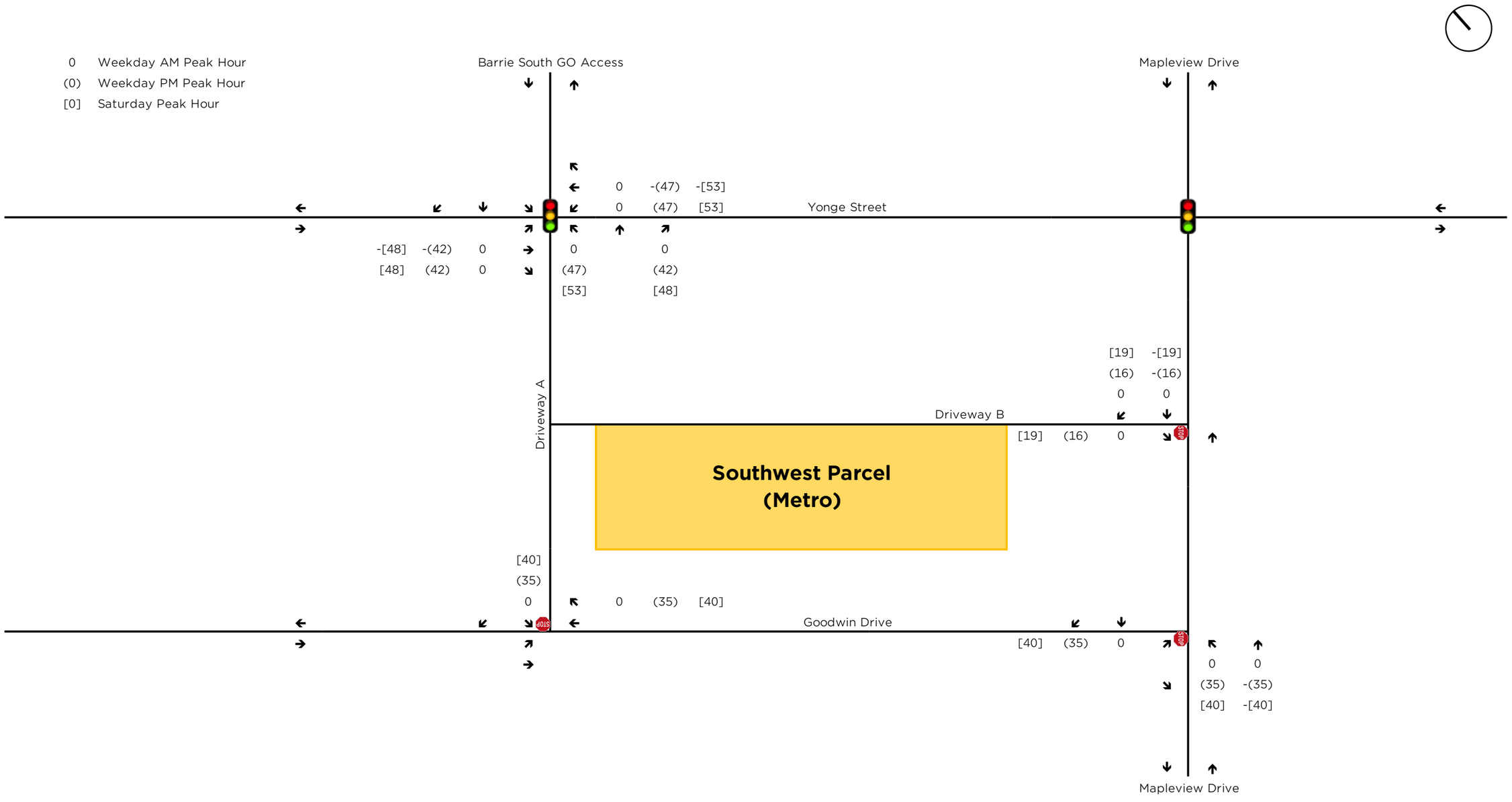
METRO GROCERY STORE NO. 145

Figure 5: Site Trip Generation – New Trips (2024)



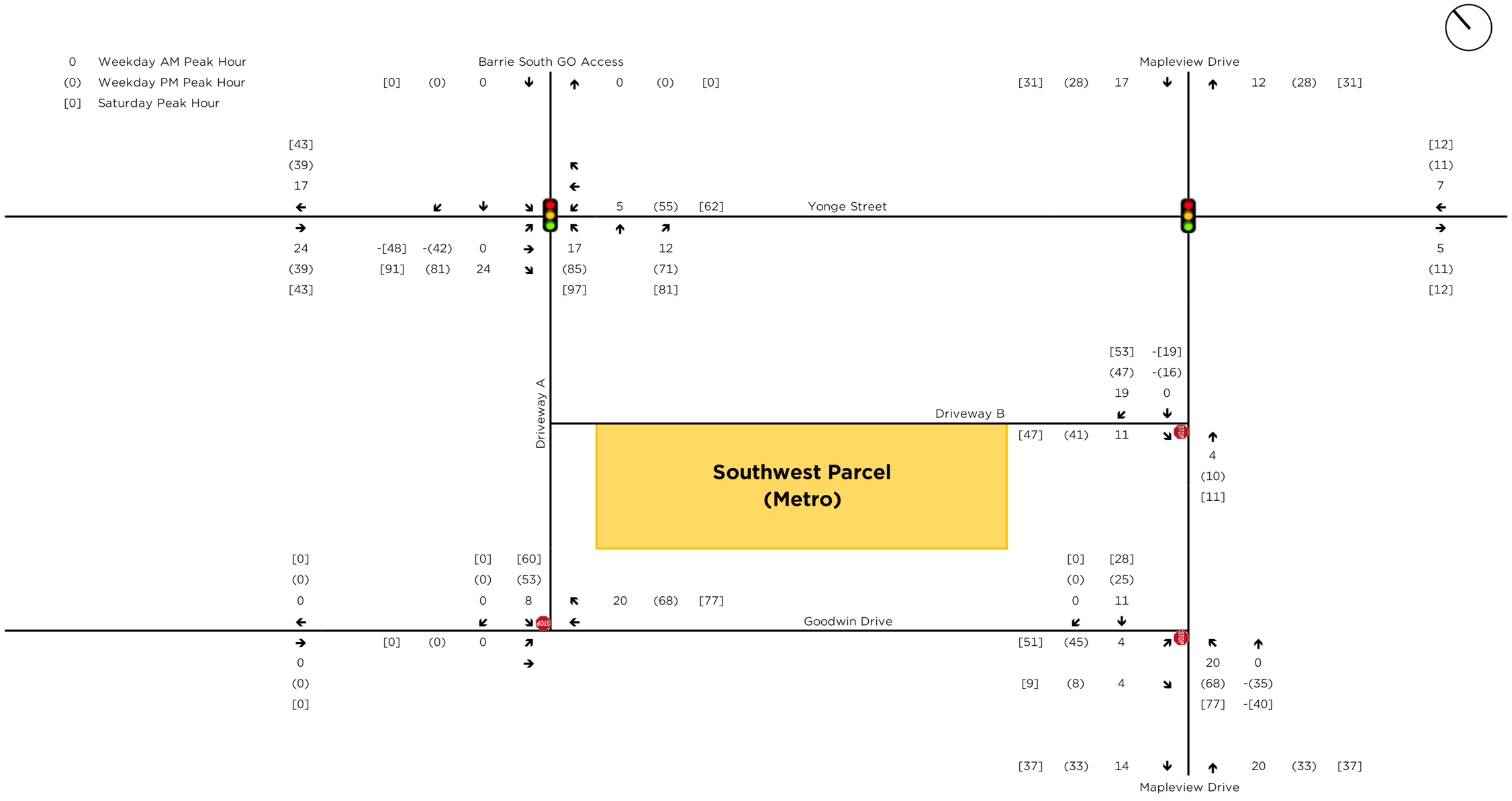
METRO GROCERY STORE NO. 145

Figure 6: Site Trip Generation – New Trips (2031)



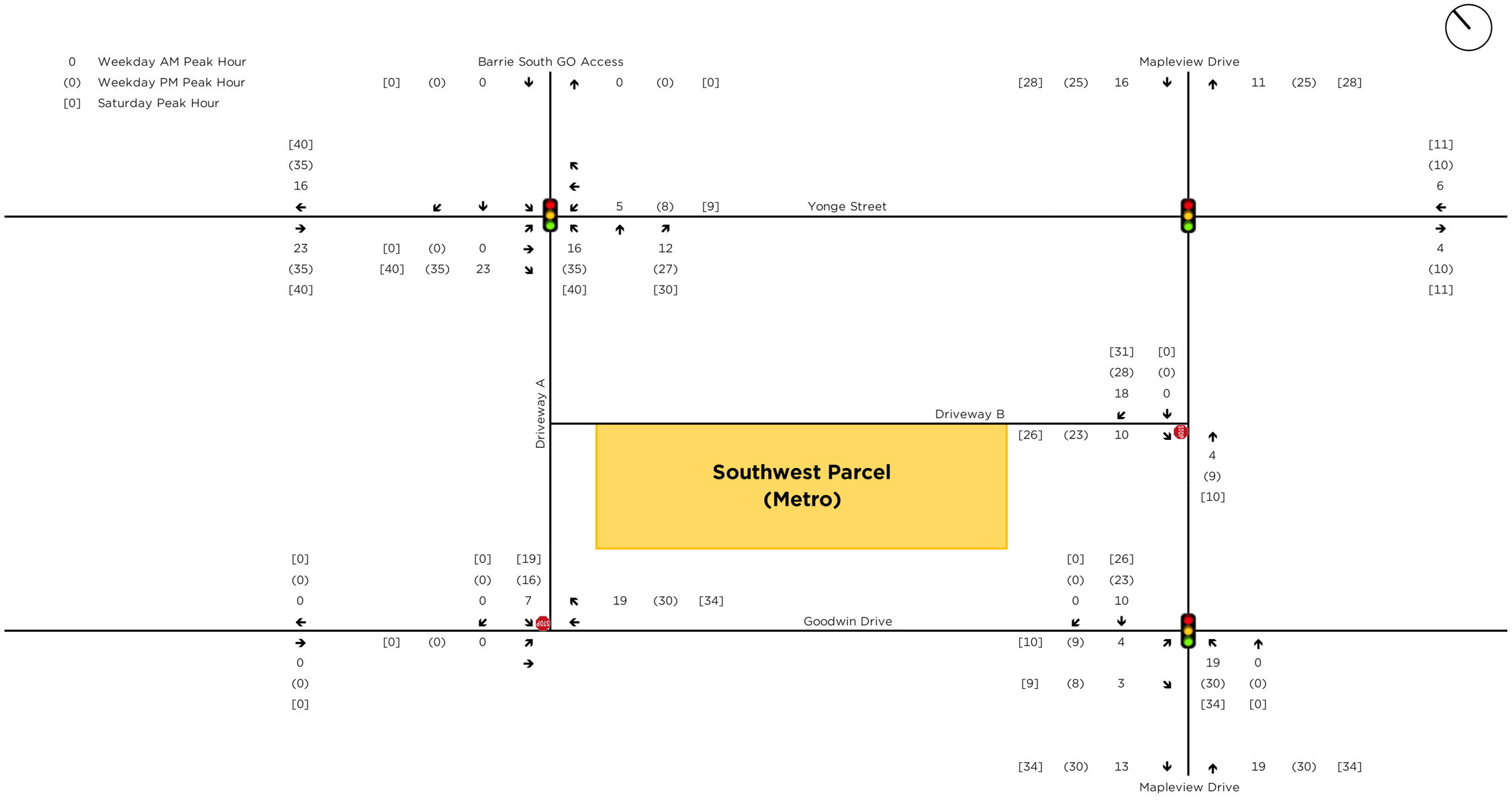
METRO GROCERY STORE NO. 145

Figure 7: Site Trip Generation – Pass-by Trips



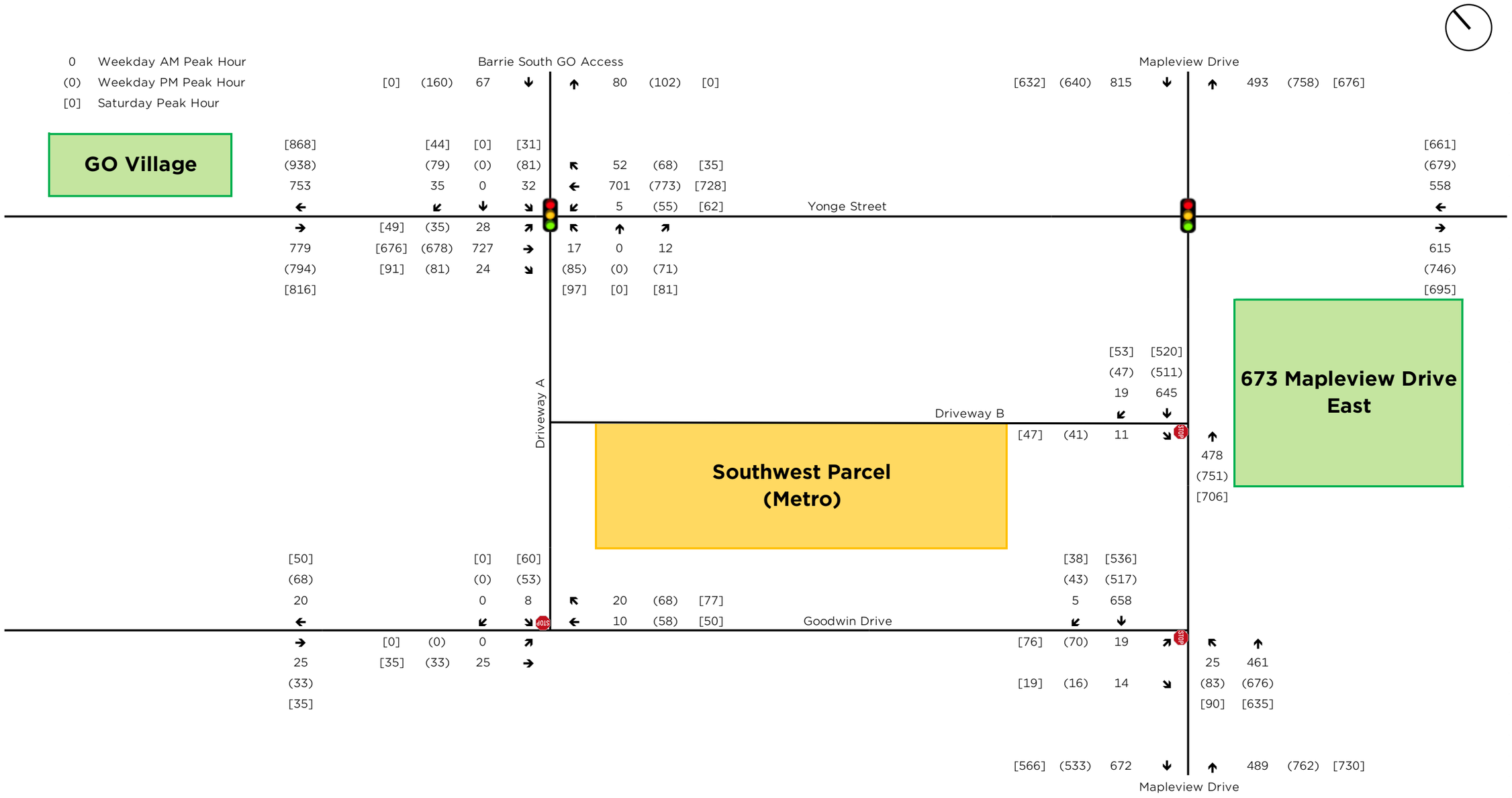
METRO GROCERY STORE NO. 145

Figure 8: Site Trip Generation – Total Trips (2024)



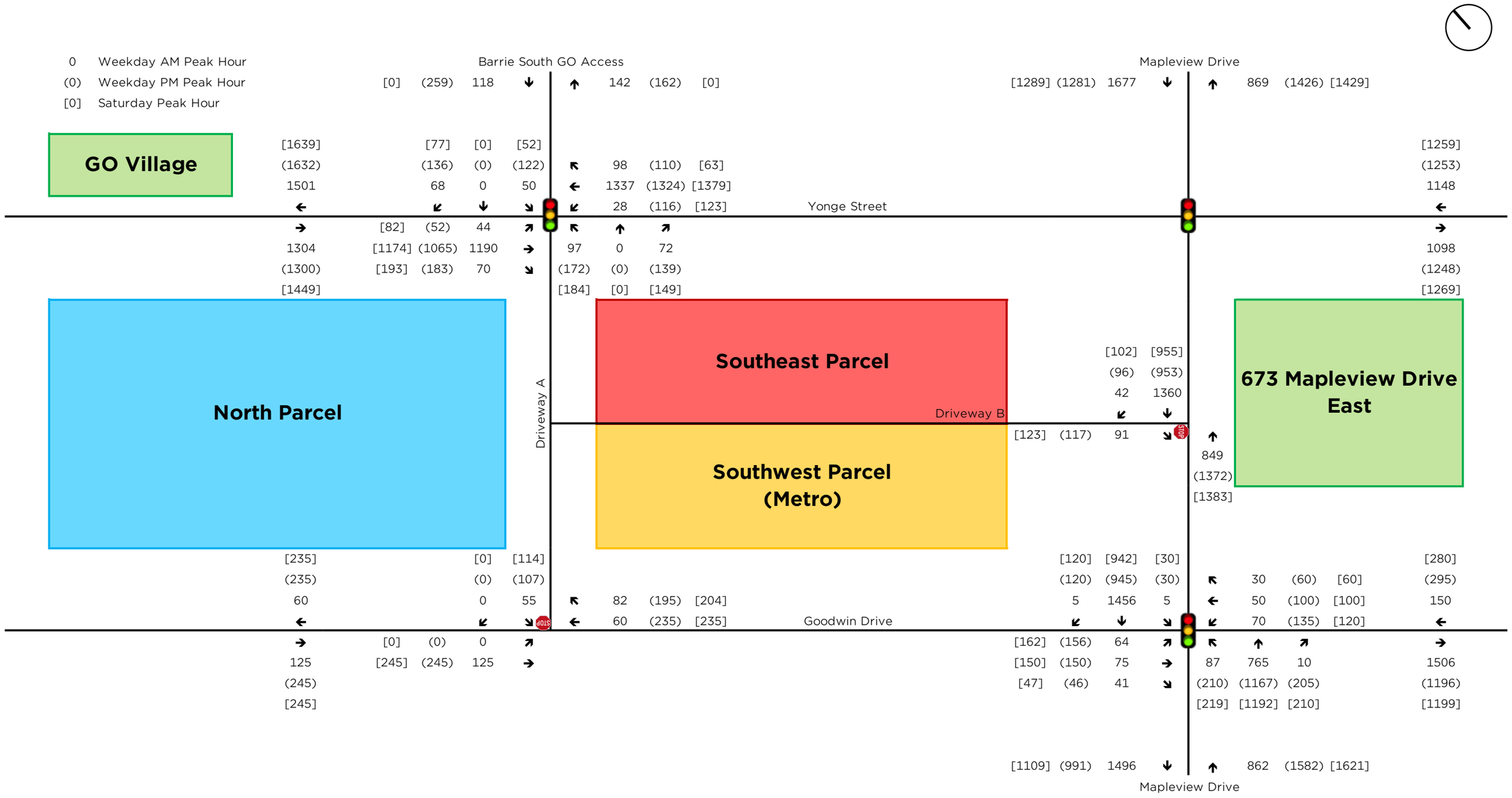
METRO GROCERY STORE NO. 145

Figure 9: Site Trip Generation – Total Trips (2031)



METRO GROCERY STORE NO. 145

Figure 10: Traffic Volumes – 2024



METRO GROCERY STORE NO. 145

Figure 11: Traffic Volumes – 2031

Appendix A:
Traffic Counts

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Turning Movement Count (2 . YONGE ST & BARRIE SOUTH GO ACCESS)

Start Time	N Approach YONGE ST					E Approach BARRIE SOUTH GO ACCESS					S Approach YONGE ST					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
05:00:00	29	6	0	0	35	1	4	0	0	5	5	14	0	0	19	59	
05:15:00	34	17	0	0	51	5	2	0	0	7	16	7	0	0	23	81	
05:30:00	38	2	0	1	40	0	3	0	1	3	5	12	0	0	17	60	
05:45:00	38	17	0	0	55	5	5	0	0	10	17	24	0	1	41	106	306
06:00:00	51	2	0	0	53	1	5	0	0	6	11	31	0	1	42	101	348
06:15:00	65	28	0	1	93	8	7	0	0	15	31	30	0	3	61	169	436
06:30:00	47	3	0	0	50	4	5	0	0	9	3	32	0	0	35	94	470
06:45:00	88	16	0	0	104	10	3	0	1	13	22	58	0	1	80	197	561
07:00:00	87	24	0	0	111	11	23	0	2	34	55	57	0	3	112	257	717
07:15:00	71	3	0	0	74	11	14	0	0	25	5	64	0	0	69	168	716
07:30:00	110	5	0	1	115	3	6	0	2	9	5	111	0	0	116	240	862
07:45:00	158	4	0	0	162	5	6	0	2	11	8	163	0	0	171	344	1009
08:00:00	121	13	0	0	134	10	7	0	0	17	20	94	0	0	114	265	1017
08:15:00	106	3	0	0	109	9	9	0	1	18	5	103	0	0	108	235	1084
08:30:00	116	3	0	0	119	1	4	0	1	5	4	114	0	1	118	242	1086
08:45:00	86	8	0	1	94	6	2	0	0	8	9	93	0	0	102	204	946
BREAK																	
16:00:00	114	3	0	0	117	1	2	0	3	3	1	142	0	1	143	263	
16:15:00	112	5	0	0	117	4	5	0	3	9	6	164	0	2	170	296	
16:30:00	124	3	0	1	127	4	4	0	1	8	3	162	0	2	165	300	
16:45:00	132	3	0	1	135	5	5	0	0	10	13	168	0	0	181	326	1185
17:00:00	116	5	0	0	121	10	7	0	2	17	9	168	0	0	177	315	1237
17:15:00	152	15	0	2	167	17	22	0	2	39	21	129	0	0	150	356	1297
17:30:00	139	6	0	0	145	29	34	0	0	63	14	133	0	1	147	355	1352
17:45:00	114	5	0	0	119	9	4	0	0	13	7	106	0	0	113	245	1271
18:00:00	108	8	0	0	116	1	4	0	0	5	16	143	0	2	159	280	1236
18:15:00	100	3	0	0	103	31	33	0	0	64	6	114	0	1	120	287	1167
18:30:00	95	5	0	3	100	5	7	0	1	12	7	130	0	0	137	249	1061
18:45:00	89	5	0	0	94	32	27	0	1	59	6	112	0	1	118	271	1087
19:00:00	85	3	0	0	88	1	2	0	3	3	2	109	0	0	111	202	1009
19:15:00	94	9	0	0	103	10	9	0	3	19	14	75	0	2	89	211	933
19:30:00	73	5	0	0	78	22	28	0	0	50	5	74	0	0	79	207	891
19:45:00	66	4	0	1	70	4	11	0	2	15	4	65	0	0	69	154	774

Grand Total	2958	241	0	12	3199	275	309	0	31	584	355	3001	0	22	3356	**7139**	-
Approach%	92.5%	7.5%	0%		-	47.1%	52.9%	0%		-	10.6%	89.4%	0%		-	**-**	-
Totals %	41.4%	3.4%	0%		44.8%	3.9%	4.3%	0%		8.2%	5%	42%	0%		47%	**-**	-
Heavy	49	48	0		-	46	22	0		-	19	68	0		-	**-**	-
Heavy %	1.7%	19.9%	0%		-	16.7%	7.1%	0%		-	5.4%	2.3%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

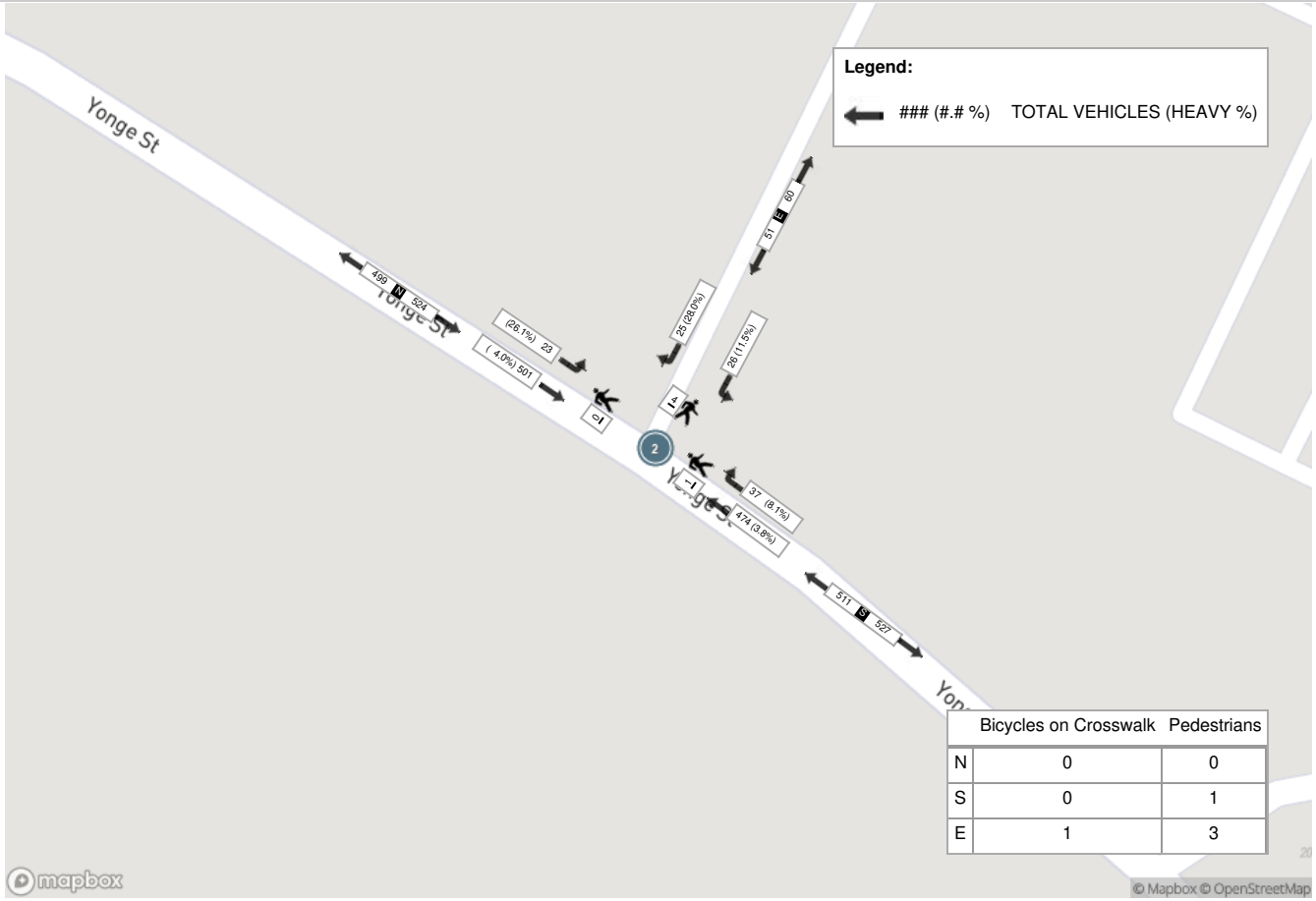
Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (7.62 °C)

Start Time	N Approach YONGE ST					E Approach BARRIE SOUTH GO ACCESS					S Approach YONGE ST					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
07:45:00	158	4	0	0	162	5	6	0	2	11	8	163	0	0	171	344
08:00:00	121	13	0	0	134	10	7	0	0	17	20	94	0	0	114	265
08:15:00	106	3	0	0	109	9	9	0	1	18	5	103	0	0	108	235
08:30:00	116	3	0	0	119	1	4	0	1	5	4	114	0	1	118	242
Grand Total	501	23	0	0	524	25	26	0	4	51	37	474	0	1	511	**1086**
Approach%	95.6%	4.4%	0%		-	49%	51%	0%		-	7.2%	92.8%	0%		-	**-**
Totals %	46.1%	2.1%	0%		48.3%	2.3%	2.4%	0%		4.7%	3.4%	43.6%	0%		47.1%	**-**
PHF	0.79	0.44	0		0.81	0.63	0.72	0		0.71	0.46	0.73	0		0.75	**-**
Heavy	20	6	0		26	7	3	0		10	3	18	0		21	**-**
Heavy %	4%	26.1%	0%		5%	28%	11.5%	0%		19.6%	8.1%	3.8%	0%		4.1%	**-**
Lights	481	17	0		498	18	23	0		41	34	456	0		490	**-**
Lights %	96%	73.9%	0%		95%	72%	88.5%	0%		80.4%	91.9%	96.2%	0%		95.9%	**-**
Single-Unit Trucks	8	0	0		8	0	0	0		0	0	8	0		8	**-**
Single-Unit Trucks %	1.6%	0%	0%		1.5%	0%	0%	0%		0%	0%	1.7%	0%		1.6%	**-**
Buses	11	6	0		17	7	3	0		10	3	8	0		11	**-**
Buses %	2.2%	26.1%	0%		3.2%	28%	11.5%	0%		19.6%	8.1%	1.7%	0%		2.2%	**-**
Articulated Trucks	1	0	0		1	0	0	0		0	0	2	0		2	**-**
Articulated Trucks %	0.2%	0%	0%		0.2%	0%	0%	0%		0%	0%	0.4%	0%		0.4%	**-**
Bicycles on Road	0	0	0		0	0	0	0		0	0	0	0		0	**-**
Bicycles on Road %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	0	-	-	-	-	3	-	-	-	-	1	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	60%		-	-	-	20%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	20%		-	-	-	0%		**-**

Peak Hour: 04:45 PM - 05:45 PM Weather: Clear Sky (14.83 °C)

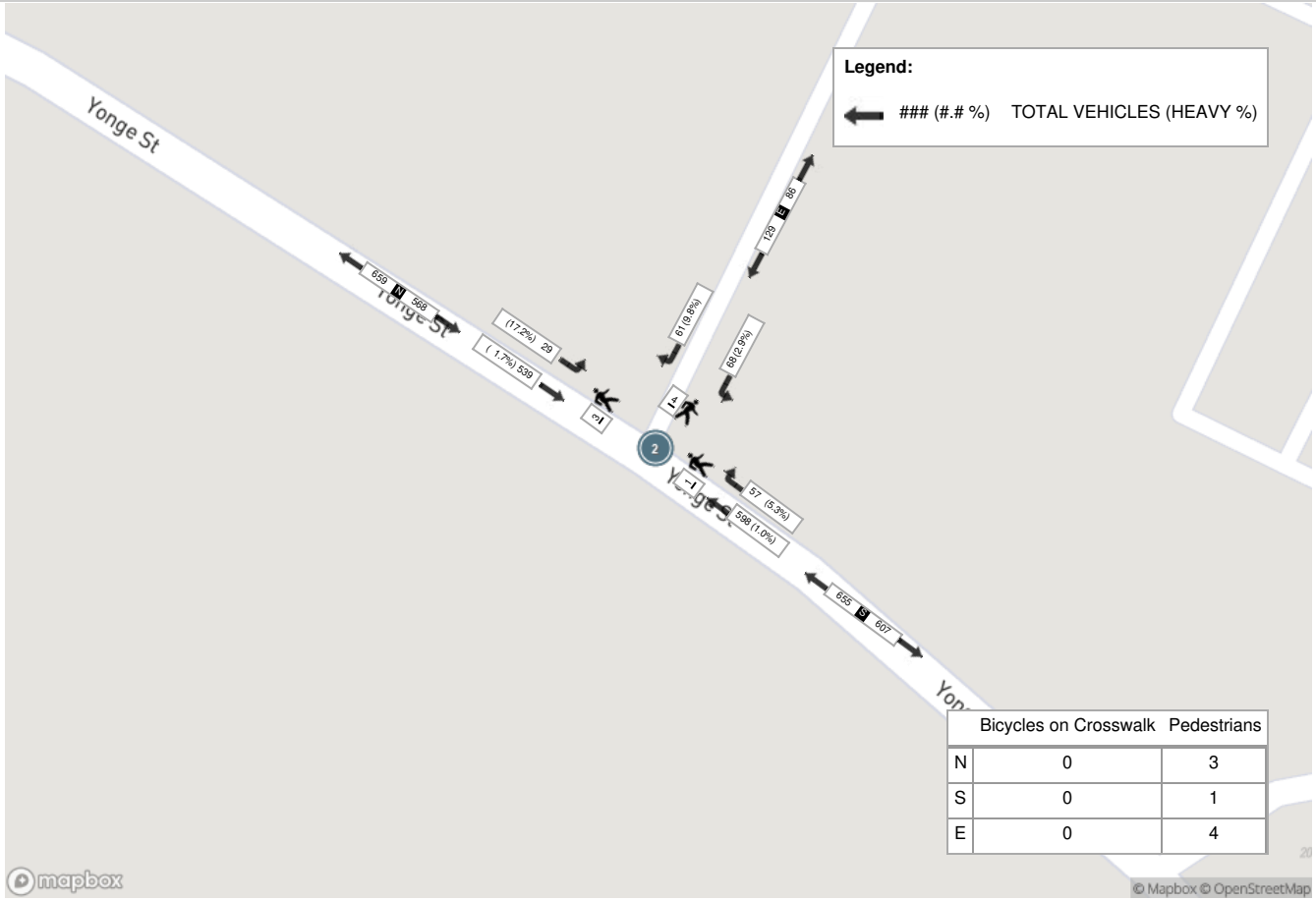
Start Time	N Approach YONGE ST					E Approach BARRIE SOUTH GO ACCESS					S Approach YONGE ST					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
16:45:00	132	3	0	1	135	5	5	0	0	10	13	168	0	0	181	326
17:00:00	116	5	0	0	121	10	7	0	2	17	9	168	0	0	177	315
17:15:00	152	15	0	2	167	17	22	0	2	39	21	129	0	0	150	356
17:30:00	139	6	0	0	145	29	34	0	0	63	14	133	0	1	147	355
Grand Total	539	29	0	3	568	61	68	0	4	129	57	598	0	1	655	**1352**
Approach%	94.9%	5.1%	0%		-	47.3%	52.7%	0%		-	8.7%	91.3%	0%		-	**-**
Totals %	39.9%	2.1%	0%		42%	4.5%	5%	0%		9.5%	4.2%	44.2%	0%		48.4%	**-**
PHF	0.89	0.48	0		0.85	0.53	0.5	0		0.51	0.68	0.89	0		0.9	**-**
Heavy	9	5	0		14	6	2	0		8	3	6	0		9	**-**
Heavy %	1.7%	17.2%	0%		2.5%	9.8%	2.9%	0%		6.2%	5.3%	1%	0%		1.4%	**-**
Lights	529	24	0		553	55	66	0		121	54	592	0		646	**-**
Lights %	98.1%	82.8%	0%		97.4%	90.2%	97.1%	0%		93.8%	94.7%	99%	0%		98.6%	**-**
Single-Unit Trucks	7	0	0		7	0	0	0		0	0	5	0		5	**-**
Single-Unit Trucks %	1.3%	0%	0%		1.2%	0%	0%	0%		0%	0%	0.8%	0%		0.8%	**-**
Buses	1	5	0		6	6	2	0		8	3	1	0		4	**-**
Buses %	0.2%	17.2%	0%		1.1%	9.8%	2.9%	0%		6.2%	5.3%	0.2%	0%		0.6%	**-**
Articulated Trucks	1	0	0		1	0	0	0		0	0	0	0		0	**-**
Articulated Trucks %	0.2%	0%	0%		0.2%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Bicycles on Road	1	0	0		1	0	0	0		0	0	0	0		0	**-**
Bicycles on Road %	0.2%	0%	0%		0.2%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	3	-	-	-	-	4	-	-	-	-	1	-	**-**
Pedestrians%	-	-	-	37.5%		-	-	-	50%		-	-	-	12.5%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (7.62 °C)



	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	1
E	1	3

Peak Hour: 04:45 PM - 05:45 PM Weather: Clear Sky (14.83 °C)



	Bicycles on Crosswalk	Pedestrians
N	0	3
S	0	1
E	0	4

Spectrum

Turning Movement Count
Location Name: YONGE ST & BARRIE SOUTH GO ACCESS
Date: Sat, Oct 01, 2022 Deployment Lead: Peter Ilias

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

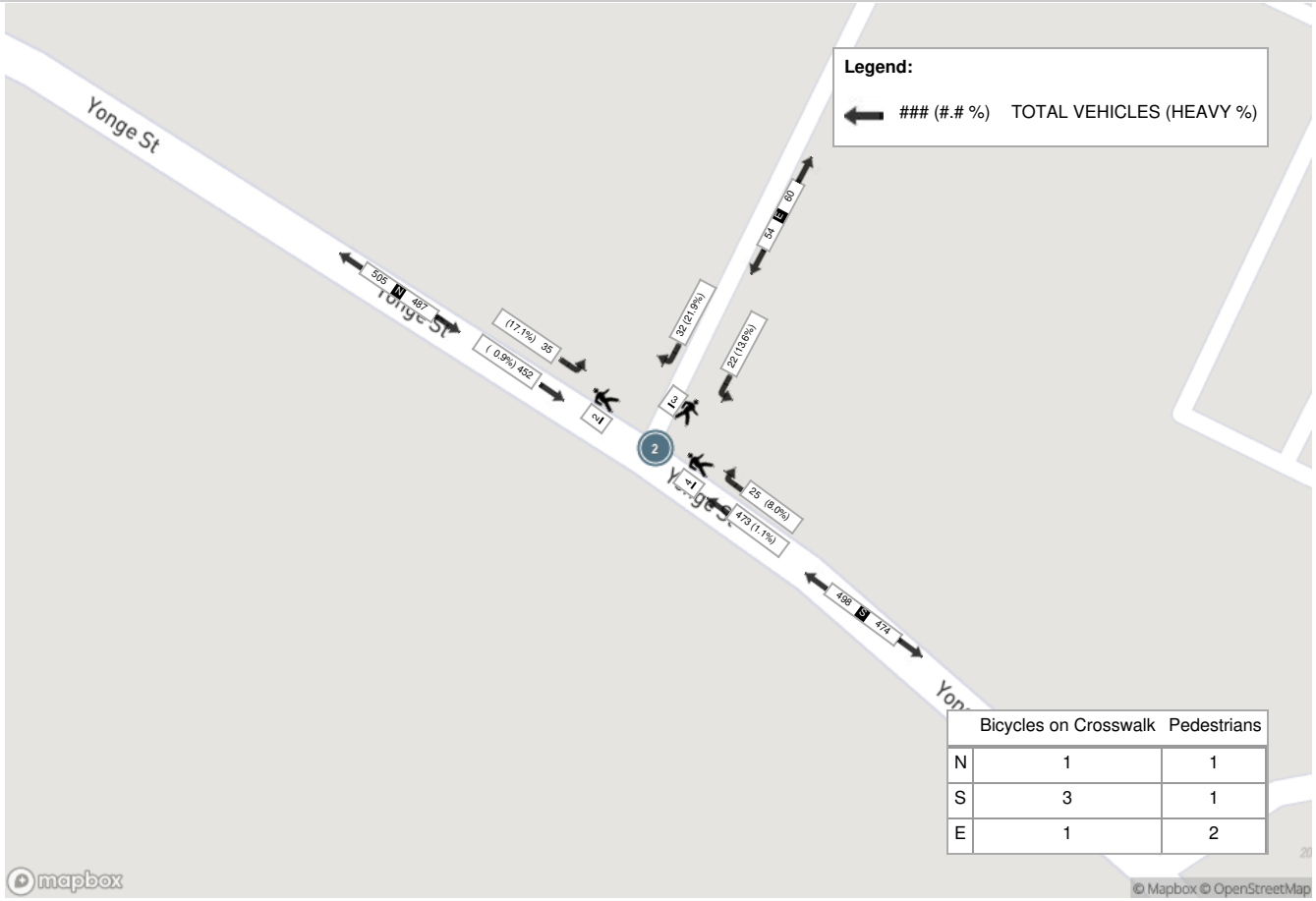
Turning Movement Count (2 . YONGE ST & BARRIE SOUTH GO ACCESS)

Start Time	N Approach YONGE ST					E Approach BARRIE SOUTH GO ACCESS					S Approach YONGE ST					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
11:00:00	114	18	0	0	132	9	6	0	0	15	19	107	0	1	126	273	
11:15:00	108	5	0	1	113	9	5	0	3	14	4	133	0	0	137	264	
11:30:00	100	1	2	0	103	2	0	0	1	2	3	124	0	0	127	232	
11:45:00	109	1	1	0	111	5	2	0	0	7	5	92	0	0	97	215	984
12:00:00	98	1	0	0	99	3	3	0	1	6	1	116	0	0	117	222	933
12:15:00	123	4	0	0	127	3	3	0	1	6	7	113	0	0	120	253	922
12:30:00	105	2	0	0	107	2	5	0	5	7	2	133	0	2	135	249	939
12:45:00	116	5	0	1	121	2	2	0	2	4	4	119	0	1	123	248	972
13:00:00	112	2	0	0	114	2	2	0	0	4	0	140	0	2	140	258	1008
13:15:00	109	18	0	2	127	14	5	0	2	19	7	115	0	0	122	268	1023
13:30:00	106	8	0	0	114	11	10	0	1	21	7	108	0	2	115	250	1024
13:45:00	125	7	0	0	132	5	5	0	0	10	11	110	0	0	121	263	1039
Grand Total	1325	72	3	4	1400	67	48	0	16	115	70	1410	0	8	1480	**2995**	-
Approach%	94.6%	5.1%	0.2%		-	58.3%	41.7%	0%		-	4.7%	95.3%	0%		-	**-**	-
Totals %	44.2%	2.4%	0.1%		46.7%	2.2%	1.6%	0%		3.8%	2.3%	47.1%	0%		49.4%	**-**	-
Heavy	18	18	2		-	18	8	0		-	8	19	0		-	**-**	-
Heavy %	1.4%	25%	66.7%		-	26.9%	16.7%	0%		-	11.4%	1.3%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

Peak Hour: 01:00 PM - 02:00 PM Weather: Overcast Clouds (12.85 °C)

Start Time	N Approach YONGE ST					E Approach BARRIE SOUTH GO ACCESS					S Approach YONGE ST					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
13:00:00	112	2	0	0	114	2	2	0	0	4	0	140	0	2	140	258
13:15:00	109	18	0	2	127	14	5	0	2	19	7	115	0	0	122	268
13:30:00	106	8	0	0	114	11	10	0	1	21	7	108	0	2	115	250
13:45:00	125	7	0	0	132	5	5	0	0	10	11	110	0	0	121	263
Grand Total	452	35	0	2	487	32	22	0	3	54	25	473	0	4	498	**1039**
Approach%	92.8%	7.2%	0%		-	59.3%	40.7%	0%		-	5%	95%	0%		-	**-**
Totals %	43.5%	3.4%	0%		46.9%	3.1%	2.1%	0%		5.2%	2.4%	45.5%	0%		47.9%	**-**
PHF	0.9	0.49	0		0.92	0.57	0.55	0		0.64	0.57	0.84	0		0.89	**-**
Heavy	4	6	0		10	7	3	0		10	2	5	0		7	**-**
Heavy %	0.9%	17.1%	0%		2.1%	21.9%	13.6%	0%		18.5%	8%	1.1%	0%		1.4%	**-**
Lights	447	29	0		476	25	19	0		44	23	468	0		491	**-**
Lights %	98.9%	82.9%	0%		97.7%	78.1%	86.4%	0%		81.5%	92%	98.9%	0%		98.6%	**-**
Single-Unit Trucks	4	0	0		4	0	0	0		0	0	5	0		5	**-**
Single-Unit Trucks %	0.9%	0%	0%		0.8%	0%	0%	0%		0%	0%	1.1%	0%		1%	**-**
Buses	0	6	0		6	7	3	0		10	2	0	0		2	**-**
Buses %	0%	17.1%	0%		1.2%	21.9%	13.6%	0%		18.5%	8%	0%	0%		0.4%	**-**
Articulated Trucks	0	0	0		0	0	0	0		0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Bicycles on Road	1	0	0		1	0	0	0		0	0	0	0		0	**-**
Bicycles on Road %	0.2%	0%	0%		0.2%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	1	-	-	-	-	2	-	-	-	-	1	-	**-**
Pedestrians%	-	-	-	11.1%		-	-	-	22.2%		-	-	-	11.1%		**-**
Bicycles on Crosswalk	-	-	-	1	-	-	-	-	1	-	-	-	-	3	-	**-**
Bicycles on Crosswalk%	-	-	-	11.1%		-	-	-	11.1%		-	-	-	33.3%		**-**

Peak Hour: 01:00 PM - 02:00 PM Weather: Overcast Clouds (12.85 °C)



	Bicycles on Crosswalk	Pedestrians
N	1	1
S	3	1
E	1	2

Spectrum

Turning Movement Count
Location Name: MAPLEVIEW DR E & GOODWIN DR
Date: Thu, Feb 10, 2022 Deployment Lead: Peter Ilias

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Turning Movement Count (5 . MAPLEVIEW DR E & GOODWIN DR)

Start Time	N Approach GOODWIN DR						E Approach MAPLEVIEW DR E						S Approach GOODWIN DR						W Approach MAPLEVIEW DR E						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:30:00	4	0	2	0	1	6	1	79	0	0	0	80	0	0	0	0	0	0	0	67	0	0	0	67	153	
07:45:00	4	0	2	0	3	6	0	93	0	0	1	93	0	0	0	0	0	0	0	74	0	0	0	74	173	
08:00:00	2	0	0	0	0	2	1	71	0	0	0	72	0	0	0	0	0	0	0	69	1	0	0	70	144	
08:15:00	3	0	0	0	0	3	1	71	0	0	0	72	1	0	0	0	1	1	0	79	4	0	0	83	159	629
08:30:00	3	0	1	0	0	4	0	103	0	0	0	103	0	0	0	0	0	0	0	75	1	0	0	76	183	659
08:45:00	7	0	2	0	0	9	0	84	0	0	0	84	0	0	0	0	0	0	0	62	2	0	0	64	157	643
09:00:00	3	0	3	0	0	6	0	68	0	0	0	68	0	0	0	0	0	0	0	57	1	0	0	58	132	631
09:15:00	0	0	0	0	0	0	1	65	0	0	0	66	0	0	0	0	0	0	0	49	0	0	0	49	115	587
BREAK																										
16:00:00	4	0	2	0	0	6	3	83	0	0	0	86	0	0	0	0	1	0	1	89	5	0	0	95	187	
16:15:00	0	0	2	0	1	2	2	116	0	0	1	118	0	0	0	0	0	0	0	94	3	0	0	97	217	
16:30:00	0	0	0	0	0	0	3	82	0	0	1	85	0	0	0	0	0	0	0	106	5	0	0	111	196	
16:45:00	1	0	1	0	0	2	3	67	0	0	0	70	0	0	0	0	0	0	0	99	8	0	0	107	179	779
17:00:00	2	0	3	0	0	5	4	77	0	0	0	81	0	0	0	0	0	0	0	124	0	0	0	124	210	802
17:15:00	1	0	0	0	0	1	4	94	0	0	0	98	0	0	0	0	0	0	0	109	2	0	0	111	210	795
17:30:00	0	0	1	0	0	1	2	77	0	0	0	79	1	0	0	0	0	1	0	108	3	0	0	111	192	791
17:45:00	0	0	0	0	1	0	1	78	1	0	1	80	0	0	0	0	0	0	0	92	1	0	0	93	173	785
Grand Total	34	0	19	0	6	53	26	1308	1	0	4	1335	2	0	0	0	2	2	1	1353	36	0	0	1390	**2780**	-
Approach%	64.2%	0%	35.8%	0%		-	1.9%	98%	0.1%	0%		-	100%	0%	0%	0%		-	0.1%	97.3%	2.6%	0%		-	**-**	-
Totals %	1.2%	0%	0.7%	0%		1.9%	0.9%	47.1%	0%	0%		48%	0.1%	0%	0%	0%		0.1%	0%	48.7%	1.3%	0%		50%	**-**	-
Heavy	3	0	1	0		-	0	43	0	0		-	0	0	0	0		-	0	49	0	0		-	**-**	-
Heavy %	8.8%	0%	5.3%	0%		-	0%	3.3%	0%	0%		-	0%	0%	0%	0%		-	0%	3.6%	0%	0%		-	**-**	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Overcast Clouds (-0.04 °C)

Start Time	N Approach GOODWIN DR						E Approach MAPLEVIEW DR E						S Approach GOODWIN DR						W Approach MAPLEVIEW DR E						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	4	0	2	0	3	6	0	93	0	0	1	93	0	0	0	0	0	0	0	74	0	0	0	74	173
08:00:00	2	0	0	0	0	2	1	71	0	0	0	72	0	0	0	0	0	0	0	69	1	0	0	70	144
08:15:00	3	0	0	0	0	3	1	71	0	0	0	72	1	0	0	0	1	1	0	79	4	0	0	83	159
08:30:00	3	0	1	0	0	4	0	103	0	0	0	103	0	0	0	0	0	0	0	75	1	0	0	76	183
Grand Total	12	0	3	0	3	15	2	338	0	0	1	340	1	0	0	0	1	1	0	297	6	0	0	303	**659**
Approach%	80%	0%	20%	0%		-	0.6%	99.4%	0%	0%		-	100%	0%	0%	0%		-	0%	98%	2%	0%		-	**-**
Totals %	1.8%	0%	0.5%	0%		2.3%	0.3%	51.3%	0%	0%		51.6%	0.2%	0%	0%	0%		0.2%	0%	45.1%	0.9%	0%		46%	**-**
PHF	0.75	0	0.38	0		0.63	0.5	0.82	0	0		0.83	0.25	0	0	0		0.25	0	0.94	0.38	0		0.91	**-**
Heavy	2	0	0	0		2	0	8	0	0		8	0	0	0	0		0	0	21	0	0		21	**-**
Heavy %	16.7%	0%	0%	0%		13.3%	0%	2.4%	0%	0%		2.4%	0%	0%	0%	0%		0%	0%	7.1%	0%	0%		6.9%	**-**
Lights	10	0	3	0		13	2	330	0	0		332	1	0	0	0		1	0	276	6	0		282	**-**
Lights %	83.3%	0%	100%	0%		86.7%	100%	97.6%	0%	0%		97.6%	100%	0%	0%	0%		100%	0%	92.9%	100%	0%		93.1%	**-**
Single-Unit Trucks	2	0	0	0		2	0	6	0	0		6	0	0	0	0		0	0	14	0	0		14	**-**
Single-Unit Trucks %	16.7%	0%	0%	0%		13.3%	0%	1.8%	0%	0%		1.8%	0%	0%	0%	0%		0%	0%	4.7%	0%	0%		4.6%	**-**
Buses	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	1	0	0		1	**-**
Buses %	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	**-**
Articulated Trucks	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	6	0	0		6	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	0%	0%	0%	0%		0%	0%	2%	0%	0%		2%	**-**
Pedestrians	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	-	60%		-	-	-	-	20%		-	-	-	-	20%		-	-	-	-	0%		**-**

Spectrum

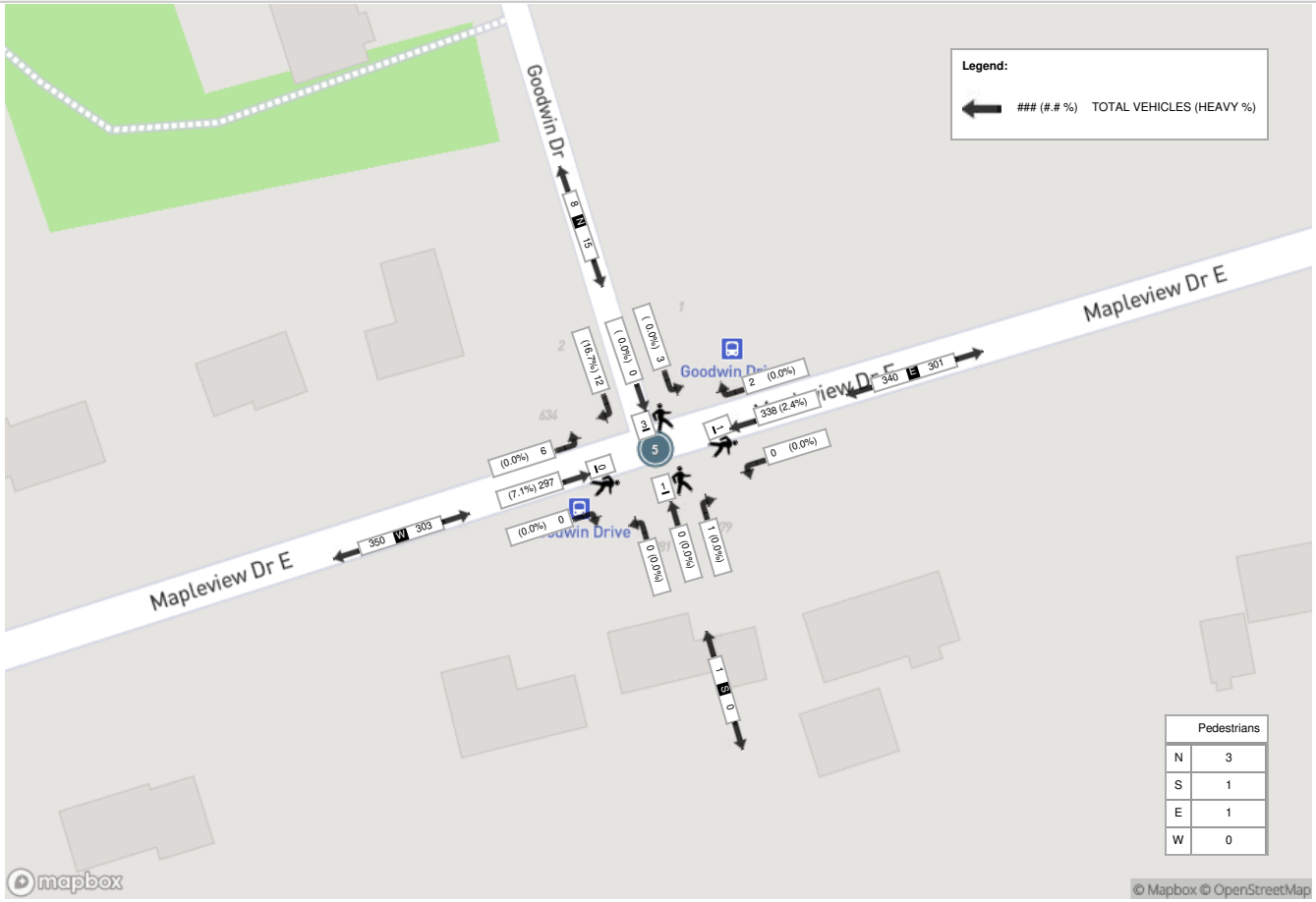
Turning Movement Count
Location Name: MAPLEVIEW DR E & GOODWIN DR
Date: Thu, Feb 10, 2022 Deployment Lead: Peter Ilias

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast Clouds (0.34 °C)

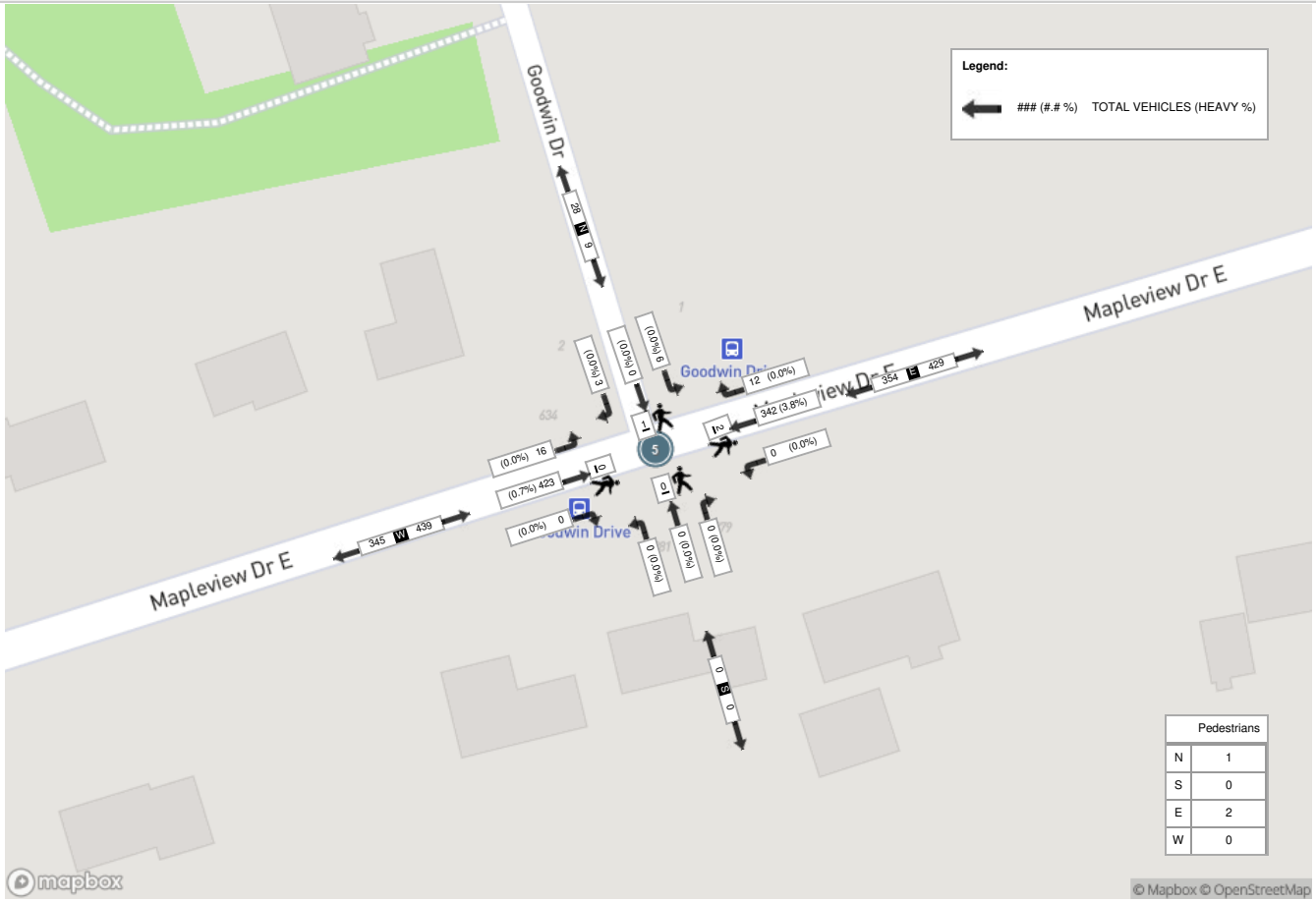
Start Time	N Approach GOODWIN DR						E Approach MAPLEVIEW DR E						S Approach GOODWIN DR						W Approach MAPLEVIEW DR E						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:15:00	0	0	2	0	1	2	2	116	0	0	1	118	0	0	0	0	0	0	0	94	3	0	0	97	217
16:30:00	0	0	0	0	0	0	3	82	0	0	1	85	0	0	0	0	0	0	0	106	5	0	0	111	196
16:45:00	1	0	1	0	0	2	3	67	0	0	0	70	0	0	0	0	0	0	0	99	8	0	0	107	179
17:00:00	2	0	3	0	0	5	4	77	0	0	0	81	0	0	0	0	0	0	0	124	0	0	0	124	210
Grand Total	3	0	6	0	1	9	12	342	0	0	2	354	0	0	0	0	0	0	0	423	16	0	0	439	**802**
Approach%	33.3%	0%	66.7%	0%		-	3.4%	96.6%	0%	0%		-	0%	0%	0%	0%		-	0%	96.4%	3.6%	0%		-	**-**
Totals %	0.4%	0%	0.7%	0%		1.1%	1.5%	42.6%	0%	0%		44.1%	0%	0%	0%	0%		0%	0%	52.7%	2%	0%		54.7%	**-**
PHF	0.38	0	0.5	0		0.45	0.75	0.74	0	0		0.75	0	0	0	0		0	0	0.85	0.5	0		0.89	**-**
Heavy	0	0	0	0		0	0	13	0	0		13	0	0	0	0		0	0	3	0	0		3	**-**
Heavy %	0%	0%	0%	0%		0%	0%	3.8%	0%	0%		3.7%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.7%	**-**
Lights	3	0	6	0		9	12	329	0	0		341	0	0	0	0		0	0	420	16	0		436	**-**
Lights %	100%	0%	100%	0%		100%	100%	96.2%	0%	0%		96.3%	0%	0%	0%	0%		0%	0%	99.3%	100%	0%		99.3%	**-**
Single-Unit Trucks	0	0	0	0		0	0	6	0	0		6	0	0	0	0		0	0	1	0	0		1	**-**
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	1.8%	0%	0%		1.7%	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.2%	**-**
Buses	0	0	0	0		0	0	5	0	0		5	0	0	0	0		0	0	0	0	0		0	**-**
Buses %	0%	0%	0%	0%		0%	0%	1.5%	0%	0%		1.4%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Articulated Trucks	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	2	0	0		2	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.6%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.5%	**-**
Pedestrians	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	-	33.3%		-	-	-	-	66.7%		-	-	-	-	0%		-	-	-	-	0%		**-**

Peak Hour: 07:45 AM - 08:45 AM **Weather: Overcast Clouds (-0.04 °C)**



BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast Clouds (0.34 °C)



Spectrum

Turning Movement Count
Location Name: MAPLEVIEW DR E & GOODWIN DR
Date: Sat, Feb 12, 2022 Deployment Lead: Peter Ilias

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Turning Movement Count (5 . MAPLEVIEW DR E & GOODWIN DR)

Start Time	N Approach GOODWIN DR						E Approach MAPLEVIEW DR E						S Approach GOODWIN DR						W Approach MAPLEVIEW DR E						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
12:00:00	1	0	2	0	0	3	0	97	0	0	0	97	0	0	0	0	0	0	0	82	2	0	0	84	184	
12:15:00	4	0	0	0	0	4	1	75	0	0	0	76	0	0	0	0	0	0	0	90	2	0	0	92	172	
12:30:00	1	0	0	0	0	1	1	86	0	0	0	87	0	0	0	0	0	0	0	83	2	0	0	85	173	
12:45:00	3	0	2	0	0	5	1	92	0	0	0	93	0	0	0	0	0	0	0	78	1	0	0	79	177	706
13:00:00	2	0	1	0	1	3	2	81	0	0	1	83	0	0	0	0	0	0	0	88	1	0	2	89	175	697
13:15:00	3	0	0	0	0	3	0	84	0	0	0	84	0	0	0	0	0	0	0	90	3	0	0	93	180	705
13:30:00	1	0	0	0	0	1	0	97	0	0	1	97	0	0	0	0	0	0	0	84	5	0	0	89	187	719
13:45:00	4	0	2	0	0	6	1	77	0	0	0	78	0	0	0	0	0	0	0	78	1	0	0	79	163	705
14:00:00	0	0	0	0	0	0	1	88	0	0	0	89	0	0	0	0	0	0	0	87	2	0	0	89	178	708
14:15:00	2	0	0	0	0	2	1	73	0	0	0	74	0	0	0	0	0	0	0	74	4	0	0	78	154	682
14:30:00	2	0	1	0	0	3	1	74	0	0	0	75	0	0	0	0	0	0	0	86	1	0	0	87	165	660
14:45:00	1	0	2	0	0	3	1	72	0	0	0	73	0	0	0	0	0	0	0	77	2	0	0	79	155	652
15:00:00	2	0	0	0	0	2	0	87	0	0	0	87	0	0	0	0	0	0	0	88	2	0	0	90	179	653
15:15:00	1	0	0	0	0	1	0	81	0	0	0	81	0	0	0	0	0	0	0	78	3	0	0	81	163	662
15:30:00	2	0	0	0	0	2	2	84	0	0	0	86	0	0	0	0	0	0	0	74	5	0	0	79	167	664
15:45:00	1	0	0	0	1	1	3	88	0	0	1	91	0	0	0	0	0	0	0	93	3	0	0	96	188	697
Grand Total	30	0	10	0	2	40	15	1336	0	0	3	1351	0	0	0	0	0	0	0	1330	39	0	2	1369	**2760**	-
Approach%	75%	0%	25%	0%		-	1.1%	98.9%	0%	0%		-	0%	0%	0%	0%		-	0%	97.2%	2.8%	0%		-	**-**	-
Totals %	1.1%	0%	0.4%	0%		1.4%	0.5%	48.4%	0%	0%		48.9%	0%	0%	0%	0%		0%	0%	48.2%	1.4%	0%		49.6%	**-**	-
Heavy	1	0	0	0		-	1	10	0	0		-	0	0	0	0		-	0	7	0	0		-	**-**	-
Heavy %	3.3%	0%	0%	0%		-	6.7%	0.7%	0%	0%		-	0%	0%	0%	0%		-	0%	0.5%	0%	0%		-	**-**	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-

Spectrum

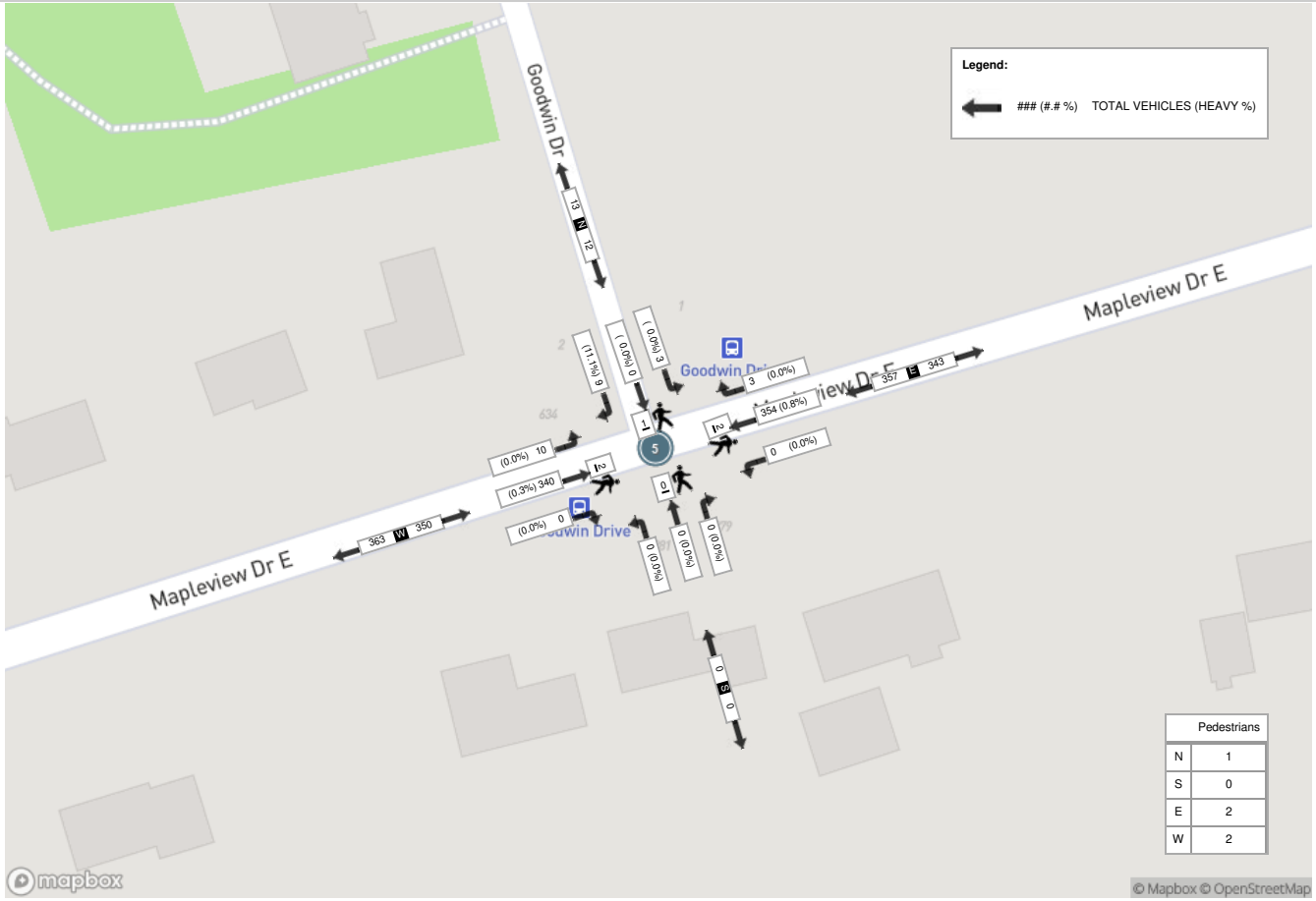
Turning Movement Count
Location Name: MAPLEVIEW DR E & GOODWIN DR
Date: Sat, Feb 12, 2022 Deployment Lead: Peter Ilias

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 12:45 PM - 01:45 PM Weather: Overcast Clouds (-12.14 °C)

Start Time	N Approach GOODWIN DR						E Approach MAPLEVIEW DR E						S Approach GOODWIN DR						W Approach MAPLEVIEW DR E						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
12:45:00	3	0	2	0	0	5	1	92	0	0	0	93	0	0	0	0	0	0	0	78	1	0	0	79	177
13:00:00	2	0	1	0	1	3	2	81	0	0	1	83	0	0	0	0	0	0	0	88	1	0	2	89	175
13:15:00	3	0	0	0	0	3	0	84	0	0	0	84	0	0	0	0	0	0	0	90	3	0	0	93	180
13:30:00	1	0	0	0	0	1	0	97	0	0	1	97	0	0	0	0	0	0	0	84	5	0	0	89	187
Grand Total	9	0	3	0	1	12	3	354	0	0	2	357	0	0	0	0	0	0	0	340	10	0	2	350	**719**
Approach%	75%	0%	25%	0%		-	0.8%	99.2%	0%	0%		-	0%	0%	0%	0%		-	0%	97.1%	2.9%	0%		-	**-**
Totals %	1.3%	0%	0.4%	0%		1.7%	0.4%	49.2%	0%	0%		49.7%	0%	0%	0%	0%		0%	0%	47.3%	1.4%	0%		48.7%	**-**
PHF	0.75	0	0.38	0		0.6	0.38	0.91	0	0		0.92	0	0	0	0		0	0	0.94	0.5	0		0.94	**-**
Heavy	1	0	0	0		1	0	3	0	0		3	0	0	0	0		0	0	1	0	0		1	**-**
Heavy %	11.1%	0%	0%	0%		8.3%	0%	0.8%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	**-**
Lights	8	0	3	0		11	3	351	0	0		354	0	0	0	0		0	0	339	10	0		349	**-**
Lights %	88.9%	0%	100%	0%		91.7%	100%	99.2%	0%	0%		99.2%	0%	0%	0%	0%		0%	0%	99.7%	100%	0%		99.7%	**-**
Single-Unit Trucks	0	0	0	0		0	0	3	0	0		3	0	0	0	0		0	0	1	0	0		1	**-**
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	0.8%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	**-**
Buses	1	0	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	**-**
Buses %	11.1%	0%	0%	0%		8.3%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	2	-	**-**
Pedestrians%	-	-	-	-	20%		-	-	-	-	40%		-	-	-	-	0%		-	-	-	-	40%		**-**

Peak Hour: 12:45 PM - 01:45 PM **Weather: Overcast Clouds (-12.14 °C)**



Appendix B:
LOS Definitions

TATHAM ENGINEERING

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CAPACITY ANALYSIS AT UNSIGNALIZED INTERSECTIONS

Highway Capacity Manual Methodology

The level of service at an unsignalized intersection is determined on the basis of control delay for each critical lane. This method of analysis is taken from the Highway Capacity Manual, Special Report 209, by the Transportation Research Board, 1997.

The average control delay for any particular critical movement (control delay includes initial deceleration, queue move-up time, stopped delay, and final acceleration delay) is a function of the service rate or capacity of the approach and degree of saturation. The level of service criteria for unsignalized intersections is outlined below and is related to ranges in vehicle delay.

Level of Service	Expected Delay to Minor Street Traffic	Average Control Delay 'd' (sec/veh)
A	Little or no delays	$0 < d \leq 10$
B	Short traffic delays	$10 \leq d \leq 15$
C	Average traffic delays	$15 \leq d \leq 25$
D	Long traffic delays	$25 \leq d \leq 35$
E	Very long traffic delays	$35 \leq d \leq 50$
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	$d > 50$

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CAPACITY ANALYSIS AT SIGNALIZED INTERSECTIONS

Highway Capacity Manual Methodology

The capacity of signalized intersections has been determined in terms of delay taken from Chapter 9 of the Highway Capacity Manual, Special Report 209, by the Transportation Research Board, 2000.

To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to "Level of Service". Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Only the portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration, queue move-up time, stopped delay, and final acceleration delay. The following table describes in detail the characteristics of each level:

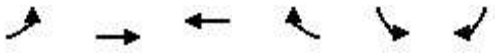
Level of Service	Expected Delay to Minor Street Traffic	Average Control Delay 'd' (sec/veh)
A	Describes operations with very low control delay, up to 10 seconds/vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all at this LOS. Short cycle lengths may also contribute to low delay.	$d \leq 10$
B	Describes operations with control delay greater than 10 seconds and up to 20 seconds/vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop at this level than at LOS A, causing longer average delays.	$10 \leq d \leq 20$
C	Describes operations with control delay greater than 20 seconds and up to 35 seconds/vehicle. These higher delays may result from fair progression, longer cycle length, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.	$20 \leq d \leq 35$
D	Describes operations with control delay greater than 35 seconds and up to 55 seconds/vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures become noticeable.	$35 \leq d \leq 55$
E	Describes operations with control delay greater than 55 seconds and up to 80 seconds/vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	$55 \leq d \leq 80$
F	**LOS F** describes operations with control delay in excess of 80 seconds/vehicle. This *oversaturation*, considered to be unacceptable to most drivers, occurs when arrival flow rates exceed the design capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such high delay levels.	$d > 80$

Appendix C:
Existing Operations

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	26	25	474	37	23	501
Future Volume (vph)	26	25	474	37	23	501
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		4.0	6.0
Lane Util. Factor	0.97	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3471	1601	3540		1789	3579
Flt Permitted	0.95	1.00	1.00		0.42	1.00
Satd. Flow (perm)	3471	1601	3540		799	3579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	27	515	40	25	545
RTOR Reduction (vph)	0	25	3	0	0	0
Lane Group Flow (vph)	28	2	552	0	25	545
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8			6	
Actuated Green, G (s)	8.0	8.0	85.5		93.8	93.8
Effective Green, g (s)	8.0	8.0	85.5		93.8	93.8
Actuated g/C Ratio	0.07	0.07	0.75		0.82	0.82
Clearance Time (s)	6.0	6.0	6.0		4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	244	112	2659		695	2950
v/s Ratio Prot			c0.16		0.00	c0.15
v/s Ratio Perm	c0.01	0.00			0.03	
v/c Ratio	0.11	0.02	0.21		0.04	0.18
Uniform Delay, d1	49.6	49.2	4.2		1.9	2.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.1	0.2		0.0	0.1
Delay (s)	49.8	49.3	4.3		1.9	2.2
Level of Service	D	D	A		A	A
Approach Delay (s)	49.6		4.3			2.2
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	113.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	308	345	5	5	10
Future Volume (Veh/h)	5	308	345	5	5	10
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)	5	335	375	5	5	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			354			
pX, platoon unblocked	0.88				0.88	0.88
vC, conflicting volume	380				552	375
vC1, stage 1 conf vol					375	
vC2, stage 2 conf vol					178	
vCu, unblocked vol	223				420	218
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	98
cM capacity (veh/h)	1178				644	690

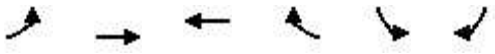
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	117	223	375	5	16
Volume Left	5	0	0	0	5
Volume Right	0	0	0	5	11
cSH	1178	1700	1700	1700	675
Volume to Capacity	0.00	0.13	0.22	0.00	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.0	0.6
Control Delay (s)	0.4	0.0	0.0	0.0	10.5
Lane LOS	A				B
Approach Delay (s)	0.1		0.0		10.5
Approach LOS					B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	68	61	598	57	29	539
Future Volume (vph)	68	61	598	57	29	539
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		4.0	6.0
Lane Util. Factor	0.97	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3471	1601	3532		1789	3579
Flt Permitted	0.95	1.00	1.00		0.36	1.00
Satd. Flow (perm)	3471	1601	3532		670	3579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	66	650	62	32	586
RTOR Reduction (vph)	0	61	4	0	0	0
Lane Group Flow (vph)	74	5	708	0	32	586
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8			6	
Actuated Green, G (s)	8.0	8.0	77.4		85.6	85.6
Effective Green, g (s)	8.0	8.0	77.4		85.6	85.6
Actuated g/C Ratio	0.08	0.08	0.73		0.81	0.81
Clearance Time (s)	6.0	6.0	6.0		4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	262	121	2588		587	2901
v/s Ratio Prot			c0.20		0.00	c0.16
v/s Ratio Perm	c0.02	0.00			0.04	
v/c Ratio	0.28	0.04	0.27		0.05	0.20
Uniform Delay, d1	46.1	45.2	4.7		2.1	2.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.1	0.3		0.0	0.2
Delay (s)	46.7	45.4	5.0		2.1	2.4
Level of Service	D	D	A		A	A
Approach Delay (s)	46.1		5.0			2.4
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	105.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	448	329	15	5	5
Future Volume (Veh/h)	15	448	329	15	5	5
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)	16	487	358	16	5	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			354			
pX, platoon unblocked	0.92				0.92	0.92
vC, conflicting volume	374				634	358
vC1, stage 1 conf vol					358	
vC2, stage 2 conf vol					276	
vCu, unblocked vol	276				558	259
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	99
cM capacity (veh/h)	1181				602	681

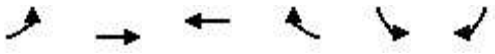
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	178	325	358	16	10
Volume Left	16	0	0	0	5
Volume Right	0	0	0	16	5
cSH	1181	1700	1700	1700	639
Volume to Capacity	0.01	0.19	0.21	0.01	0.02
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.4
Control Delay (s)	0.8	0.0	0.0	0.0	10.7
Lane LOS	A				B
Approach Delay (s)	0.3		0.0		10.7
Approach LOS					B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	32	473	25	35	452
Future Volume (vph)	22	32	473	25	35	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		4.0	6.0
Lane Util. Factor	0.97	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3471	1601	3552		1789	3579
Flt Permitted	0.95	1.00	1.00		0.41	1.00
Satd. Flow (perm)	3471	1601	3552		772	3579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	35	514	27	38	491
RTOR Reduction (vph)	0	32	3	0	0	0
Lane Group Flow (vph)	24	3	538	0	38	491
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8			6	
Actuated Green, G (s)	5.7	5.7	40.8		47.3	47.3
Effective Green, g (s)	5.7	5.7	40.8		47.3	47.3
Actuated g/C Ratio	0.09	0.09	0.63		0.73	0.73
Clearance Time (s)	6.0	6.0	6.0		4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	304	140	2229		600	2604
v/s Ratio Prot			c0.15		0.00	c0.14
v/s Ratio Perm	c0.01	0.00			0.04	
v/c Ratio	0.08	0.02	0.24		0.06	0.19
Uniform Delay, d1	27.2	27.1	5.3		2.6	2.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.1	0.3		0.0	0.2
Delay (s)	27.4	27.2	5.6		2.6	3.0
Level of Service	C	C	A		A	A
Approach Delay (s)	27.2		5.6			2.9
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	5.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

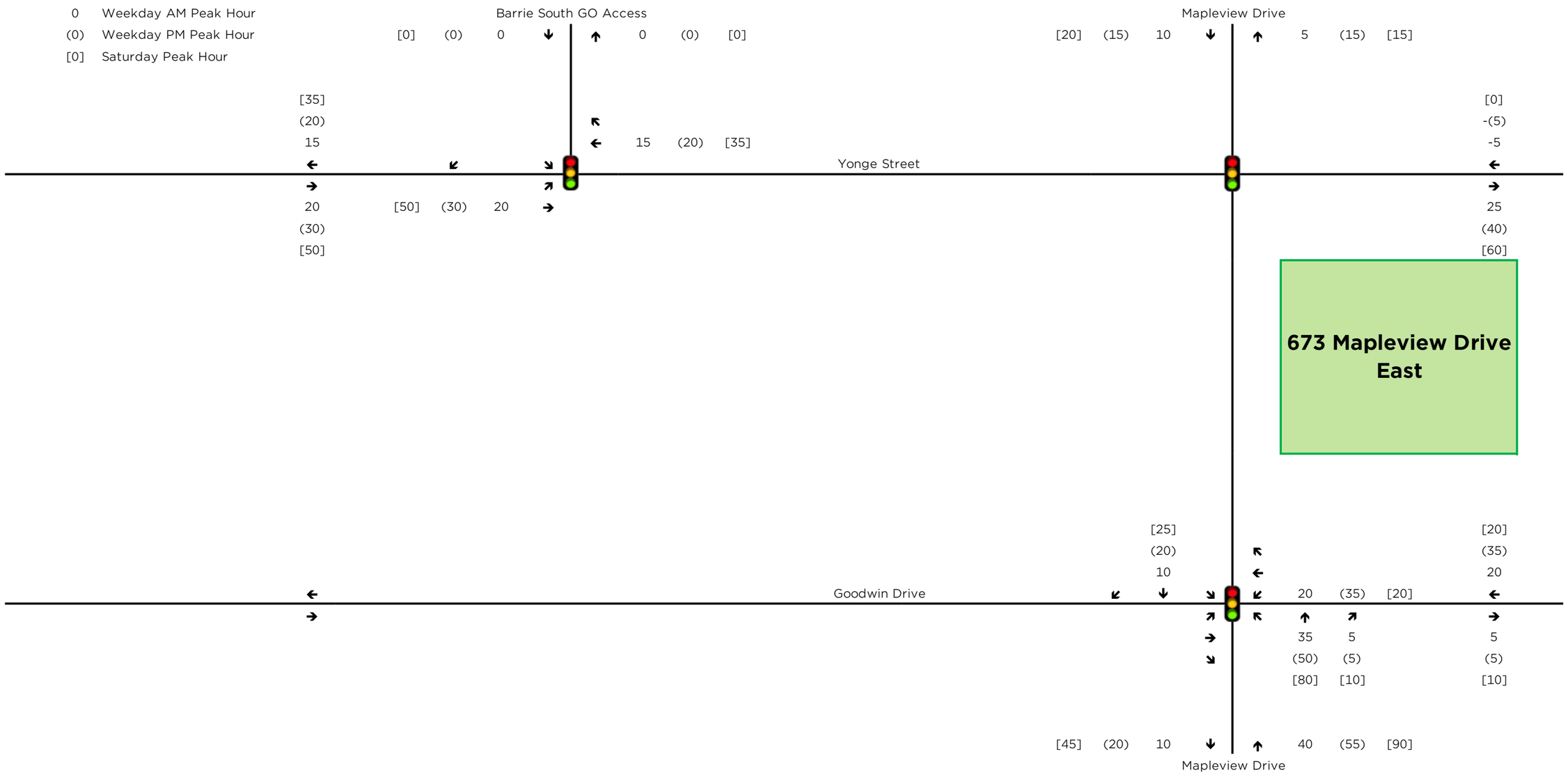


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	345	357	5	5	10
Future Volume (Veh/h)	10	345	357	5	5	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	375	388	5	5	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			354			
pX, platoon unblocked	0.91				0.91	0.91
vC, conflicting volume	393				598	388
vC1, stage 1 conf vol					388	
vC2, stage 2 conf vol					210	
vCu, unblocked vol	277				503	272
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	98
cM capacity (veh/h)	1161				615	657

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	136	250	388	5	16
Volume Left	11	0	0	0	5
Volume Right	0	0	0	5	11
cSH	1161	1700	1700	1700	644
Volume to Capacity	0.01	0.15	0.23	0.00	0.02
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.6
Control Delay (s)	0.7	0.0	0.0	0.0	10.7
Lane LOS	A				B
Approach Delay (s)	0.3		0.0		10.7
Approach LOS					B

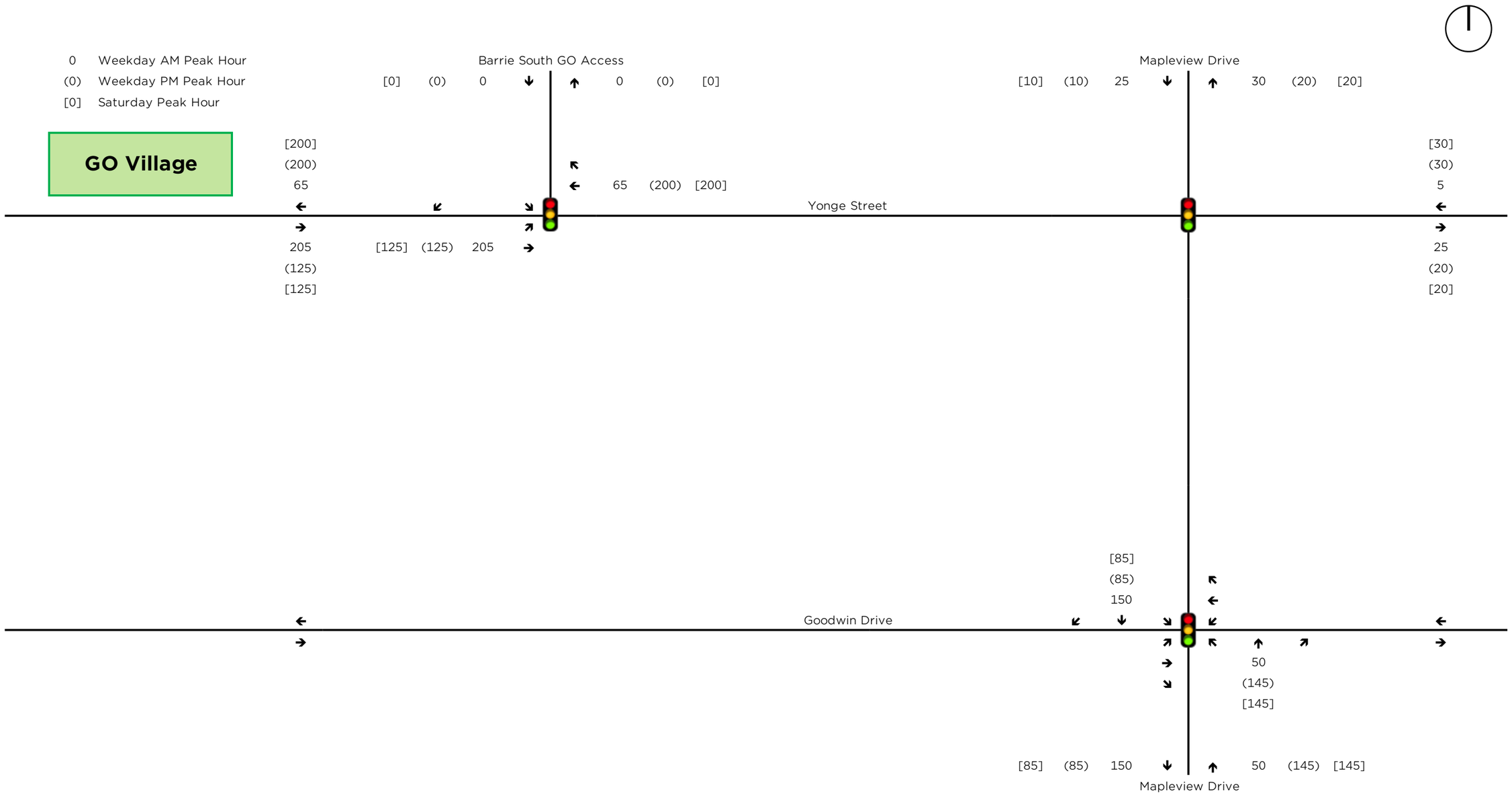
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D:
Vehicle Turning Assessment



METRO GROCERY STORE NO. 145

Figure D1: 673 Mapleview Drive East



METRO GROCERY STORE NO. 145

Figure D2: GO Village

0 Weekday AM Peak Hour
(0) Weekday PM Peak Hour
[0] Saturday Peak Hour

Barrie South GO Access

Mapleview Drive

Yonge Street

Driveway A

Driveway B

Goodwin Drive

North Parcel

METRO GROCERY STORE NO. 145

Figure D3: Barrie West – North Parcel

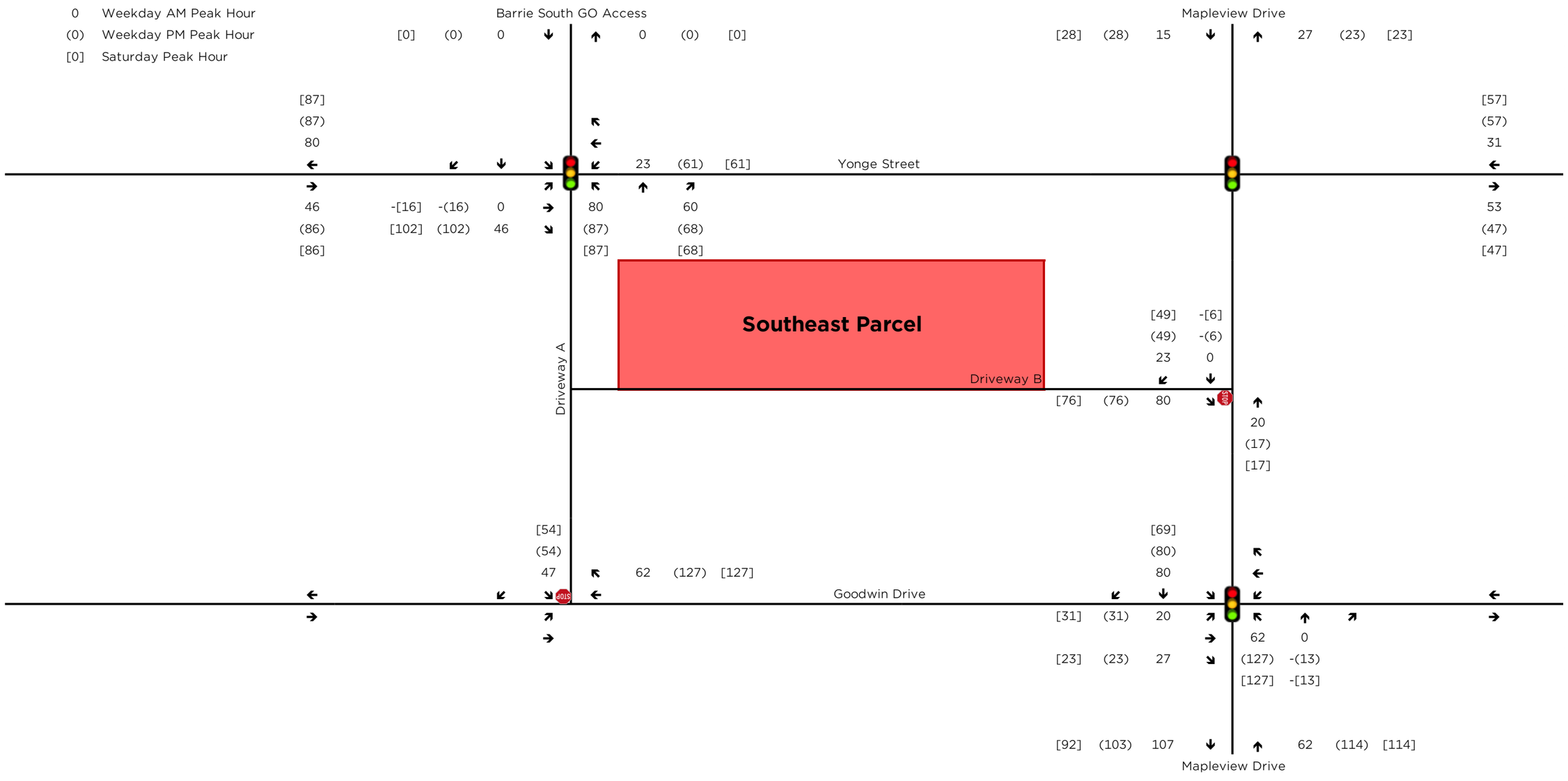


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Figure D4: Barrie West – Southeast Parcel

Appendix E:
Background Developments

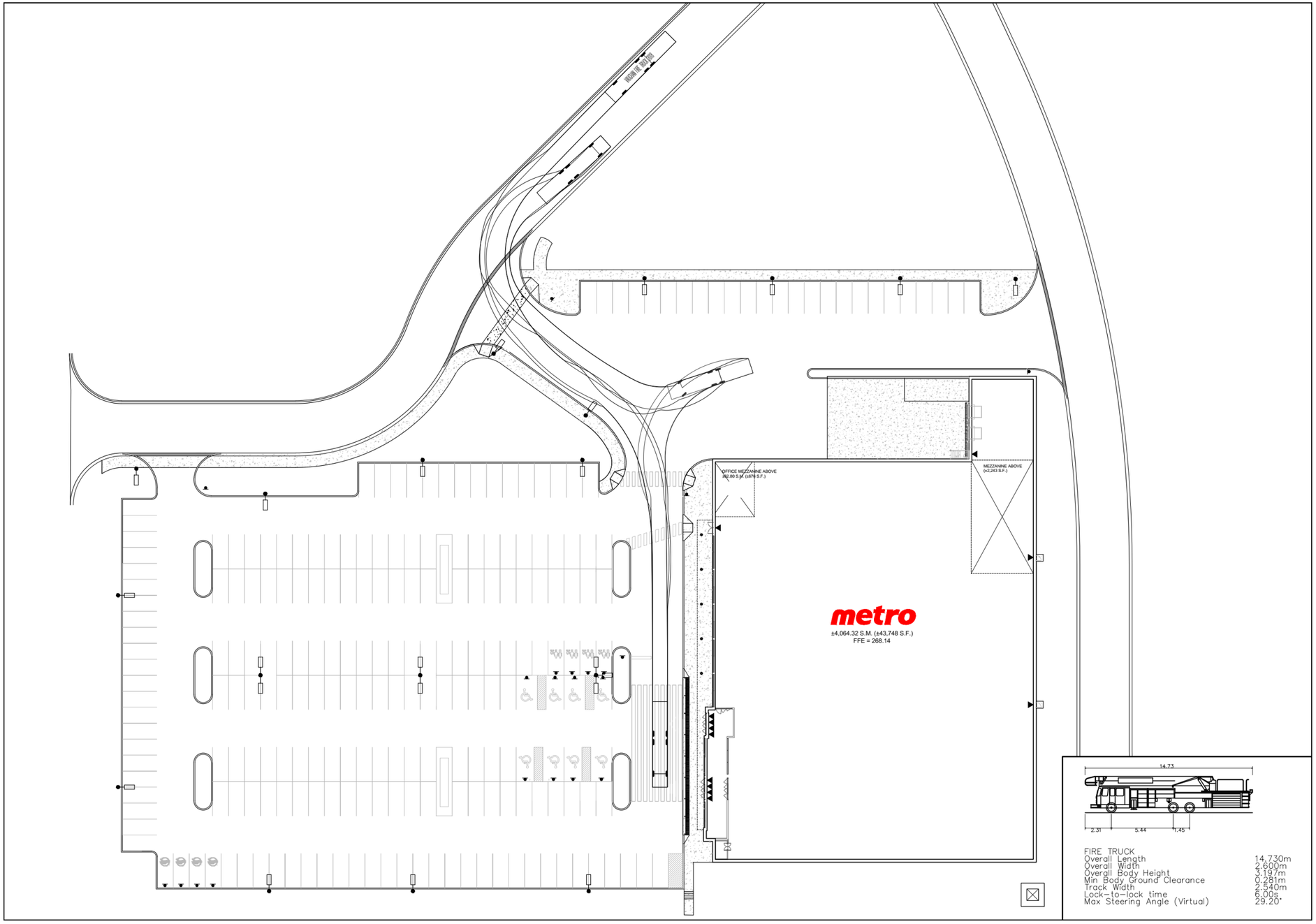

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Figure E1: Fire Truck

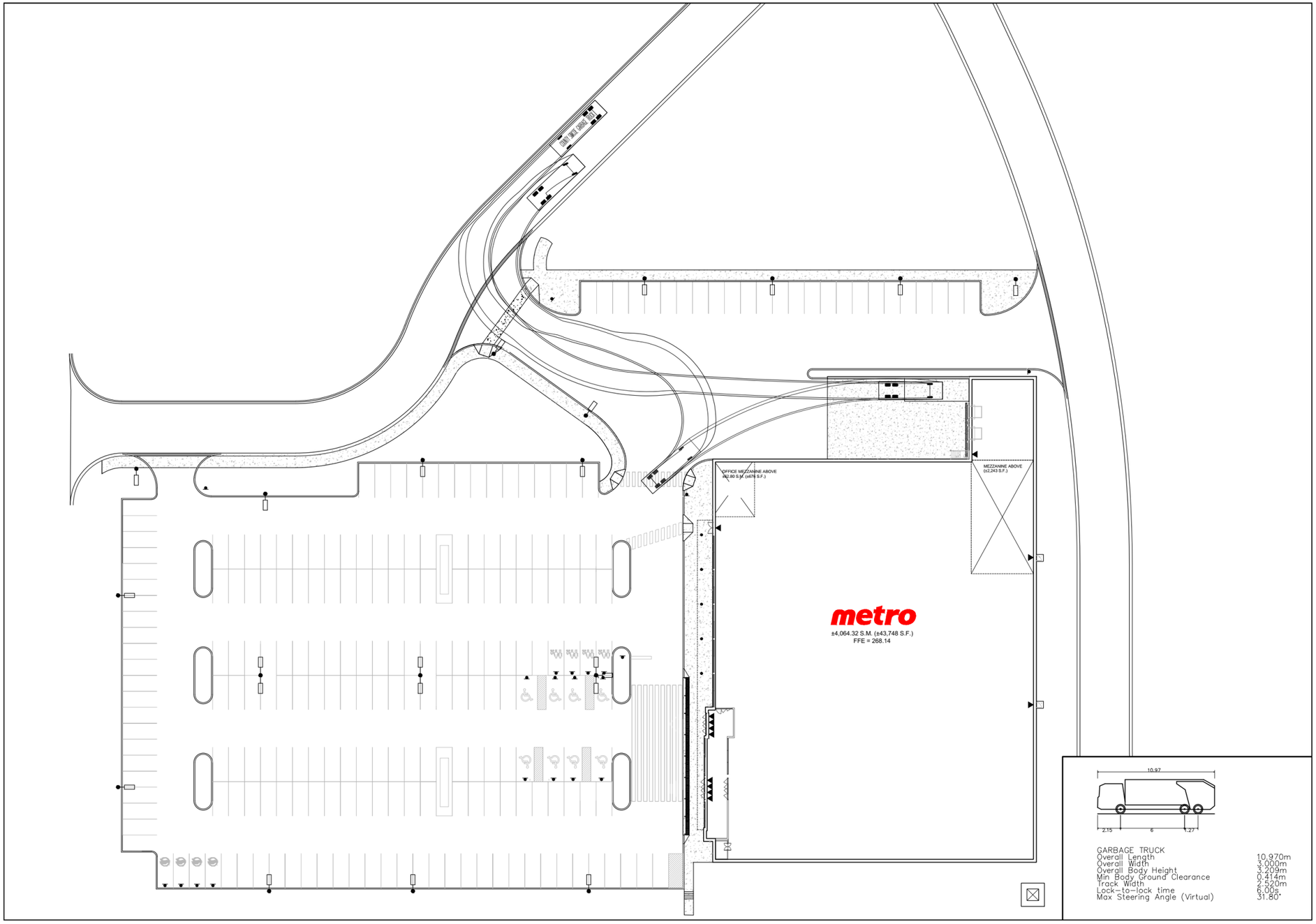

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Figure E2: Garbage Truck

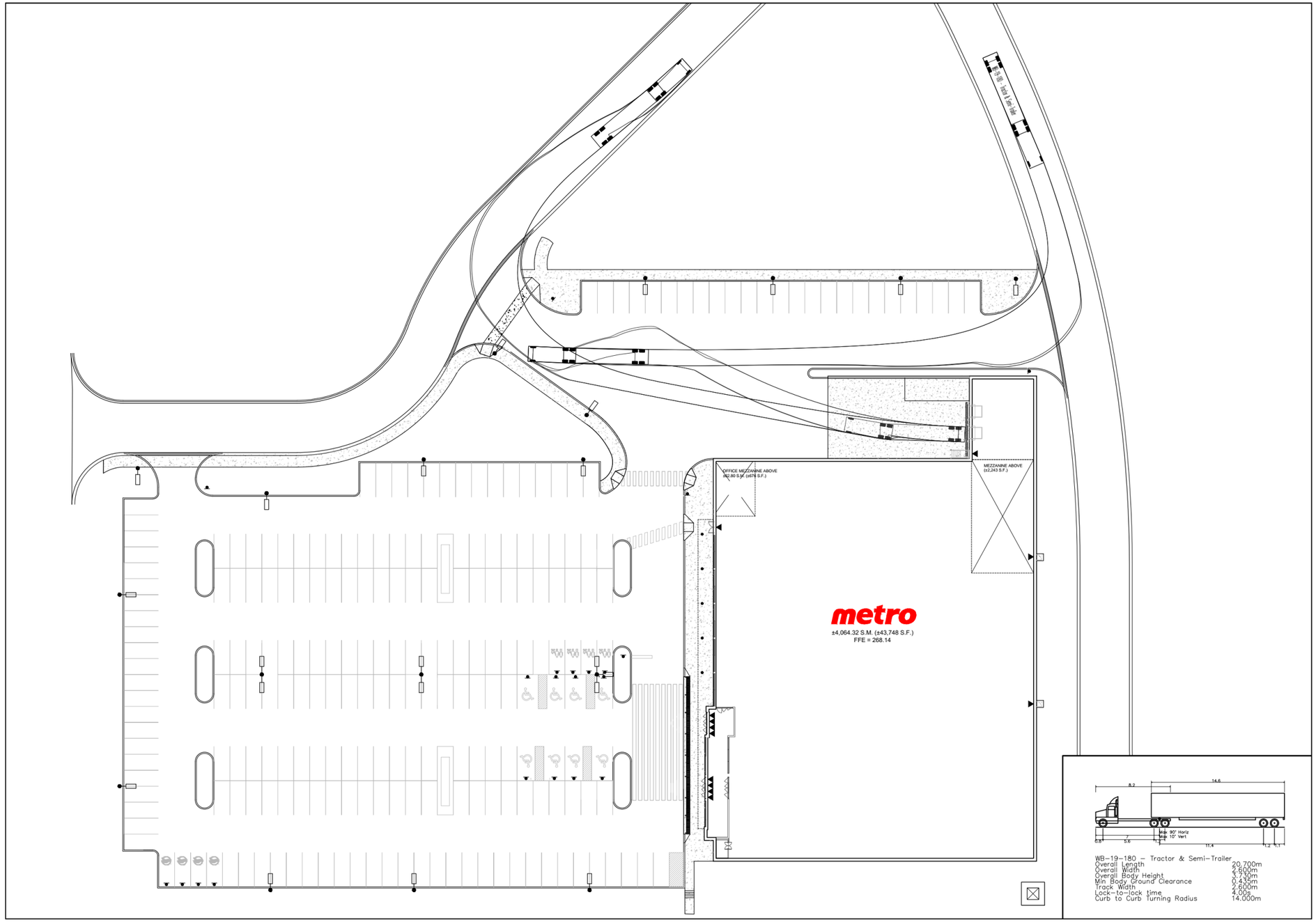

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Figure E3: Tractor & Semi-Trailer

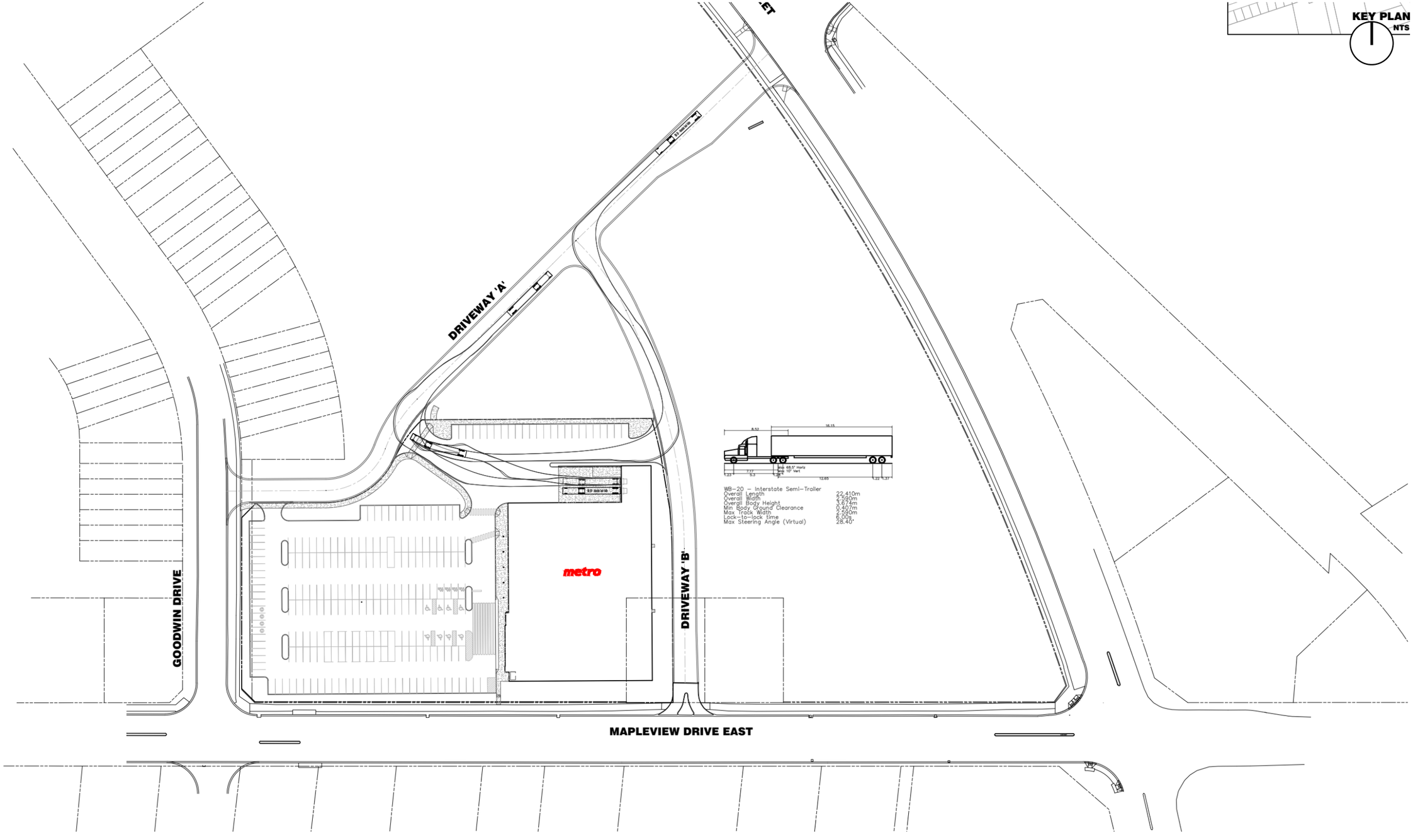

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Figure E4: Tractor & Semi-Trailer Inbound

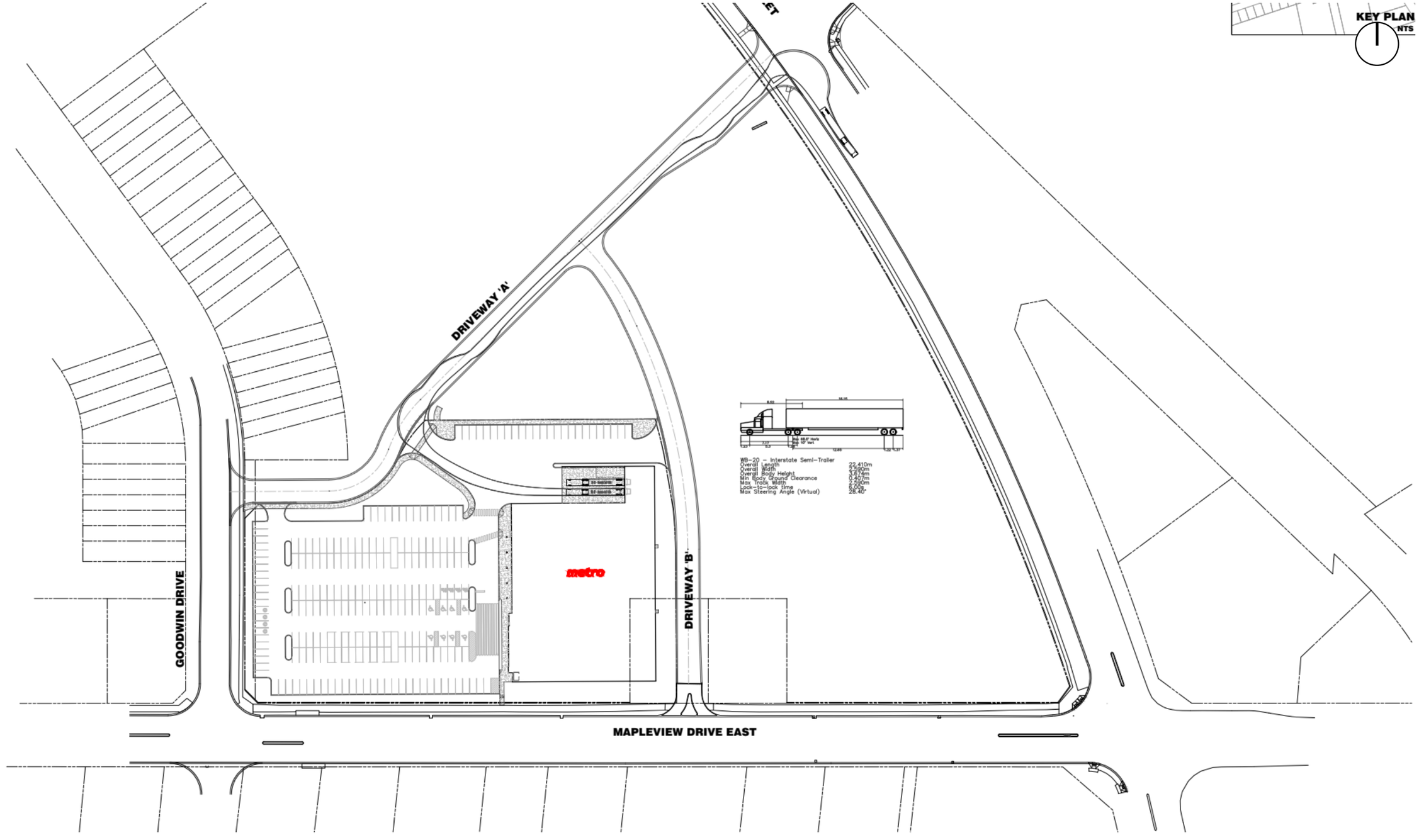

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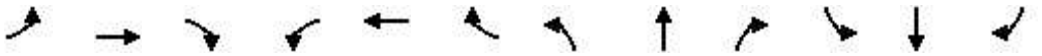
Figure E5: Tractor & Semi-Trailer Outbound

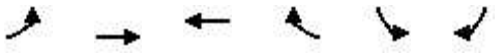
Appendix F:
Future Operations



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	0	12	32	0	35	5	701	52	28	727	24
Future Volume (vph)	17	0	12	32	0	35	5	701	52	28	727	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00	1.00		1.00	1.00	0.95		1.00	0.95	
Frt	1.00		0.85	1.00		0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95		1.00	0.95		1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789		1601	1789		1601	1789	3541		1789	3561	
Flt Permitted	0.76		1.00	0.76		1.00	0.34	1.00		0.27	1.00	
Satd. Flow (perm)	1426		1601	1426		1601	648	3541		505	3561	
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)	18	0	13	35	0	38	5	762	57	30	790	26
RTOR Reduction (vph)	0	0	11	0	0	32	0	6	0	0	2	0
Lane Group Flow (vph)	18	0	2	35	0	6	5	813	0	30	814	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	12.2		12.2	12.2		12.2	39.5	38.3		49.7	44.5	
Effective Green, g (s)	12.2		12.2	12.2		12.2	39.5	38.3		49.7	44.5	
Actuated g/C Ratio	0.17		0.17	0.17		0.17	0.53	0.52		0.67	0.60	
Clearance Time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	235		264	235		264	364	1835		468	2144	
v/s Ratio Prot							0.00	c0.23		c0.01	c0.23	
v/s Ratio Perm	0.01		0.00	c0.02		0.00	0.01			0.04		
v/c Ratio	0.08		0.01	0.15		0.02	0.01	0.44		0.06	0.38	
Uniform Delay, d1	26.1		25.8	26.4		25.9	8.0	11.1		4.6	7.6	
Progression Factor	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1		0.0	0.3		0.0	0.0	0.8		0.1	0.1	
Delay (s)	26.2		25.8	26.7		25.9	8.0	11.9		4.7	7.7	
Level of Service	C		C	C		C	A	B		A	A	
Approach Delay (s)		26.0			26.3			11.9			7.6	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	461	658	5	19	14
Future Volume (Veh/h)	25	461	658	5	19	14
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)	27	501	715	5	21	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)			354			
pX, platoon unblocked	0.90				0.90	0.90
vC, conflicting volume	720				1022	360
vC1, stage 1 conf vol					718	
vC2, stage 2 conf vol					304	
vCu, unblocked vol	477				812	79
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	97				96	98
cM capacity (veh/h)	977				476	873

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	27	250	250	477	243	36
Volume Left	27	0	0	0	0	21
Volume Right	0	0	0	0	5	15
cSH	977	1700	1700	1700	1700	587
Volume to Capacity	0.03	0.15	0.15	0.28	0.14	0.06
Queue Length 95th (m)	0.6	0.0	0.0	0.0	0.0	1.5
Control Delay (s)	8.8	0.0	0.0	0.0	0.0	11.5
Lane LOS	A					B
Approach Delay (s)	0.4			0.0		11.5
Approach LOS						B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	30.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	0	10	20	0	25
Future Volume (Veh/h)	8	0	10	20	0	25
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)	9	0	11	22	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)						
pX, platoon unblocked						
vC, conflicting volume	49	22			33	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	49	22			33	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	960	1055			1579	

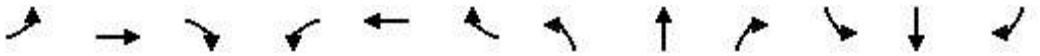
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	9	33	27
Volume Left	9	0	0
Volume Right	0	22	0
cSH	960	1700	1579
Volume to Capacity	0.01	0.02	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	478	645	19	0	11
Future Volume (Veh/h)	0	478	645	19	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	520	701	21	0	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)			175			
pX, platoon unblocked	0.88				0.88	0.88
vC, conflicting volume	701				972	361
vC1, stage 1 conf vol					712	
vC2, stage 2 conf vol					260	
vCu, unblocked vol	388				695	1
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1027				517	952

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	260	260	467	255	12
Volume Left	0	0	0	0	0
Volume Right	0	0	0	21	12
cSH	1700	1700	1700	1700	952
Volume to Capacity	0.15	0.15	0.27	0.15	0.01
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	0.0	0.0	8.8
Lane LOS					A
Approach Delay (s)	0.0		0.0		8.8
Approach LOS					A

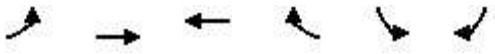
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	0	71	81	0	79	55	773	68	35	678	81
Future Volume (vph)	85	0	71	81	0	79	55	773	68	35	678	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00	1.00		1.00	1.00	0.95		1.00	0.95	
Frt	1.00		0.85	1.00		0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95		1.00	0.95		1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789		1601	1789		1601	1789	3535		1789	3521	
Flt Permitted	0.76		1.00	0.76		1.00	0.29	1.00		0.25	1.00	
Satd. Flow (perm)	1426		1601	1426		1601	539	3535		466	3521	
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)	92	0	77	88	0	86	60	840	74	38	737	88
RTOR Reduction (vph)	0	0	59	0	0	65	0	7	0	0	10	0
Lane Group Flow (vph)	92	0	18	88	0	21	60	907	0	38	815	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	18.1		18.1	18.1		18.1	41.6	37.8		41.6	37.8	
Effective Green, g (s)	18.1		18.1	18.1		18.1	41.6	37.8		41.6	37.8	
Actuated g/C Ratio	0.24		0.24	0.24		0.24	0.55	0.50		0.55	0.50	
Clearance Time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	340		382	340		382	358	1765		322	1758	
v/s Ratio Prot							c0.01	c0.26		0.01	0.23	
v/s Ratio Perm	c0.06		0.01	0.06		0.01	0.08			0.06		
v/c Ratio	0.27		0.05	0.26		0.05	0.17	0.51		0.12	0.46	
Uniform Delay, d1	23.4		22.2	23.4		22.2	8.2	12.8		8.3	12.3	
Progression Factor	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4		0.1	0.4		0.1	0.2	1.1		0.2	0.9	
Delay (s)	23.9		22.2	23.8		22.3	8.4	13.8		8.4	13.2	
Level of Service	C		C	C		C	A	B		A	B	
Approach Delay (s)		23.1			23.0			13.5			13.0	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	75.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	83	676	517	43	70	16
Future Volume (Veh/h)	83	676	517	43	70	16
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)	90	735	562	47	76	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)			354			
pX, platoon unblocked	0.96				0.96	0.96
vC, conflicting volume	609				1133	304
vC1, stage 1 conf vol					586	
vC2, stage 2 conf vol					548	
vCu, unblocked vol	510				1056	193
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	91				81	98
cM capacity (veh/h)	1009				404	783

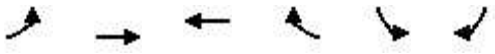
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	90	368	368	375	234	93
Volume Left	90	0	0	0	0	76
Volume Right	0	0	0	0	47	17
cSH	1009	1700	1700	1700	1700	443
Volume to Capacity	0.09	0.22	0.22	0.22	0.14	0.21
Queue Length 95th (m)	2.2	0.0	0.0	0.0	0.0	6.0
Control Delay (s)	8.9	0.0	0.0	0.0	0.0	15.3
Lane LOS	A					C
Approach Delay (s)	1.0			0.0		15.3
Approach LOS						C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	53	0	58	68	0	33
Future Volume (Veh/h)	53	0	58	68	0	33
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)	58	0	63	74	0	36
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	136	100			137	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	136	100			137	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	100			100	
cM capacity (veh/h)	857	956			1447	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	58	137	36
Volume Left	58	0	0
Volume Right	0	74	0
cSH	857	1700	1447
Volume to Capacity	0.07	0.08	0.00
Queue Length 95th (m)	1.7	0.0	0.0
Control Delay (s)	9.5	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.5	0.0	0.0
Approach LOS	A		

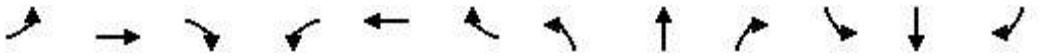
Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	17.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	751	511	47	0	41
Future Volume (Veh/h)	0	751	511	47	0	41
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	816	555	51	0	45
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)			175			
pX, platoon unblocked	0.92				0.92	0.92
vC, conflicting volume	555				988	303
vC1, stage 1 conf vol					580	
vC2, stage 2 conf vol					408	
vCu, unblocked vol	338				810	63
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	95
cM capacity (veh/h)	1119				504	907

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	408	408	370	236	45
Volume Left	0	0	0	0	0
Volume Right	0	0	0	51	45
cSH	1700	1700	1700	1700	907
Volume to Capacity	0.24	0.24	0.22	0.14	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.2
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

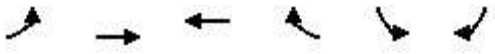
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	0	81	31	0	44	62	728	35	49	676	91
Future Volume (vph)	97	0	81	31	0	44	62	728	35	49	676	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00	1.00		1.00	1.00	0.95		1.00	0.95	
Frt	1.00		0.85	1.00		0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95		1.00	0.95		1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789		1601	1789		1601	1789	3554		1789	3515	
Flt Permitted	0.76		1.00	0.76		1.00	0.27	1.00		0.30	1.00	
Satd. Flow (perm)	1426		1601	1426		1601	504	3554		556	3515	
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)	105	0	88	34	0	48	67	791	38	53	735	99
RTOR Reduction (vph)	0	0	67	0	0	37	0	3	0	0	11	0
Lane Group Flow (vph)	105	0	21	34	0	11	67	826	0	53	823	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	17.9		17.9	17.9		17.9	43.3	38.1		40.7	36.8	
Effective Green, g (s)	17.9		17.9	17.9		17.9	43.3	38.1		40.7	36.8	
Actuated g/C Ratio	0.24		0.24	0.24		0.24	0.57	0.50		0.54	0.48	
Clearance Time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	336		377	336		377	375	1784		361	1704	
v/s Ratio Prot							c0.01	0.23		0.01	c0.23	
v/s Ratio Perm	c0.07		0.01	0.02		0.01	0.09			0.07		
v/c Ratio	0.31		0.06	0.10		0.03	0.18	0.46		0.15	0.48	
Uniform Delay, d1	23.9		22.5	22.7		22.3	7.7	12.3		8.6	13.2	
Progression Factor	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5		0.1	0.1		0.0	0.2	0.9		0.2	1.0	
Delay (s)	24.5		22.5	22.8		22.4	8.0	13.1		8.8	14.1	
Level of Service	C		C	C		C	A	B		A	B	
Approach Delay (s)		23.6			22.6			12.7			13.8	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	75.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	90	635	536	38	76	19
Future Volume (Veh/h)	90	635	536	38	76	19
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)	98	690	583	41	83	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)			354			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	624				1144	312
vC1, stage 1 conf vol					604	
vC2, stage 2 conf vol					541	
vCu, unblocked vol	509				1055	182
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	90				79	97
cM capacity (veh/h)	1003				401	791

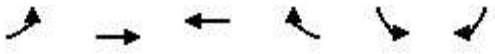
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	98	345	345	389	235	104
Volume Left	98	0	0	0	0	83
Volume Right	0	0	0	0	41	21
cSH	1003	1700	1700	1700	1700	445
Volume to Capacity	0.10	0.20	0.20	0.23	0.14	0.23
Queue Length 95th (m)	2.5	0.0	0.0	0.0	0.0	6.8
Control Delay (s)	9.0	0.0	0.0	0.0	0.0	15.5
Lane LOS	A					C
Approach Delay (s)	1.1			0.0		15.5
Approach LOS						C

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	60	0	50	77	0	35
Future Volume (Veh/h)	60	0	50	77	0	35
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)	65	0	54	84	0	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	134	96			138	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	134	96			138	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	100			100	
cM capacity (veh/h)	860	960			1446	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	65	138	38
Volume Left	65	0	0
Volume Right	0	84	0
cSH	860	1700	1446
Volume to Capacity	0.08	0.08	0.00
Queue Length 95th (m)	1.9	0.0	0.0
Control Delay (s)	9.5	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.5	0.0	0.0
Approach LOS	A		

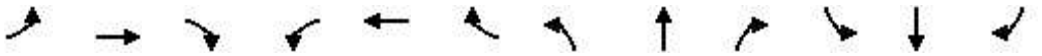
Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	17.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	706	520	53	0	47
Future Volume (Veh/h)	0	706	520	53	0	47
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	767	565	58	0	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)			175			
pX, platoon unblocked	0.91				0.91	0.91
vC, conflicting volume	565				978	312
vC1, stage 1 conf vol					594	
vC2, stage 2 conf vol					384	
vCu, unblocked vol	328				780	50
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	94
cM capacity (veh/h)	1120				512	919

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	384	384	377	246	51
Volume Left	0	0	0	0	0
Volume Right	0	0	0	58	51
cSH	1700	1700	1700	1700	919
Volume to Capacity	0.23	0.23	0.22	0.14	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.3
Control Delay (s)	0.0	0.0	0.0	0.0	9.1
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.1
Approach LOS					A

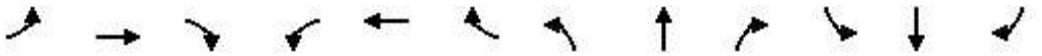
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	0	72	50	0	68	28	1337	98	44	1190	70
Future Volume (vph)	97	0	72	50	0	68	28	1337	98	44	1190	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00	1.00		1.00	1.00	0.95		1.00	0.95	
Frt	1.00		0.85	1.00		0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95		1.00	0.95		1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789		1601	1789		1601	1789	3542		1789	3549	
Flt Permitted	0.76		1.00	0.76		1.00	0.12	1.00		0.08	1.00	
Satd. Flow (perm)	1426		1601	1426		1601	221	3542		158	3549	
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)	105	0	78	54	0	74	30	1453	107	48	1293	76
RTOR Reduction (vph)	0	0	61	0	0	58	0	5	0	0	4	0
Lane Group Flow (vph)	105	0	17	54	0	16	30	1555	0	48	1365	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	18.2		18.2	18.2		18.2	51.5	47.6		51.5	47.6	
Effective Green, g (s)	18.2		18.2	18.2		18.2	51.5	47.6		51.5	47.6	
Actuated g/C Ratio	0.21		0.21	0.21		0.21	0.60	0.56		0.60	0.56	
Clearance Time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	302		340	302		340	204	1967		169	1971	
v/s Ratio Prot							0.01	c0.44		c0.01	0.38	
v/s Ratio Perm	c0.07		0.01	0.04		0.01	0.08			0.16		
v/c Ratio	0.35		0.05	0.18		0.05	0.15	0.79		0.28	0.69	
Uniform Delay, d1	28.7		26.9	27.6		26.8	9.3	15.1		11.6	13.8	
Progression Factor	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7		0.1	0.3		0.1	0.3	3.3		0.9	2.0	
Delay (s)	29.4		26.9	27.9		26.9	9.7	18.4		12.5	15.8	
Level of Service	C		C	C		C	A	B		B	B	
Approach Delay (s)		28.3			27.3			18.3			15.7	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	85.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	765	10	5	1456	5	70	50	30	64	75	41
Future Volume (vph)	87	765	10	5	1456	5	70	50	30	64	75	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3572		1789	3577		1789	1776		1789	1783	
Flt Permitted	0.08	1.00		0.33	1.00		0.68	1.00		0.70	1.00	
Satd. Flow (perm)	148	3572		631	3577		1272	1776		1319	1783	
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)	95	832	11	5	1583	5	76	54	33	70	82	45
RTOR Reduction (vph)	0	1	0	0	0	0	0	28	0	0	26	0
Lane Group Flow (vph)	95	842	0	5	1588	0	76	59	0	70	101	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	57.0	51.7		48.2	46.9		11.1	11.1		11.1	11.1	
Effective Green, g (s)	57.0	51.7		48.2	46.9		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.71	0.65		0.60	0.59		0.14	0.14		0.14	0.14	
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	2305		398	2094		176	246		182	247	
v/s Ratio Prot	c0.03	0.24		0.00	c0.44			0.03			0.06	
v/s Ratio Perm	0.26			0.01			c0.06			0.05		
v/c Ratio	0.41	0.37		0.01	0.76		0.43	0.24		0.38	0.41	
Uniform Delay, d1	10.0	6.6		6.4	12.4		31.6	30.7		31.4	31.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.4		0.0	2.6		1.7	0.5		1.4	1.1	
Delay (s)	11.2	7.0		6.4	15.0		33.3	31.2		32.7	32.6	
Level of Service	B	A		A	B		C	C		C	C	
Approach Delay (s)		7.5			15.0			32.2			32.7	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	55	0	60	82	0	125
Future Volume (Veh/h)	55	0	60	82	0	125
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)	60	0	65	89	0	136
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			86			
pX, platoon unblocked						
vC, conflicting volume	246	110			154	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	246	110			154	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	100			100	
cM capacity (veh/h)	743	944			1426	

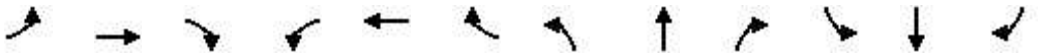
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	60	154	136
Volume Left	60	0	0
Volume Right	0	89	0
cSH	743	1700	1426
Volume to Capacity	0.08	0.09	0.00
Queue Length 95th (m)	2.0	0.0	0.0
Control Delay (s)	10.3	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.3	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	849	1360	42	0	91
Future Volume (Veh/h)	0	849	1360	42	0	91
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	923	1478	46	0	99
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		179	175			
pX, platoon unblocked	0.73				0.78	0.73
vC, conflicting volume	1478				1962	762
vC1, stage 1 conf vol					1501	
vC2, stage 2 conf vol					462	
vCu, unblocked vol	908				1083	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	87
cM capacity (veh/h)	542				240	789

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	462	462	985	539	99
Volume Left	0	0	0	0	0
Volume Right	0	0	0	46	99
cSH	1700	1700	1700	1700	789
Volume to Capacity	0.27	0.27	0.58	0.32	0.13
Queue Length 95th (m)	0.0	0.0	0.0	0.0	3.3
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

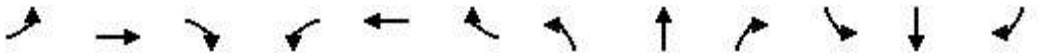
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	0	139	122	0	136	116	1324	110	52	1065	183
Future Volume (vph)	172	0	139	122	0	136	116	1324	110	52	1065	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00	1.00		1.00	1.00	0.95		1.00	0.95	
Frt	1.00		0.85	1.00		0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95		1.00	0.95		1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789		1601	1789		1601	1789	3537		1789	3500	
Flt Permitted	0.76		1.00	0.76		1.00	0.09	1.00		0.09	1.00	
Satd. Flow (perm)	1426		1601	1426		1601	167	3537		172	3500	
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)	187	0	151	133	0	148	126	1439	120	57	1158	199
RTOR Reduction (vph)	0	0	111	0	0	109	0	7	0	0	16	0
Lane Group Flow (vph)	187	0	40	133	0	39	126	1552	0	57	1341	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	24.0		24.0	24.0		24.0	52.2	45.2		49.4	43.8	
Effective Green, g (s)	24.0		24.0	24.0		24.0	52.2	45.2		49.4	43.8	
Actuated g/C Ratio	0.26		0.26	0.26		0.26	0.57	0.50		0.54	0.48	
Clearance Time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	376		423	376		423	221	1760		193	1688	
v/s Ratio Prot							c0.04	c0.44		0.02	0.38	
v/s Ratio Perm	c0.13		0.02	0.09		0.02	0.28			0.14		
v/c Ratio	0.50		0.09	0.35		0.09	0.57	0.88		0.30	0.79	
Uniform Delay, d1	28.3		25.2	27.1		25.2	14.4	20.4		15.5	19.7	
Progression Factor	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0		0.1	0.6		0.1	3.5	6.8		0.9	4.0	
Delay (s)	29.3		25.3	27.7		25.3	17.9	27.2		16.4	23.7	
Level of Service	C		C	C		C	B	C		B	C	
Approach Delay (s)		27.5			26.4			26.5			23.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	1167	205	30	945	120	135	100	60	156	150	46
Future Volume (vph)	210	1167	205	30	945	120	135	100	60	156	150	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.94		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3498		1789	3518		1789	1778		1789	1817	
Flt Permitted	0.14	1.00		0.10	1.00		0.51	1.00		0.60	1.00	
Satd. Flow (perm)	258	3498		197	3518		967	1778		1134	1817	
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)	228	1268	223	33	1027	130	147	109	65	170	163	50
RTOR Reduction (vph)	0	13	0	0	10	0	0	26	0	0	14	0
Lane Group Flow (vph)	228	1478	0	33	1147	0	147	148	0	170	199	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	55.0	47.0		45.0	41.0		16.8	16.8		16.8	16.8	
Effective Green, g (s)	55.0	47.0		45.0	41.0		16.8	16.8		16.8	16.8	
Actuated g/C Ratio	0.66	0.56		0.54	0.49		0.20	0.20		0.20	0.20	
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	352	1961		181	1721		193	356		227	364	
v/s Ratio Prot	c0.08	c0.42		0.01	0.33			0.08			0.11	
v/s Ratio Perm	0.35			0.09			c0.15			0.15		
v/c Ratio	0.65	0.75		0.18	0.67		0.76	0.41		0.75	0.55	
Uniform Delay, d1	10.3	14.0		10.9	16.2		31.6	29.2		31.5	30.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	2.7		0.5	2.1		16.2	0.8		12.7	1.7	
Delay (s)	14.4	16.7		11.4	18.3		47.8	30.0		44.2	31.8	
Level of Service	B	B		B	B		D	C		D	C	
Approach Delay (s)		16.4			18.1			38.1			37.3	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	83.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	107	0	235	195	0	245
Future Volume (Veh/h)	107	0	235	195	0	245
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)	116	0	255	212	0	266
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			86			
pX, platoon unblocked	0.91	0.91			0.91	
vC, conflicting volume	627	361			467	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	545	254			370	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	100			100	
cM capacity (veh/h)	457	717			1086	

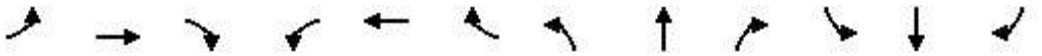
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	116	467	266
Volume Left	116	0	0
Volume Right	0	212	0
cSH	457	1700	1086
Volume to Capacity	0.25	0.27	0.00
Queue Length 95th (m)	7.6	0.0	0.0
Control Delay (s)	15.6	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.6	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1372	953	96	0	117
Future Volume (Veh/h)	0	1372	953	96	0	117
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	1491	1036	104	0	127
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		179	175			
pX, platoon unblocked	0.80				0.79	0.80
vC, conflicting volume	1036				1834	570
vC1, stage 1 conf vol					1088	
vC2, stage 2 conf vol					746	
vCu, unblocked vol	543				375	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	85
cM capacity (veh/h)	817				402	867

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	746	746	691	449	127
Volume Left	0	0	0	0	0
Volume Right	0	0	0	104	127
cSH	1700	1700	1700	1700	867
Volume to Capacity	0.44	0.44	0.41	0.26	0.15
Queue Length 95th (m)	0.0	0.0	0.0	0.0	3.9
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

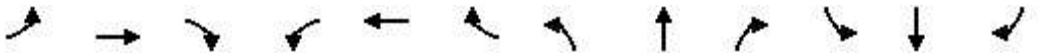
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	0	149	52	0	77	123	1379	63	82	1174	193
Future Volume (vph)	184	0	149	52	0	77	123	1379	63	82	1174	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00	1.00		1.00	1.00	0.95		1.00	0.95	
Frt	1.00		0.85	1.00		0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95		1.00	0.95		1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789		1601	1789		1601	1789	3555		1789	3503	
Flt Permitted	0.76		1.00	0.76		1.00	0.09	1.00		0.09	1.00	
Satd. Flow (perm)	1426		1601	1426		1601	167	3555		172	3503	
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)	200	0	162	57	0	84	134	1499	68	89	1276	210
RTOR Reduction (vph)	0	0	119	0	0	62	0	4	0	0	14	0
Lane Group Flow (vph)	200	0	43	57	0	22	134	1563	0	89	1472	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	24.0		24.0	24.0		24.0	52.2	45.2		49.4	43.8	
Effective Green, g (s)	24.0		24.0	24.0		24.0	52.2	45.2		49.4	43.8	
Actuated g/C Ratio	0.26		0.26	0.26		0.26	0.57	0.50		0.54	0.48	
Clearance Time (s)	6.0		6.0	6.0		6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	376		423	376		423	221	1769		193	1689	
v/s Ratio Prot							c0.05	c0.44		0.03	0.42	
v/s Ratio Perm	c0.14		0.03	0.04		0.01	0.30			0.22		
v/c Ratio	0.53		0.10	0.15		0.05	0.61	0.88		0.46	0.87	
Uniform Delay, d1	28.6		25.2	25.6		24.9	16.1	20.4		16.2	21.0	
Progression Factor	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4		0.1	0.2		0.1	4.6	6.8		1.7	6.5	
Delay (s)	30.0		25.4	25.8		25.0	20.7	27.3		18.0	27.5	
Level of Service	C		C	C		C	C	C		B	C	
Approach Delay (s)		27.9			25.3			26.8			26.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	219	1192	210	30	942	120	120	100	60	162	150	47
Future Volume (vph)	219	1192	210	30	942	120	120	100	60	162	150	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.94		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3498		1789	3518		1789	1778		1789	1816	
Flt Permitted	0.13	1.00		0.10	1.00		0.52	1.00		0.60	1.00	
Satd. Flow (perm)	251	3498		188	3518		970	1778		1139	1816	
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)	238	1296	228	33	1024	130	130	109	65	176	163	51
RTOR Reduction (vph)	0	13	0	0	10	0	0	26	0	0	14	0
Lane Group Flow (vph)	238	1511	0	33	1144	0	130	148	0	176	200	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	54.6	46.6		44.1	40.1		17.1	17.1		17.1	17.1	
Effective Green, g (s)	54.6	46.6		44.1	40.1		17.1	17.1		17.1	17.1	
Actuated g/C Ratio	0.65	0.56		0.53	0.48		0.20	0.20		0.20	0.20	
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	356	1947		175	1685		198	363		232	371	
v/s Ratio Prot	c0.08	c0.43		0.01	0.33			0.08			0.11	
v/s Ratio Perm	0.35			0.09			0.13			c0.15		
v/c Ratio	0.67	0.78		0.19	0.68		0.66	0.41		0.76	0.54	
Uniform Delay, d1	10.9	14.5		11.5	16.8		30.6	28.9		31.4	29.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.7	3.1		0.5	2.2		7.6	0.7		13.3	1.6	
Delay (s)	15.6	17.6		12.1	19.1		38.2	29.6		44.6	31.4	
Level of Service	B	B		B	B		D	C		D	C	
Approach Delay (s)		17.3			18.9			33.3			37.4	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	83.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	114	0	220	204	0	245
Future Volume (Veh/h)	114	0	220	204	0	245
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)	124	0	239	222	0	266
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			86			
pX, platoon unblocked	0.92	0.92			0.92	
vC, conflicting volume	616	350			461	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	542	254			374	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	73	100			100	
cM capacity (veh/h)	463	724			1093	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	124	461	266
Volume Left	124	0	0
Volume Right	0	222	0
cSH	463	1700	1093
Volume to Capacity	0.27	0.27	0.00
Queue Length 95th (m)	8.1	0.0	0.0
Control Delay (s)	15.6	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.6	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1383	955	102	0	123
Future Volume (Veh/h)	0	1383	955	102	0	123
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	1503	1038	111	0	134
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		179	175			
pX, platoon unblocked	0.80				0.77	0.80
vC, conflicting volume	1038				1845	574
vC1, stage 1 conf vol					1094	
vC2, stage 2 conf vol					752	
vCu, unblocked vol	550				350	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	85
cM capacity (veh/h)	813				406	868

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	752	752	692	457	134
Volume Left	0	0	0	0	0
Volume Right	0	0	0	111	134
cSH	1700	1700	1700	1700	868
Volume to Capacity	0.44	0.44	0.41	0.27	0.15
Queue Length 95th (m)	0.0	0.0	0.0	0.0	4.1
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	0.5		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix G:
Construction Parking & Access

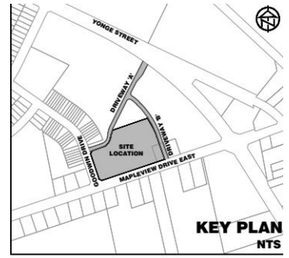


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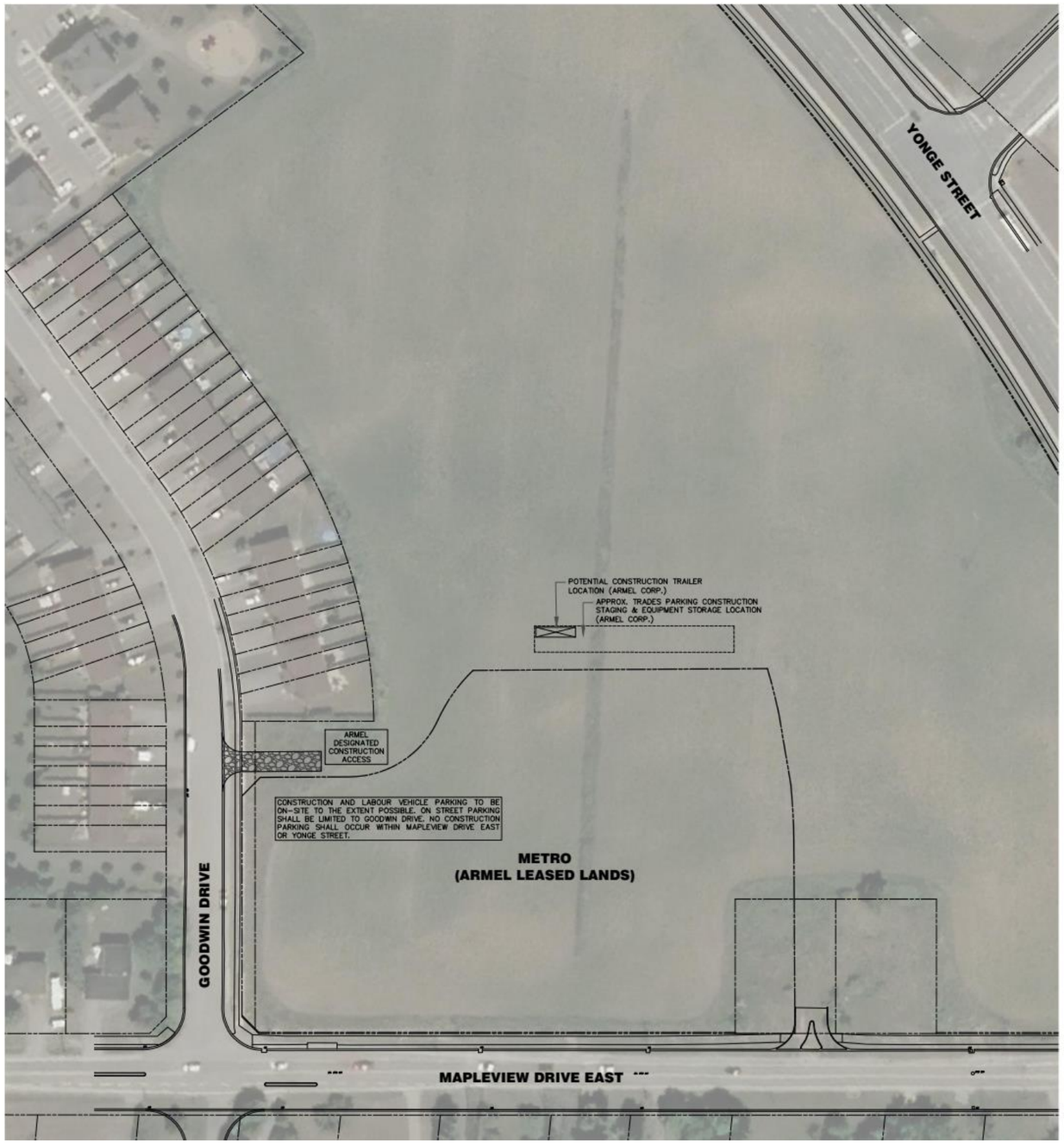
Figure G1: Metro Construction Parking & Access Plan



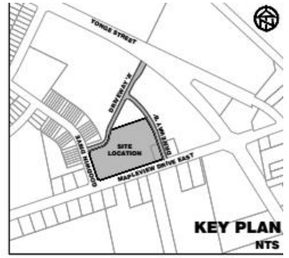


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Figure G2: Armel Construction Parking & Access Plan