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27 January 2022

City of Ottawa
Development Review Services
110 Laurier Avenue West
Ottawa, ON K1P 1J1

Attention: Wally Dubyk, P.Eng.

Dear Wally Dubyk:

Re: 770 Brookfield Road – On-Street Parking and Loading Assessment
1st Review – Response to City Comments

The following response form has been prepared to address City of Ottawa Transportation comments received on November 30, 2022. City comments are noted in black with the corresponding responses from Parsons in Green. This response is accompanied by a revised memo and Pavement Marking and Signage Plan.

Transportation Engineering

On-Street Parking and Loading Assessment Memo

Comment 1. The first bullet point of Section 4.0 states, "for a roadway posted at 60km/h, a minimum buffer of 0.6m (without the curb) is recommended". Brookfield Avenue has a posted speed limit of 50km/h. Note that, per Table 4.6 of OTM Book 18, the minimum buffer width is 0.6m is for roadways with a posted speed limit of 60km/h or less.
Report updated.

Comment 2. In the second bullet of Section 4.0, please note that OTM Book 18's minimum buffer width when on-street parking is adjacent to a cycling facility is also 0.6m (per note a of Table 4.6).
Note 'a' is in specific reference to one-way facility types. As a two-way facility, the suggest minimum is also 0.6m. It is noted that for placement of signs within the buffer, ideally 1.0m is required to achieve the separation from the MUP and the roadway. Text updated.

Comment 3. In the third bullet of Section 4.0, it is stated that "a minimum 12m clear sight distance is required …". Per Table 6.1 of OTM Book 18, the access curb return radii of 5m responds to a minimum clear sight distance of 14m (not 12m). The 14m clear sight distance should be measured from the point of curvature of the curb return.
Report updated. Point of curvature marked on plan.

Comment 4. Regarding the fourth bullet of Section 4.0 and discussions of loading activities in Section 5.0, it should be noted that Section 4.6.5 of the City of Ottawa Official Plan reads as follows:
"Development shall minimize conflict between vehicles and pedestrians and improve the attractiveness of the public realm by internalizing all servicing, loading areas, mechanical equipment and utilities into the design of the building, and by accommodating space on the site for trees, where possible. Shared service areas, and accesses *should be used to limit interruptions along sidewalks. Where underground parking is not viable, surface parking must be visually screened from the public realm."*

Further, Brookfield Avenue is the boundary of "Hub" designation. Per Section 6.1.1 3) iii) of the Official Plan, *"development within a Hub shall establish buildings that place parking, loading, vehicle access, service entrances and similar facilities so as to minimize their impact on the public realm."* Per Section 4.1.4 of the Official Plan, the City may review requirements for on-site loading and lay-by areas if requiring on-site loading would *"unduly [compromise] site functionality"*. However, 'The Revalie Ottawa' is not a small site, and therefore this does not apply. If the proponent wishes to reserve space for package deliveries, taxis, and loading and unloading, then they should consider signing/reserving on-site parking spaces for this purpose.
Noted. In discussions with the proponent, the loading facilities are no longer proposed on the street front. Deliveries and related loading/unloading activities are to remain on site.

Signage Plan

Comment 5. As noted, the proposed loading zones are not supported, and all Rx-521 signs should be replaced with Rb-53A signs.
Plan revised.

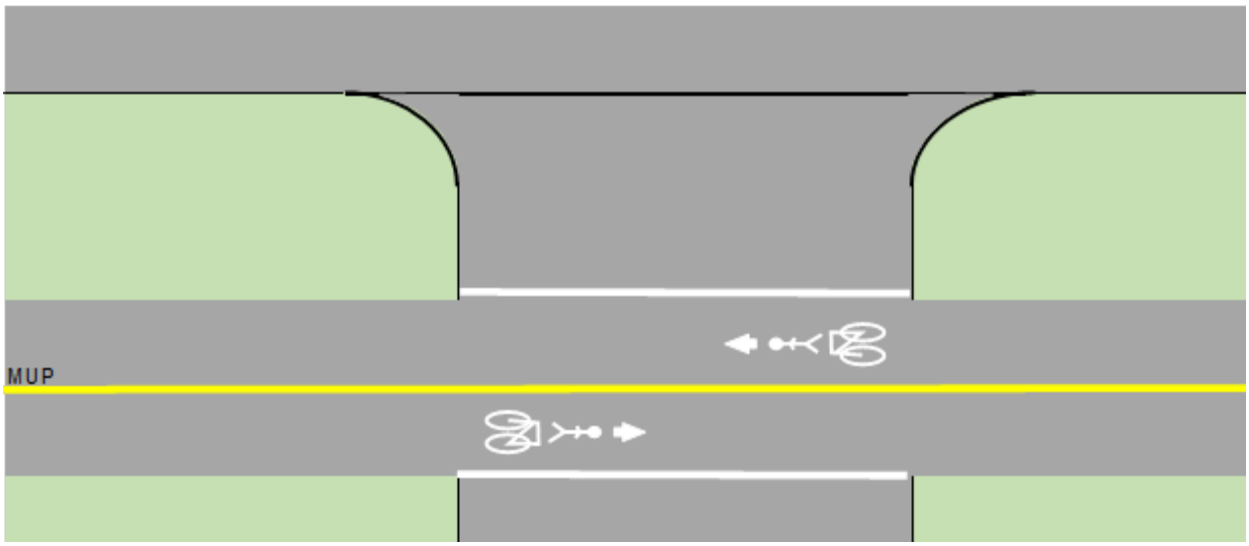
Comment 6. Placement of signage west of the main access should be repositioned to a location that does not obstruct the staircases.
Plan revised.

Comment 7. Placement of signage east of the main access is within the multi-use pathway. Per Section 4.3.5 of OTM Book 18, all signage should be installed 0.5m from the edge of the multi-use pathway (minimum 0.3m).
Plan revised. Signage east of the access is intended to restrict parking nearest the adjacent OC Transpo stop.

Comment 8. Design of interaction between the multi-use pathway and the permanent location of OC Transpo stop ID: 4139 must meet Transit Services requirements.
An on-site and virtual meeting was held with OCT to resolve the MUP-transit interaction. Plan revised.

Comment 9. As noted above, a minimum clear sight distance of 14m is required on either side of the site accesses. The 14m clear sight distance should be measured from the point of curvature of the curb return. Dimension this distance in the signage plan.
Plan revised.

Comment 10. The existing multi-use pathway is missing pavement markings through the site accesss. Through this new pavement marking and signage plan, please add edge lines, centrelines, and stencils to the multi-use pathway within the site accesses. See schematic image below:
Plan revised.



Comment 11. Provide electronic existing and proposed "Pavement Markings and Signage" drawings following acceptance of the final design to Sara Akkaoui at sara.akkaoui@ottawa.ca for review. The drawings should show all roadway markings and signs within the construction limits (and beyond if affected - i.e., warning signs that are no longer applicable).

All final pavement markings and signage installations are to be placed in accordance with the approved (stamped by the City as approved for application). "Proposed - Pavement Markings and Signage" drawing.

Once applied, the contractor is responsible for applying and removing any temporary pavement markings required during construction.

The applicant/contractor must notify City Traffic Services at Pavement.Markings@ottawa.ca to request inspection of pavement markings within the City ROW.

The applicant will be 100% responsible for all costs associated with any pavement marking and signage (material and installation) costs.

Prior to issuance of the Commence Work Notice, confirm the approval/sign-off of the proposed pavement marking and signage plan by Sara Akkaoui.

Noted. A discussion was held with Sara Akkaoi and Emmett Proulx regarding signage placement prior to submission.

The existing and proposed Pavement Markings and Signage drawings will be submitted to Sara Akkaoi for review, approval and coordination during installation.

Transit Services

Comment 12. No concerns with the signage plan (temporary bus stop location during construction and post-construction loading zone).

Plan revised to eliminate parking and load between the site access and the bus stop location.

Comment 13. The design and location of bus stop #4139 is under review. Once the bus stop location is finalized, the bus stop zone requires 34m upstream from the flag, and 18m downstream from the flag where no parking is permitted to allow for the bus to pull in and out of the curb lane.
As noted above, following meetings with OCT, the MUP-transit stop interaction zone design has been resolved. Parking will be prohibited between the access and transit stop.

Comment 14. No further comments regarding the On-street parking proposal, provided the appropriate bus stop zone/ no parking is accommodated, as per the above comment.
Noted.

Street Lighting

Comment 15. Street light review/design required as there are changes to existing roadway geometry. Digital design drawings (DGN format) are required. Please contact Jason Hockley (City of Ottawa) 613-857-1094, Jason.Hockley@ottawa.ca for more details.

Be advised that the applicant will be 100% responsible for all costs associated with any relocations/modifications to the existing street light plant.
Jason Hockley has been contacted for additional details and to confirm Street Light requirements specific to the parking proposal.

Traffic Signal Design

Comment 16. No comments for this current circulation. Traffic Signal Design Unit reserves the right to make future comments based on subsequent submissions.

If there are any future proposed changes in the existing roadway geometry that would require the installation of a pedestrian crossover (Type B or Type C), the signalization of an intersection or modifications to an existing signalized intersection, the City of Ottawa Traffic Signal Design Unit would be required to complete a traffic signal plant design and would need to be engaged in reviews during the functional design stage.
Noted.

Attachments

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Technical Memorandum

To: Wally Dubyk, Transportation Project Manager

Date: January 27, 2023

From: Jake Berube, P.Eng.

Project: 478016-01000

Copy: Emmett Proulx, Development Review and Roadway Modifications

Subject: *770 Brookfield Road – On-Street Parking and Loading Assessment - Revised*

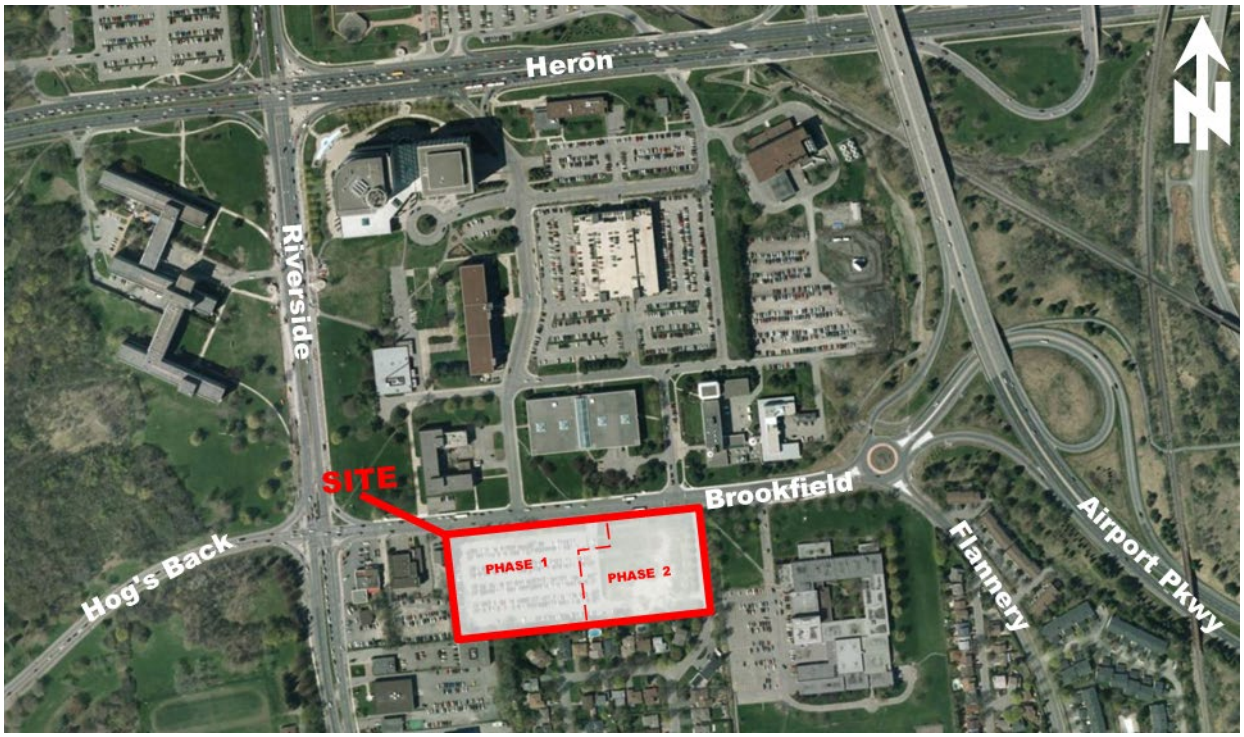
The following memo has been revised according to the November 30th, 2022 City of Ottawa Transportation comments. The proposal no longer recommends street loading fronting the site or street parking/loading east of the primary site access. The following memo has been revised to support street parking fronting the 770 Brookfield Site.

1.0 INTRODUCTION

The 770 Brookfield Road development is a 2-phase development, the first of which has been recently completed as of Summer 2022. Phase 1 of the development consists of approximately 400 student apartment units and more than 13,000 ft^2 of ground floor retail. A Transportation Impact Assessment was prepared by Parsons (February, 2018) as well as subsequent Addendums #1 (May, 2018) and #2 (August, 2018) which responded to City of Ottawa comments. Figure 1 depicts the general site context regarding the 770 Brookfield development.

At the time of the Phase 1 Transportation Impact Assessment, discussions were held with the City of Ottawa to implement parking and loading zones along Brookfield Road eastbound. The following memo provides an assessment to include on-street parking and loading areas fronting the 770 Brookfield Phase 1 site.

Figure 1: Study Area Context



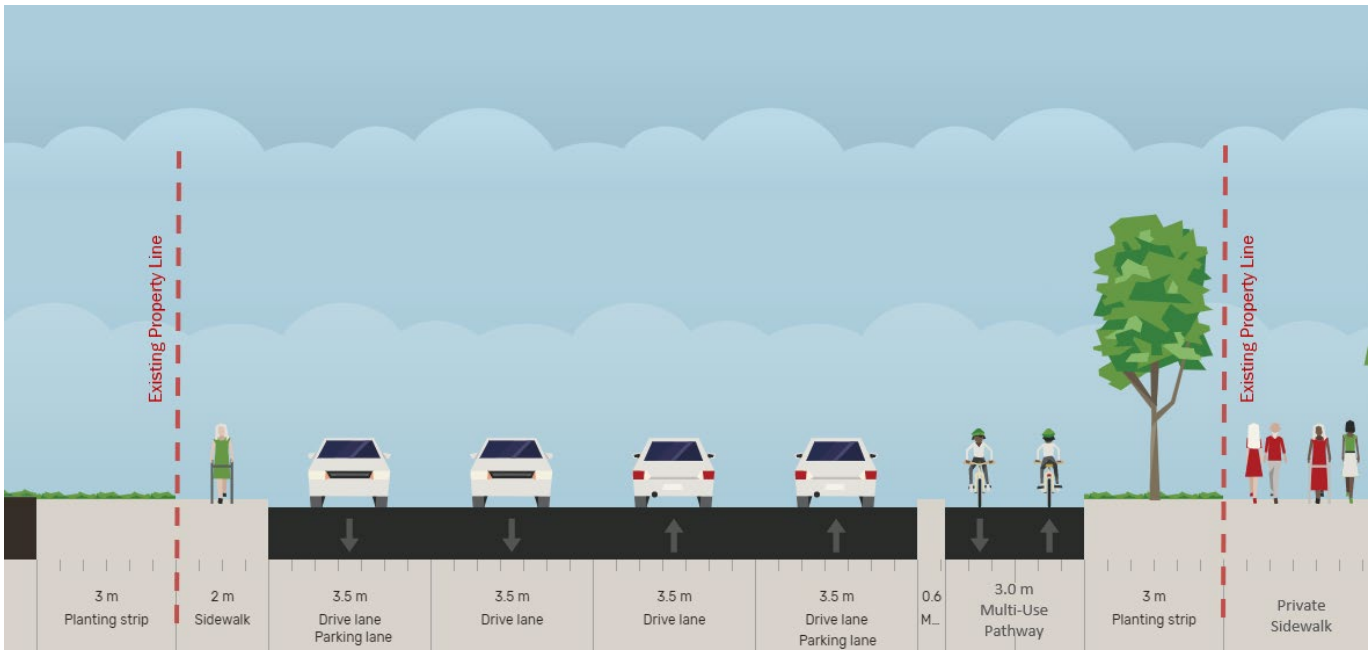
2.0 Existing Conditions

Figure 3 illustrates the latest aerial photography of the site demonstrating the following features:

- The primary site access is located between Phase 1 and Phase 2, providing movements to Brookfield Road in both directions
- A secondary site access located on the west site boundary which provides an inbound-only one-way access.
- A two-way multi-use pathway (MUP) measuring 3.0m is separated from Brookfield Road traffic by a 0.6m curb and paved boulevard. A buffer zone is then typically provided between the MUP and the private sidewalk nearest the 770 Brookfield buildings.

Brookfield Road is a major collector roadway with a four-lane cross section east of Riverside Drive which continues west as Hogsback Road with a two-lane cross section. As illustrated by the cross-section in Figure 2, it has a protected ROW width of 26m with 3.75m travel lanes, a 2.0m concrete sidewalk on the north side, and a 3.0m MUP with 0.6m buffer on the south side fronting the 770 Brookfield development. Within the study area, auxiliary turn lanes are provided at major intersections and the posted speed limit is 50 km/h. It provides for a 'Major Pathway' on the south side of the roadway while being designated a 'Spine Route' within Map 1 – Cycling Network. There are no transit priority designations for the corridor east of Riverside Drive. Brookfield Road is not a designated truck route.

Figure 2: Existing Brookfield Road Cross-Section Fronting the 770 Brookfield Road Site, Looking East



Brookfield High School is located immediately to the east of the 770 Brookfield development. The segment fronting the 770 Brookfield development is designated a school zone. The site is also approximately 400m from the Mooney's Bay LRT station to the north. Therefore, level of service targets should be consistent with these relevant policy areas where possible.

Transit service within the vicinity of the site is currently provided by OC Transpo Routes #90-Greenboro (7-days per week, 15-minute headways), #190-Mooney's Bay (7-days per week, select trips) and #290-McCarthy (Weekdays PM, select trips). Bus stops for these routes are adjacent to the site along Brookfield Road, immediately west of the traffic signal controlled intersection with Canada Post (200m west of Flannery Drive). The transit stop has been temporarily re-located to approximately 40m west of the intersection during construction of the 770 Brookfield development. The ultimate location is intended to be immediately west of the Brookfield/200m West of Flannery Drive intersection.

Figure 3: 770 Brookfield, Phase 1

3.0 EXISTING TRANSPORTATION NETWORK ANALYSIS

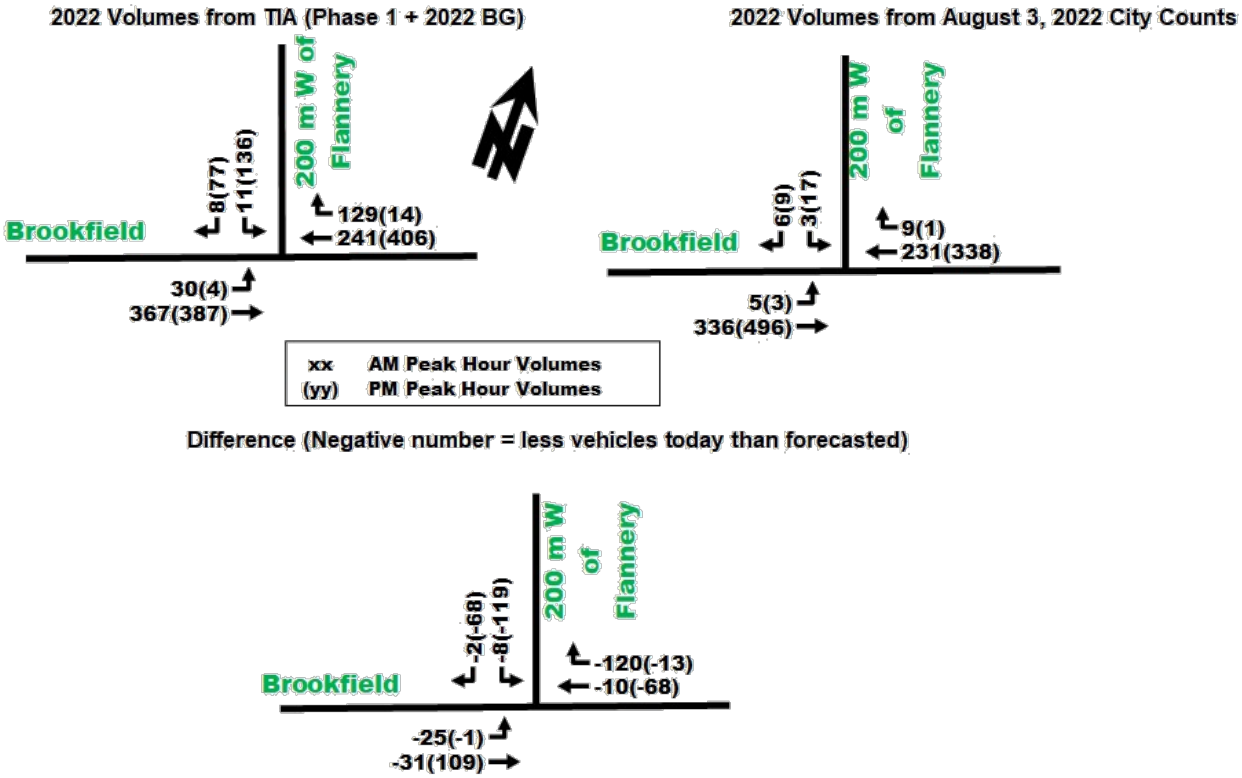
Weekday turning movement counts (TMCs), and the most recent signal timing plan, were obtained from the City of Ottawa for the Brookfield/200m west of Flannery Drive traffic signal controlled intersection. The most recent count was undertaken in August, 2022 which would include traffic from Phase 1 of the development. The August 2022 traffic count is compared to the Phase 1 TIA 2022 traffic forecast (also based on an August 2015 TMC) in Figure 4. The figure indicates the difference between the two sets of morning and afternoon peak hour volumes, where negative values indicate a decrease in traffic relative to the 2022 forecast.

Inspection of the figure indicates a general decrease in morning peak hour traffic along Brookfield Road and on the southbound approach to the intersection in the afternoon peak hour. It can be reasonable to expect an increase in peak morning traffic attributable to the Brookfield High School, which is not in class in August. Similarly, as the lands north of Brookfield are primarily employment, August trips are expected to be lower for the southbound approach.

A September 2016 count at the intersection of Brookfield/Flannery was also reviewed. Peak hour traffic volumes were found to be between 400-to-500 veh/h and 400-to-600 veh/h in the morning and afternoon peak hours of travel demand. This is comparable to the August peak hour count information observed in 2015 and 2022.

Overall, eastbound traffic along Brookfield Road fronting the development, and west of the Brookfield/200m from Flannery intersection, varies between 350 veh/h in the morning peak hour up to 500 veh/h in the afternoon peak hour.

Figure 4: Comparison of 2022 Observed and 2022 Forecasts Traffic Volumes, Brookfield/200m W of Flannery Intersection – AM (PM) Peak Hours



Intersection Capacity Analysis

The TMC data obtained from the City of Ottawa was used to complete Level of Service (LoS) analysis for the morning (AM) and afternoon (PM) peak hours at the Brookfield/200m W of Flannery intersection. Synchro 10 traffic analysis software was used to complete the following evaluations and detailed reports are included in **Appendix D**.

Table 2 provides the intersection analysis results for the weekday for the critical movement and the intersection 'as a whole' for the following three scenarios:

- Scenario 1 – Assumes the existing intersection configuration and the forecasted 2022 TIA peak hour traffic volumes;
- Scenario 2- Assumes the existing intersection configuration and the August 2022 observed peak hour traffic volumes; and
- Scenario 3 – Assumes an intersection configuration where the eastbound curb lane is unavailable, or underutilized, by vehicles during the peak hour. This scenario assumes the August 2022 peak hour traffic volumes. The proponent does not propose any modifications to the traffic signal nor a parking strategy that would materially affect signal capacity at this time.

Inspection of the table indicates that all scenarios were found to operate with an overall acceptable level of service 'A' and delay for all critical movements and intersections 'as a whole'. The intersection would operate without significant increases in vehicle delay if only a single eastbound through lane is provided. There remains significant auto capacity within the intersection to accommodate variations in seasonal traffic as either a 4-lane or 3-lane Brookfield configuration. At this time, permanent modifications to the signal or the Brookfield Road cross section are not being considered with this proposal.

The existing eastbound transit stop is located within 20m of the eastbound stop bar. Inspection of eastbound queues indicate that, even in the existing conditions, queues may interfere with bus stop operations on occasion.

Table 1: Study Area Peak Hour Intersection Performance – AM (PM) Peak Hours

BROOKFIELD/200 M W OF HOBSON TRAFFIC SIGNAL 'T' INTERSECTION	WEEKDAY AM PEAK (PM PEAK)						95TH PERC. QUEUING FOR EB-TH MOVEMENT (M)
	CRITICAL MOVEMENT			INTERSECTION			
	LOS	MAX. V/C	MVMT.	DELAY (S)	LOS	V/C	
S1 – 2022 TIA Forecasted Volumes and Existing Geometry	A (A)	0.14 (0.50)	EBT (SBL)	2.6 (8.9)	A (A)	0.14 (0.27)	20 (20)
S2 - Using Latest Counts and Existing Geometry	A (A)	0.12 (0.19)	EBT (EBT)	3.0 (4.7)	A (A)	0.12 (0.18)	17 (25)
S3- Using Latest Counts and Single EBT Movement	A (A)	0.21 (0.34)	EBT (EBT)	3.4 (5.7)	A (A)	0.21 (0.33)	40 (63)
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.							

Consistency with Road Classification

Brookfield Road is classified as a 'Major Collector' with the City of Ottawa's Official Plan. A Major Collector road is intended to 'connect communities and distribute traffic between the arterial system and local road system'. It currently accommodates approximately 600-to-850 two-way veh/h and 7,000-to-8,000 two-way veh/day in 2022. Based on the Transportation Association of Canada's Table 2.6.5: Characteristics of Urban Roads, these traffic volumes are typical for 2-lane collector roadways that serve employment hubs.

Summary

Brookfield Road is classified as a 'Major Collector' fronting the development with typical peak hour-peak direction volumes between 400 veh-and-600 veh/h. As a 4-lane roadway with a 26.0m ROW protection, the facility could be considered overbuilt for its role and function. The above analysis simply demonstrates that significant additional capacity is available on this facility to incorporate urban measures such as street parking.

4.0 Cycling OTM Book 18 Considerations

As noted, Brookfield Road provides for a bi-directional 3.0m MUP with a 0.6m buffer on the south side of the corridor. On-Street parking has a notable influence on the safety and the comfort of cyclists and pedestrians using the MUP. There exists potential conflicts of 'dooring' when cycling facilities are located adjacent to on-street parking. The Ontario Traffic Manual (OTM) Book 18: Cycling Facilities (June, 2021) was reviewed to provide context on the proposed parking provisions and existing MUP interactions along Brookfield Road fronting the 770 Brookfield development. In particular:

- OTM Book 18 Table 4.6 provides for desired and suggested minimum buffer widths for cycle tracks and multi-use paths. For a roadway posted at 60 km/h or less, a minimum buffer of 0.6m (without the curb) is recommended. Brookfield Road is posted 50 km/hr fronting the 770 Brookfield site. The buffer width not only provides comfort and safety to MUP users, but allows for improved snow storage as not to obstruct the MUP usage, areas of installation of poles and signage, and allow for sloped ramps to minimize grade changes.
- 'Dooring' is an incident of when driver or passenger doors are opened in the path of cyclists and pedestrians. Mitigating measures include additional buffer widths, particular when the cycling facility is located between the travel lanes and the street parking. OTM Book 18 Table 4.6, notes a suggested minimum buffer width of 0.6m, noting that such a width would be unsuitable for utility poles and may hinder the use of the buffer for snow storage. In the case of Brookfield Road, the bi-directional MUP with the available barrier minimizes dooring as southbound cyclists nearest parked cars are in direct view of the passenger boarding or alighting from their vehicle.
- A clear sight distance should be provided based on vehicle speeds and cyclist speeds. The driveway is considered a low volume facility where curb returns are designed with a 5.0m radius, which is recognized to increase with the application of street parking. Therefore, a minimum 14m clear sight distance is required for vehicles turning from

Brookfield into the site on either side of the primary site access. A similar 14m clear sight distance has also been considered for the secondary inbound-only access.

It is worthwhile to note that the Brookfield MUP was designed and constructed prior to the release of OTM Book 18. The above review of Book 18 indicates that, should the opportunity present itself, a wider separation between the MUP and Brookfield Road would be beneficial in any case as the existing buffer is considered below the minimum width. However, such undertaking would require significant curb works to shift the curb further north along much of Brookfield Road. Additionally, if undertaken in isolation, could result in unintended impacts to traffic flow along Brookfield. Therefore, no curb changes are recommended as part of this initiative in the short term.

5.0 Proposed Brookfield Parking Strategy

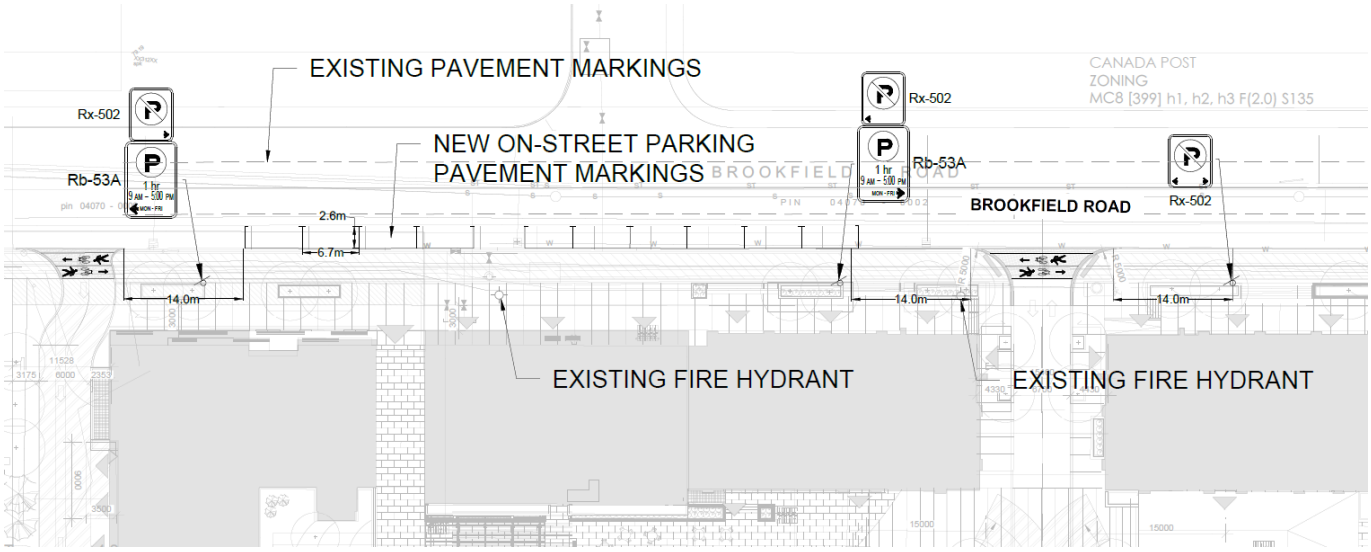
There is a desire to provide and promote on-street parking facilities along Brookfield Road, adjacent to the site. This parking would allow drivers to park briefly to access the retail portion of the site and provide an area for pick-ups/drop-offs.

As indicated by the previous analysis, there remains sufficient vehicle capacity along Brookfield Road to accommodate the vehicle demand should the southern curb lane be occupied by on-street parking, even during the peak hours.

To emphasize the role of short-term parking, it is recommended that a 1-hour parking maximum be considered during weekdays (9:00am-to-5:00pm). This restriction would reduce the ability for the adjacent high school and employment lands to occupy the spaces fronting the 770 Brookfield Development during peak weekday travel. While parking is permitted along Brookfield currently, the signage would be a form of positive reinforcement to utilize the available spaces.

Loading zones are not proposed along Brookfield Road. Loading activities should take place on site given the size, location and use of the 770 Brookfield development.

Figure 5: Proposed Brookfield Road On-Street Parking Arrangement



With regards to spacing between adjacent infrastructure, the following is considered:

- The vehicle parking would typically begin more than 100m east of the Riverside/Brookfield-Hog's Back intersection. The majority of eastbound vehicles are expected to be within the north eastbound lane which accepts vehicles from Riverside (SBLT) and Hog's Back (EB-Th).

- The proposed loading facility fronting Building 'E' and west of the main site access would be set back at least 14.0m from the point of curvature to allow for sight distances to MUP users when turning onto site and spacing from the fire hydrant (3m lateral separation at the street line).
- Parking is to be prohibited fronting Building 'F' and east of the main site access, as limited curb space is available between the access and the adjacent transit stop.

Figure 5 illustrates the recommended signage plan for on-street parking along the 770 Brookfield frontage. The existing Brookfield Road cross-section is proposed to remain largely unchanged as book-ending this section of parking would be inconsistent with the current Brookfield Road corridor. However, this level of intervention is considered beyond the scope of this proposal. Promoting parking along Brookfield Road will seek to have an initial effect of urbanizing the corridor while potentially having a positive impact on traffic speeds in the vicinity of the school zone.

6.0 FINDINGS AND RECOMMENDATIONS

Based on a review of site conditions, traffic operations and MUP implications, Brookfield Road is considered suitable for an on-street parking arrangement. There exists sufficient capacity along Brookfield Road to accommodate a single eastbound lane during the weekday peak hours. There also exists sufficient separation to adjacent major transportation facilities as to minimize conflicts along Brookfield Road and ensure eastbound motorists can react to parked vehicles.

The recently constructed multi-use path buffer has been noted to be below the minimum recommended buffer by OTM Book 18 guidelines. The presence of parking will increase the buffer between Brookfield Road traffic and MUP users. However, it also recognized that parking activities, and related dooring incidents, may conflict with MUP user activities.

The following is recommended for implementation:

- Two, 1-hour parking signs fronting building 'E', located as to ensure sufficient spacing from the adjacent accesses and staircases. Parking is to be restricted to 1-hour between 9:00AM-and-5:00PM.
- At the same location as the parking signs, 'No Parking' signage in the opposite direction.
- A 'No Parking' sign located east of the main access. This exact signage location will need to be, at minimum, 14m east of the access and should be located as to avoid the staircase.
- Signage is to be placed 0.5m from the MUP and outside the path of travel of the stairway and building frontage.

Over the long term, it is recommended that a fulsome plan be considered to urbanize Brookfield Road which could include providing an additional MUP-buffer to Book 18 guidelines and book-ending parking throughout Brookfield Road.

As per the foregoing analysis, the on-street parking facilities are not considered to create an undue safety hazard along Brookfield Road. The City of Ottawa is recommended to consider the proposed on-street parking plan for implementation by the proponent.

Should you have any questions please contact the undersigned.

Sincerely;

Jake Berube, P.Eng.
Transportation Engineer

Appendix A

Site Visit Photos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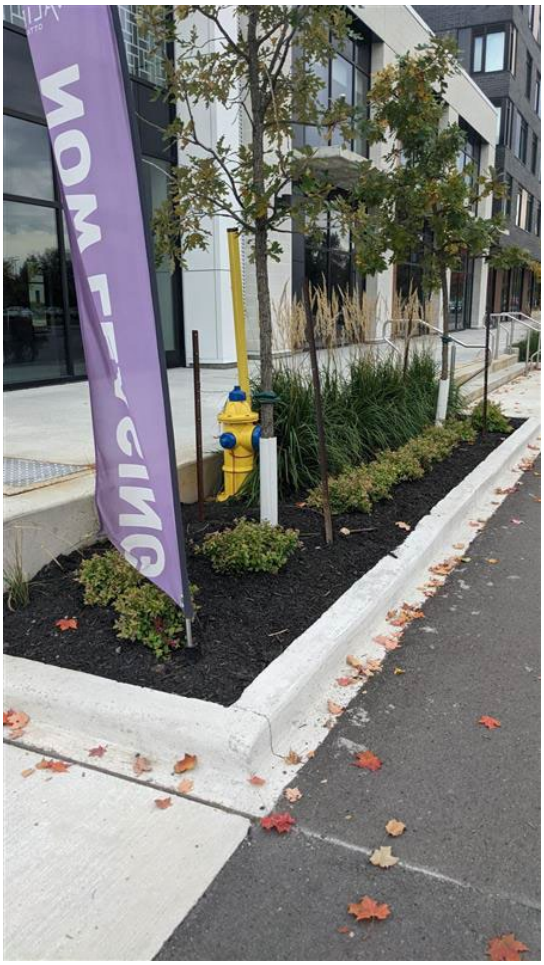

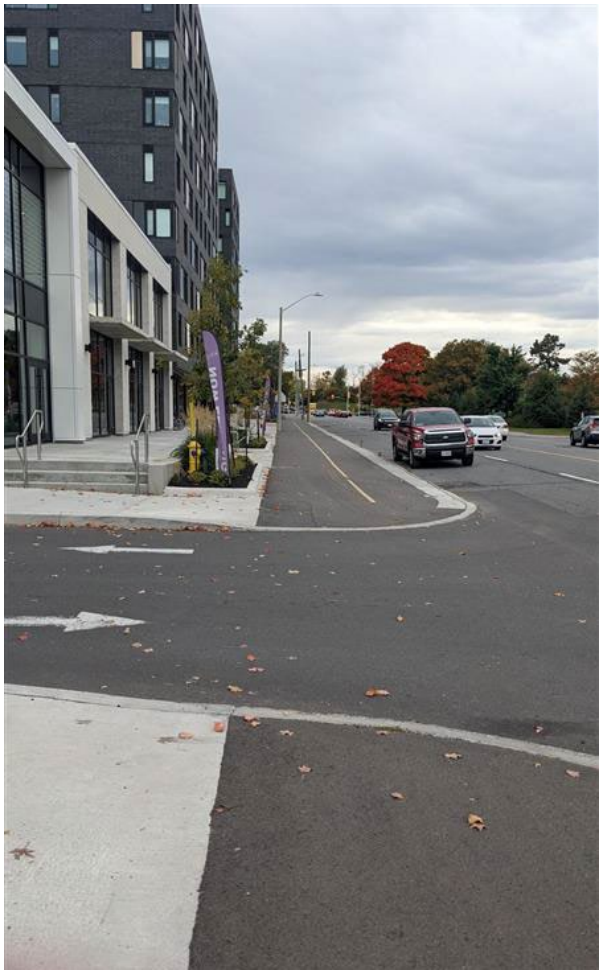


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Appendix B

Turning Movement Count Information

Transportation Services - Traffic Services

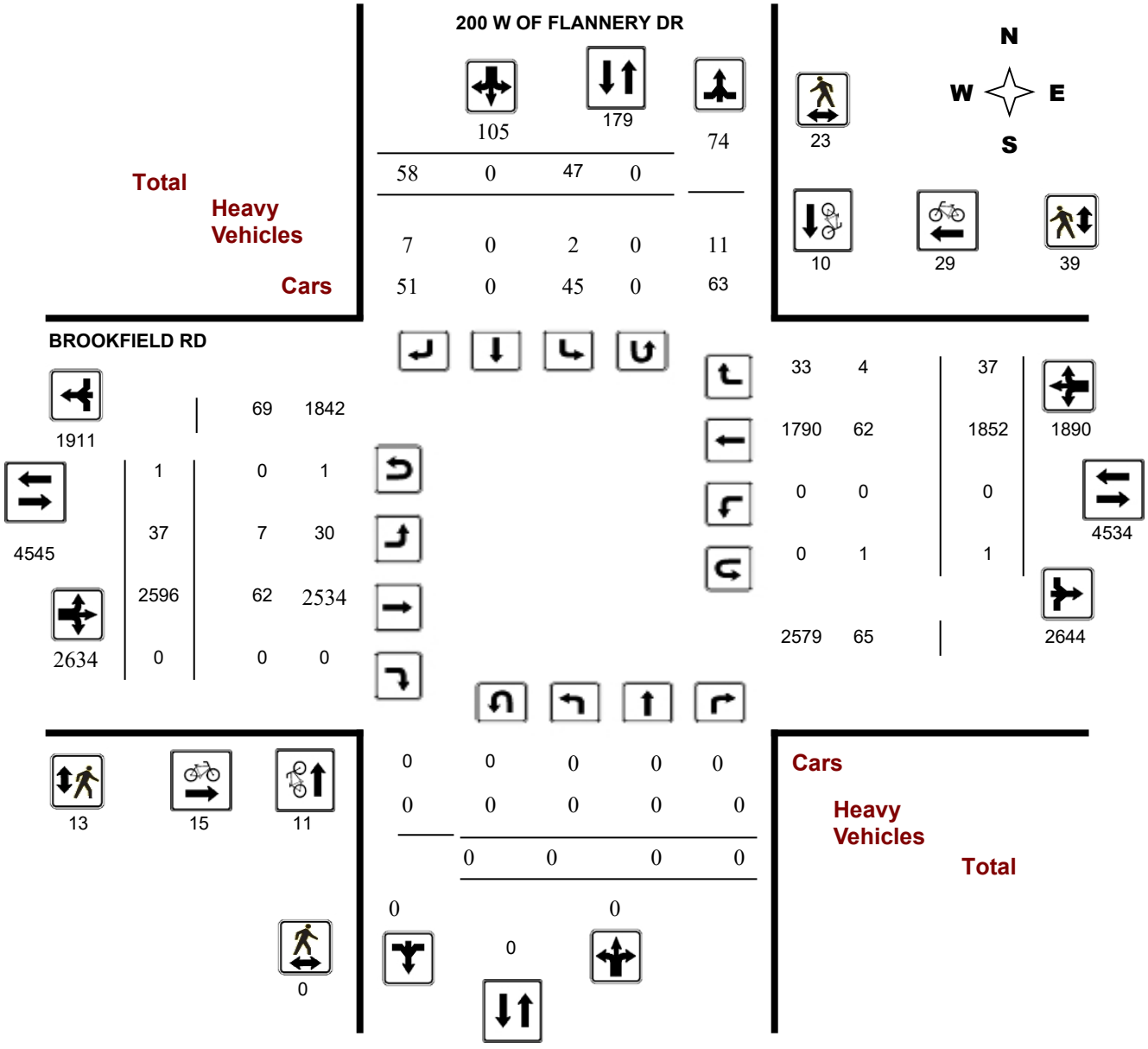
Turning Movement Count - Study Results

BROOKFIELD RD @ 200 W OF FLANNERY DR

Survey Date: Wednesday, August 03, 2022
Start Time: 07:00

WO No: 40508
Device: Miovision

Full Study Diagram



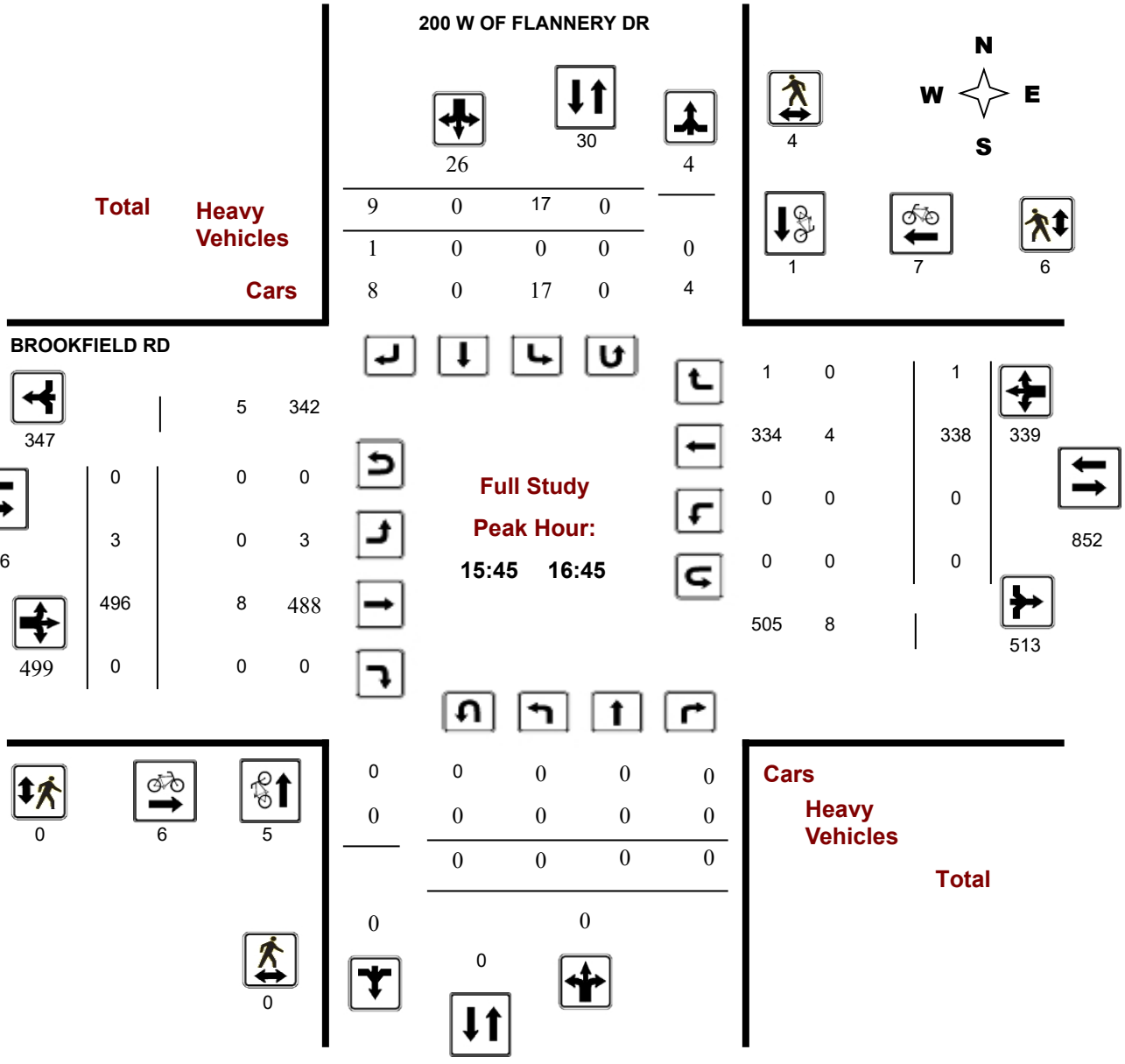
Transportation Services - Traffic Services

Turning Movement Count - Study Results

BROOKFIELD RD @ 200 W OF FLANNERY DR

Survey Date: Wednesday, August 03, 2022
Start Time: 07:00
WO No: 40508
Device: Miovision

Full Study Peak Hour Diagram



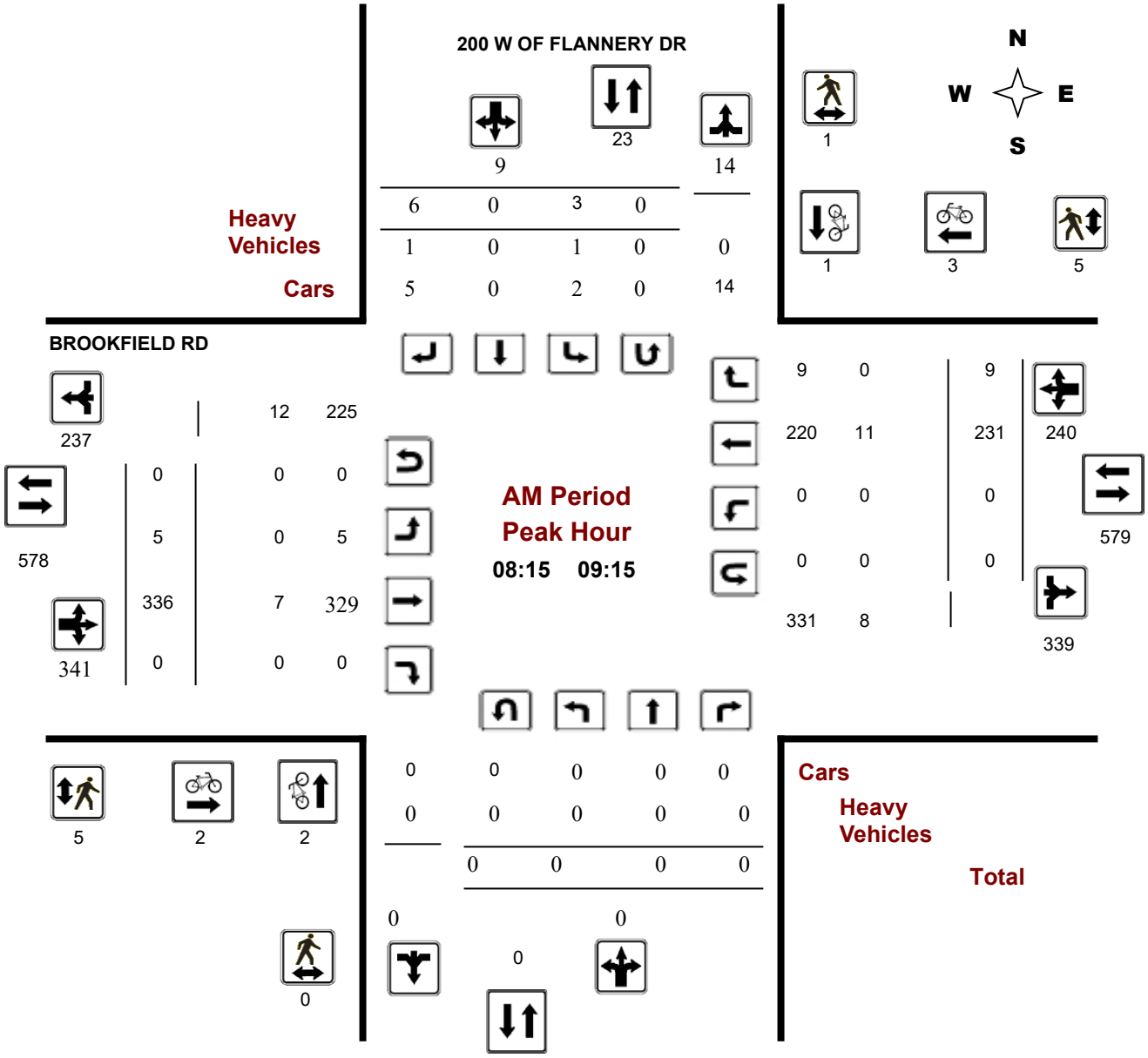
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BROOKFIELD RD @ 200 W OF FLANNERY DR

Survey Date: Wednesday, August 03, 2022 **WO No:** 40508

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



Comments

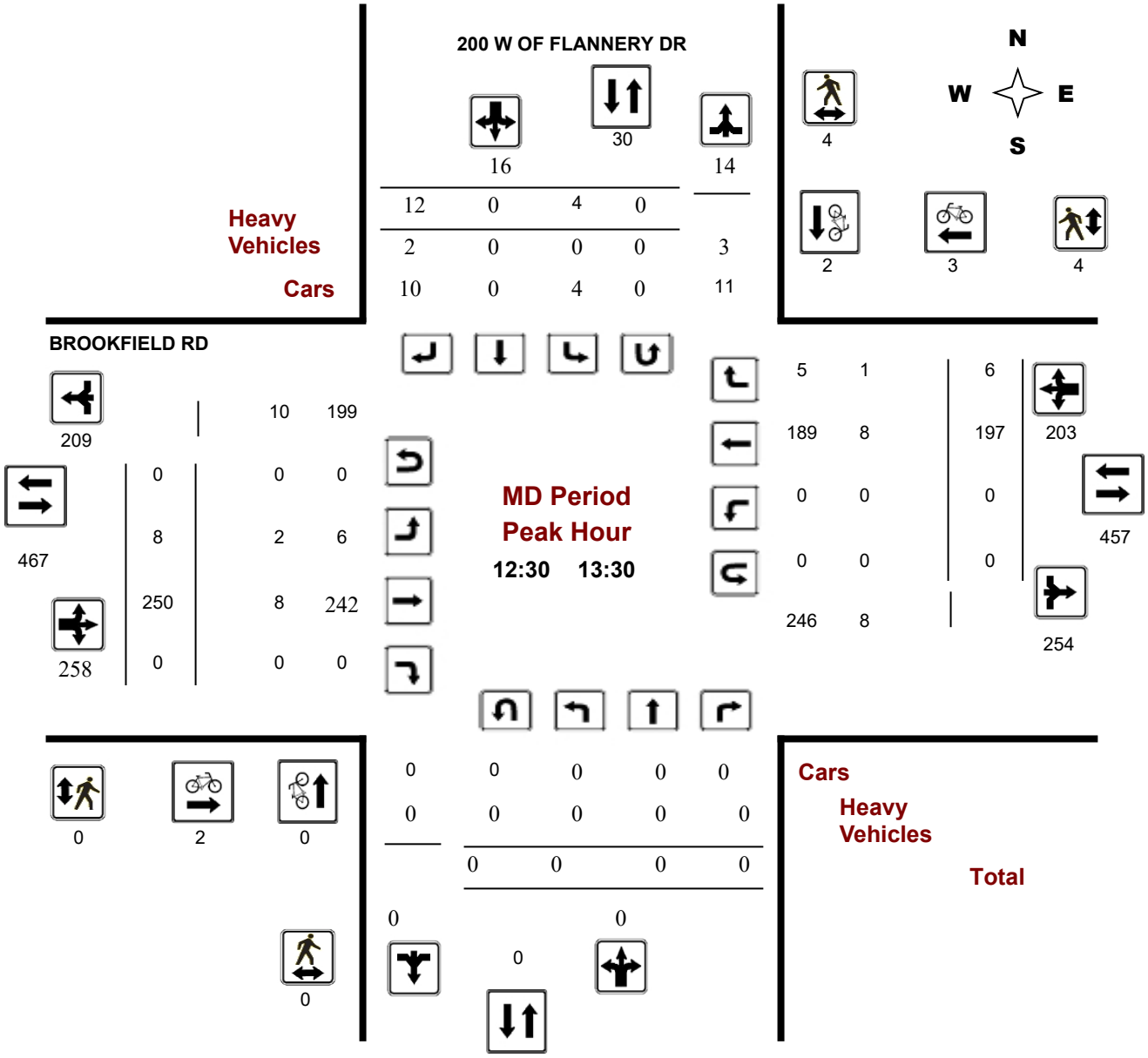
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BROOKFIELD RD @ 200 W OF FLANNERY DR

Survey Date: Wednesday, August 03, 2022 **WO No:** 40508

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



Comments

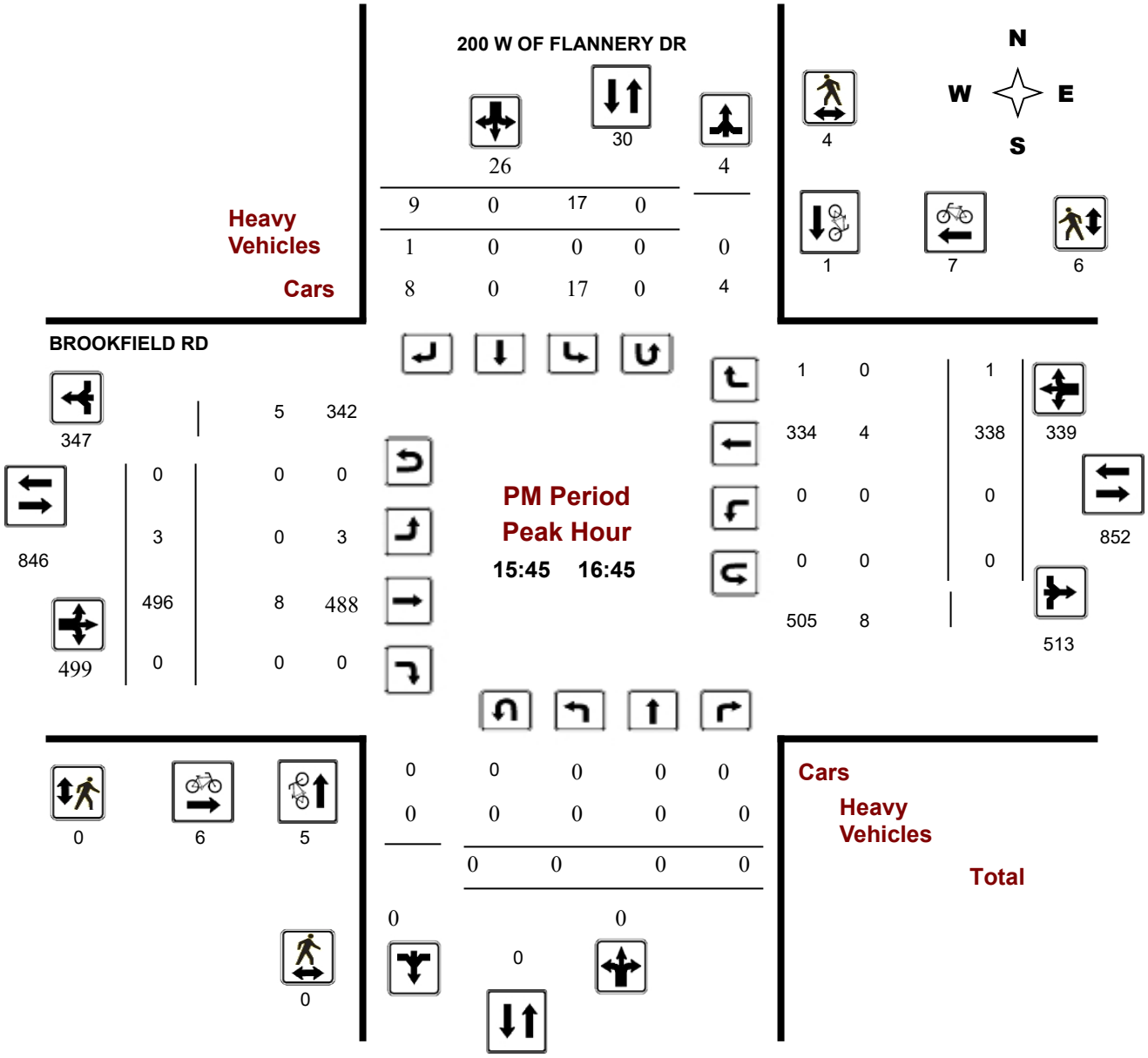
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BROOKFIELD RD @ 200 W OF FLANNERY DR

Survey Date: Wednesday, August 03, 2022 **WO No:** 40508

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



Comments

Appendix C

Pavement Marking and Signage Plan

Page Setup: ----

Drawing Frame: 790mm x 534mm City of Ottawa 2008 (Rev.0)

Plot Date: Friday, January 27, 2023 3:27:05 PM

Last Saved: Friday, January 27, 2023 3:25:36 PM

Consultant's Information: C:\Users\p0047978\OneDrive - Parsons Corp\Desktop\Desktop Working Folder\770 Brookfield\478399-pin-signage-770 Brookfield.dwg

770 Brookfield Road

Residential Development

Existing Pavement Markings and Signage

PARSONS

478399 | Dwg. No. 001

Sheet 1 of 2

Des.	Chk'd.
Dwn. AEB	Chk'd.

Scale: N.T.S

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
01	Issued for City Review	AEB	26/10/22
02	Updated As Per City Comments	AEB	27/01/23

EXISTING PAVEMENT MARKINGS

EXISTING FIRE HYDRANT

EXISTING FIRE HYDRANT

CANADA POST
ZONING
MC8 [399] h1, h2, h3 F(2.0) S135

770 BROOKFIELD PHASE I
ZONING
GM1 [155] F (1.5) $147,148

BROOKFIELD ROAD

HOBSON ROAD

PIN 04071 - 0137

DWG ##-##-####

Page Setup: ----

Drawing Frame: 790mm x 534mm City of Ottawa 2008 (Rev.0)

Plot Date: Monday, January 30, 2023 11:15:32 AM

Last Saved: Monday, January 30, 2023 11:12:31 AM

Consultant's Information: C:\Users\p0047979\BIOneDrive - Parsons Corp\Desktop\Desktop Working Folder\770 Brookfield\478399-plln-signage-770 Brookfield.dwg

770 Brookfield Road

Residential Development

Existing Pavement Markings and Signage

PARSONS

478399	Dwg. No. 001
Sheet 1 of 3	
Des.	Chk'd.
Dwn. AEB	Chk'd.
Scale: N.T.S	

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
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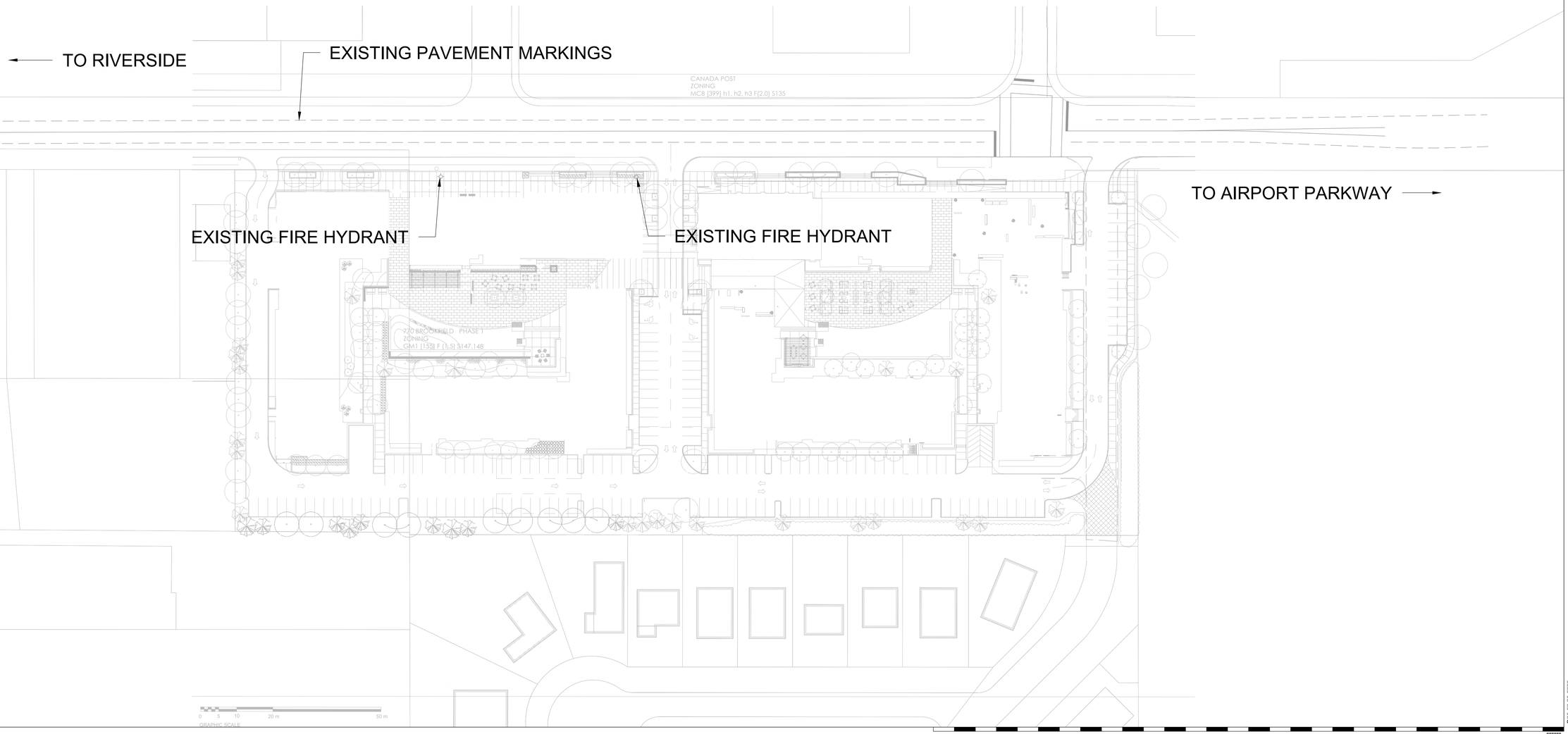

DWF-##-##-####

770 Brookfield Road

Residential Development

Proposed Pavement Markings and Signage

PARSONS

478399	Dwg. No. 002
Sheet 2 of 2	
Des.	Chk'd.
Dwn. AEB	Chk'd.
Scale: N.T.S	

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
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EXISTING PAVEMENT MARKINGS

NEW ON-STREET PARKING PAVEMENT MARKINGS

NEW BUS PAD AND TRANSIT STOP

Rx-502

Rb-53A

1 hr 9 AM - 5:00 PM MON - FRI

2.6m

6.7m

14.0m

EXISTING FIRE HYDRANT

EXISTING FIRE HYDRANT

CANADA POST
ZONING
MC8 [399] h1, h2, h3 F(2.0) S135

770 BROOKFIELD PHASE 1
ZONING
GM1 [155] F (1.5) $147,148

BROOKFIELD ROAD

HOBSON ROAD

LOT 42

pin 04071 - 0110

pin 04071 - 0113

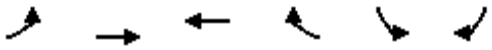
part 3 plan car-5?

part 2 plan 4r-8677

PIN 04071 - 0137

Appendix D

Synchro 11 Intersection Capacity Analysis Results

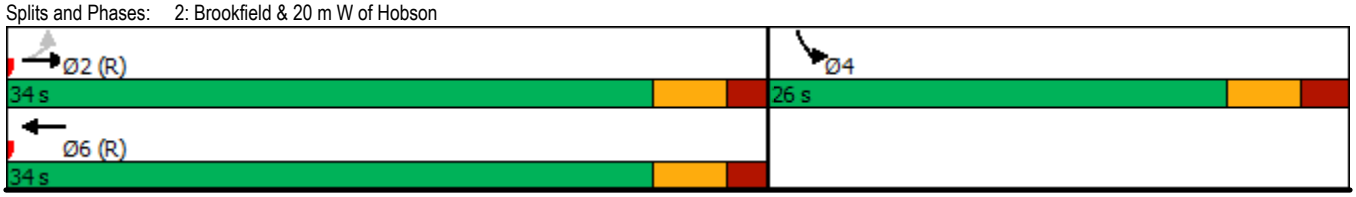


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	336	231	9	3	6
Future Volume (vph)	5	336	231	9	3	6
Satd. Flow (prot)	0	3387	3367	0	1580	0
Flt Permitted		0.952			0.984	
Satd. Flow (perm)	0	3227	3367	0	1577	0
Satd. Flow (RTOR)			9		6	
Lane Group Flow (vph)	0	341	240	0	9	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		2	6		4	
Permitted Phases	2					
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0		10.0	
Minimum Split (s)	26.2	26.2	26.2		25.5	
Total Split (s)	34.0	34.0	34.0		26.0	
Total Split (%)	56.7%	56.7%	56.7%		43.3%	
Yellow Time (s)	3.3	3.3	3.3		3.3	
All-Red Time (s)	1.9	1.9	1.9		2.2	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.2	5.2		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Act Effct Green (s)		53.9	53.9		12.0	
Actuated g/C Ratio		0.90	0.90		0.20	
v/c Ratio		0.12	0.08		0.03	
Control Delay		2.8	2.9		12.1	
Queue Delay		0.0	0.0		0.0	
Total Delay		2.8	2.9		12.1	
LOS		A	A		B	
Approach Delay		2.8	2.9		12.1	
Approach LOS		A	A		B	
Queue Length 50th (m)		0.0	0.0		0.3	
Queue Length 95th (m)		m17.3	11.8		2.7	
Internal Link Dist (m)		65.5	4.1		50.6	
Turn Bay Length (m)						
Base Capacity (vph)		2897	3023		543	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.12	0.08		0.02	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.12	
Intersection Signal Delay: 3.0	Intersection LOS: A
Intersection Capacity Utilization 36.0%	ICU Level of Service A
Analysis Period (min) 15	

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

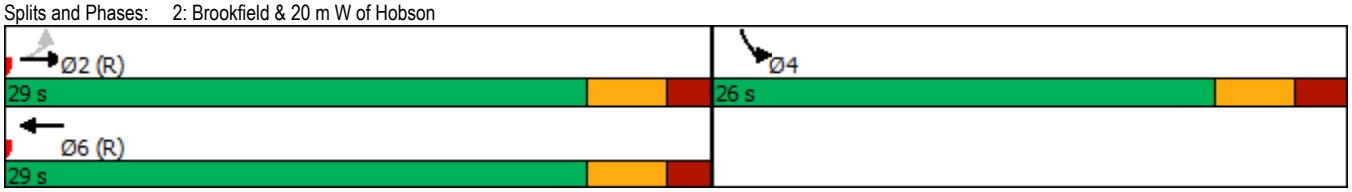
Splits and Phases: 2: Brookfield & 20 m W of Hobson

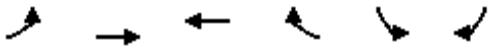


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	3	496	338	1	17	9
Future Volume (vph)	3	496	338	1	17	9
Satd. Flow (prot)	0	3390	3390	0	1639	0
Flt Permitted		0.954			0.968	
Satd. Flow (perm)	0	3234	3390	0	1634	0
Satd. Flow (RTOR)			1		9	
Lane Group Flow (vph)	0	499	339	0	26	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		2	6		4	
Permitted Phases	2					
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0		10.0	
Minimum Split (s)	26.2	26.2	26.2		25.5	
Total Split (s)	29.0	29.0	29.0		26.0	
Total Split (%)	52.7%	52.7%	52.7%		47.3%	
Yellow Time (s)	3.3	3.3	3.3		3.3	
All-Red Time (s)	1.9	1.9	1.9		2.2	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.2	5.2		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Act Effct Green (s)		44.7	44.7		12.0	
Actuated g/C Ratio		0.81	0.81		0.22	
v/c Ratio		0.19	0.12		0.07	
Control Delay		4.5	4.3		12.3	
Queue Delay		0.0	0.0		0.0	
Total Delay		4.5	4.3		12.3	
LOS		A	A		B	
Approach Delay		4.5	4.3		12.3	
Approach LOS		A	A		B	
Queue Length 50th (m)		0.0	0.0		1.4	
Queue Length 95th (m)		25.2	17.0		4.9	
Internal Link Dist (m)		73.1	3.0		50.6	
Turn Bay Length (m)						
Base Capacity (vph)		2629	2756		616	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.19	0.12		0.04	

Intersection Summary	
Cycle Length: 55	
Actuated Cycle Length: 55	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.19	
Intersection Signal Delay: 4.7	Intersection LOS: A
Intersection Capacity Utilization 34.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Brookfield & 20 m W of Hobson



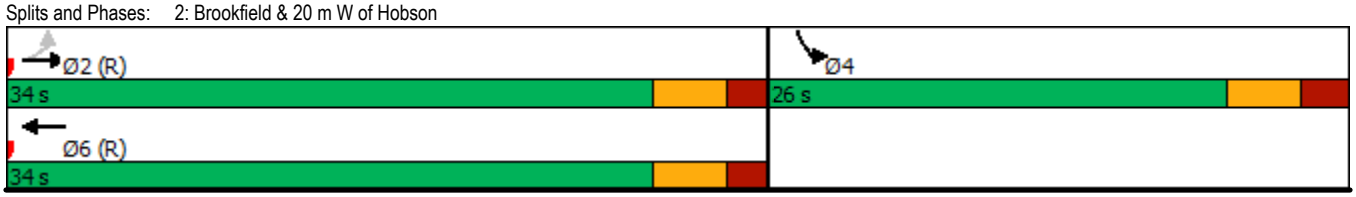


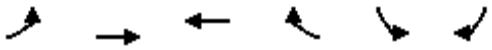
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	336	231	9	3	6
Future Volume (vph)	5	336	231	9	3	6
Satd. Flow (prot)	0	1783	3367	0	1580	0
Flt Permitted		0.997			0.984	
Satd. Flow (perm)	0	1779	3367	0	1576	0
Satd. Flow (RTOR)			9		6	
Lane Group Flow (vph)	0	341	240	0	9	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		2	6		4	
Permitted Phases	2					
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0		10.0	
Minimum Split (s)	26.2	26.2	26.2		25.5	
Total Split (s)	34.0	34.0	34.0		26.0	
Total Split (%)	56.7%	56.7%	56.7%		43.3%	
Yellow Time (s)	3.3	3.3	3.3		3.3	
All-Red Time (s)	1.9	1.9	1.9		2.2	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.2	5.2		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Act Effct Green (s)		53.9	53.9		12.0	
Actuated g/C Ratio		0.90	0.90		0.20	
v/c Ratio		0.21	0.08		0.03	
Control Delay		3.4	2.9		12.1	
Queue Delay		0.0	0.0		0.0	
Total Delay		3.4	2.9		12.1	
LOS		A	A		B	
Approach Delay		3.4	2.9		12.1	
Approach LOS		A	A		B	
Queue Length 50th (m)		0.0	0.0		0.3	
Queue Length 95th (m)		m39.5	11.8		2.7	
Internal Link Dist (m)		65.5	4.1		50.6	
Turn Bay Length (m)						
Base Capacity (vph)		1597	3023		543	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.21	0.08		0.02	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.21	
Intersection Signal Delay: 3.4	Intersection LOS: A
Intersection Capacity Utilization 41.4%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 2: Brookfield & 20 m W of Hobson

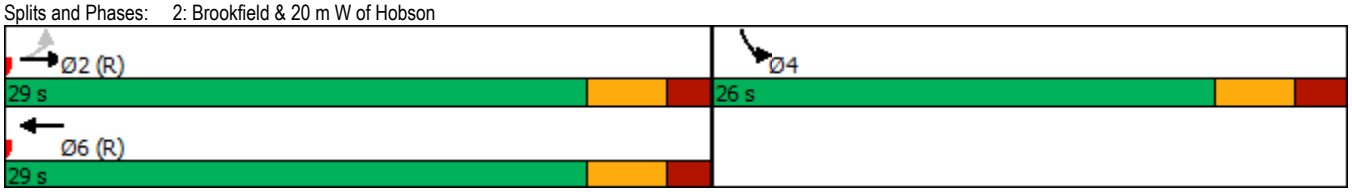


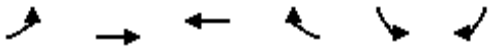


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	3	496	338	1	17	9
Future Volume (vph)	3	496	338	1	17	9
Satd. Flow (prot)	0	1784	3390	0	1639	0
Flt Permitted		0.999			0.968	
Satd. Flow (perm)	0	1782	3390	0	1630	0
Satd. Flow (RTOR)			1		9	
Lane Group Flow (vph)	0	499	339	0	26	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		2	6		4	
Permitted Phases	2					
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0		10.0	
Minimum Split (s)	26.2	26.2	26.2		25.5	
Total Split (s)	29.0	29.0	29.0		26.0	
Total Split (%)	52.7%	52.7%	52.7%		47.3%	
Yellow Time (s)	3.3	3.3	3.3		3.3	
All-Red Time (s)	1.9	1.9	1.9		2.2	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.2	5.2		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Act Effct Green (s)		44.7	44.7		12.0	
Actuated g/C Ratio		0.81	0.81		0.22	
v/c Ratio		0.34	0.12		0.07	
Control Delay		6.3	4.3		12.3	
Queue Delay		0.0	0.0		0.0	
Total Delay		6.3	4.3		12.3	
LOS		A	A		B	
Approach Delay		6.3	4.3		12.3	
Approach LOS		A	A		B	
Queue Length 50th (m)		0.0	0.0		1.4	
Queue Length 95th (m)		62.5	17.0		4.9	
Internal Link Dist (m)		73.1	3.0		50.6	
Turn Bay Length (m)						
Base Capacity (vph)		1449	2756		616	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.34	0.12		0.04	

Intersection Summary	
Cycle Length: 55	
Actuated Cycle Length: 55	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 5.7	Intersection LOS: A
Intersection Capacity Utilization 47.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Brookfield & 20 m W of Hobson



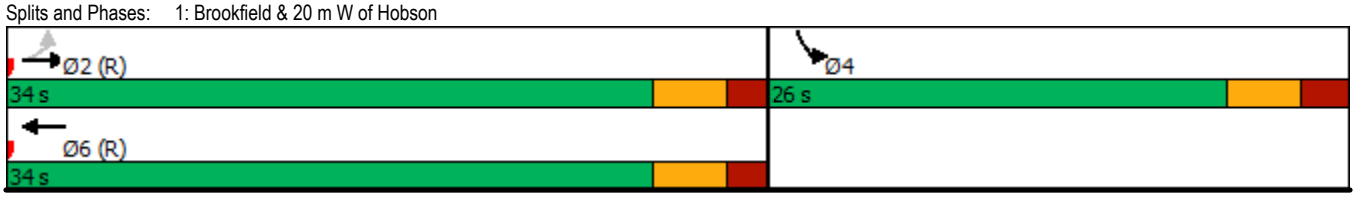


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	368	248	129	11	8
Future Volume (vph)	30	368	248	129	11	8
Satd. Flow (prot)	0	3377	3191	0	1624	0
Flt Permitted		0.916			0.972	
Satd. Flow (perm)	0	3105	3191	0	1620	0
Satd. Flow (RTOR)			129		8	
Lane Group Flow (vph)	0	398	377	0	19	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		2	6		4	
Permitted Phases	2					
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0		10.0	
Minimum Split (s)	26.2	26.2	26.2		25.5	
Total Split (s)	34.0	34.0	34.0		26.0	
Total Split (%)	56.7%	56.7%	56.7%		43.3%	
Yellow Time (s)	3.3	3.3	3.3		3.3	
All-Red Time (s)	1.9	1.9	1.9		2.2	
Lost Time Adjust (s)		-1.2	-1.2		-1.5	
Total Lost Time (s)		4.0	4.0		4.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Act Effct Green (s)		54.1	54.1		13.5	
Actuated g/C Ratio		0.90	0.90		0.22	
v/c Ratio		0.14	0.13		0.05	
Control Delay		2.6	2.1		12.7	
Queue Delay		0.0	0.0		0.0	
Total Delay		2.6	2.1		12.7	
LOS		A	A		B	
Approach Delay		2.6	2.1		12.7	
Approach LOS		A	A		B	
Queue Length 50th (m)		0.0	0.0		1.0	
Queue Length 95th (m)		m19.8	13.1		4.3	
Internal Link Dist (m)		65.5	4.1		50.6	
Turn Bay Length (m)						
Base Capacity (vph)		2800	2890		600	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.14	0.13		0.03	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.14	
Intersection Signal Delay: 2.6	Intersection LOS: A
Intersection Capacity Utilization 48.8%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 1: Brookfield & 20 m W of Hobson



Projected 2022 AM
4: Riverside & Hog's Back/Brookfield

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	138	153	63	124	116	279	1256	363	180	632	291
Future Volume (vph)	305	138	153	63	124	116	279	1256	363	180	632	291
Satd. Flow (prot)	1695	1628	0	1695	1644	0	1695	4706	0	1695	4583	0
Flt Permitted	0.271			0.582			0.950			0.950		
Satd. Flow (perm)	483	1628	0	1034	1644	0	1686	4706	0	1695	4583	0
Satd. Flow (RTOR)		55			39			69			94	
Lane Group Flow (vph)	305	291	0	63	240	0	279	1619	0	180	923	0
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.2	36.7		36.7	36.7		11.1	22.6		11.1	22.6	
Total Split (s)	15.0	52.0		37.0	37.0		32.0	48.0		20.0	36.0	
Total Split (%)	12.5%	43.3%		30.8%	30.8%		26.7%	40.0%		16.7%	30.0%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.9	3.4		3.4	3.4		2.4	1.9		2.4	1.9	
Lost Time Adjust (s)	-2.2	-2.7		-2.7	-2.7		-2.1	-1.6		-2.1	-1.6	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Act Effct Green (s)	38.3	38.3		23.3	23.3		37.7	44.0		25.7	32.0	
Actuated g/C Ratio	0.32	0.32		0.19	0.19		0.31	0.37		0.21	0.27	
v/c Ratio	1.15	0.52		0.32	0.69		0.52	0.92		0.50	0.71	
Control Delay	135.7	29.2		42.6	45.9		40.0	43.9		49.2	39.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	135.7	29.2		42.6	45.9		40.0	43.9		49.2	39.2	
LOS	F	C		D	D		D	D		D	D	
Approach Delay		83.7			45.2			43.3			40.9	
Approach LOS		F			D			D			D	
Queue Length 50th (m)	~57.6	45.3		12.8	44.8		53.6	127.4		37.4	65.3	
Queue Length 95th (m)	#112.0	63.4		22.0	65.4		90.5	#151.3		#76.4	80.9	
Internal Link Dist (m)		152.7			116.6			209.7			156.3	
Turn Bay Length (m)	18.0						140.0			135.0		
Base Capacity (vph)	265	684		284	480		532	1769		362	1291	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	1.15	0.43		0.22	0.50		0.52	0.92		0.50	0.71	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 91 (76%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.15	
Intersection Signal Delay: 48.9	Intersection LOS: D
Intersection Capacity Utilization 90.6%	ICU Level of Service E
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 4: Riverside & Hog's Back/Brookfield

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	4	387	406	14	136	77
Future Volume (vph)	4	387	406	14	136	77
Satd. Flow (prot)	0	3387	3370	0	1637	0
Flt Permitted		0.952			0.969	
Satd. Flow (perm)	0	3227	3370	0	1632	0
Satd. Flow (RTOR)			8		59	
Lane Group Flow (vph)	0	391	420	0	213	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		2	6		4	
Permitted Phases	2					
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0		10.0	
Minimum Split (s)	26.2	26.2	26.2		25.5	
Total Split (s)	29.0	29.0	29.0		26.0	
Total Split (%)	52.7%	52.7%	52.7%		47.3%	
Yellow Time (s)	3.3	3.3	3.3		3.3	
All-Red Time (s)	1.9	1.9	1.9		2.2	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.2	5.2		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Act Effct Green (s)		31.6	31.6		12.7	
Actuated g/C Ratio		0.57	0.57		0.23	
v/c Ratio		0.21	0.22		0.50	
Control Delay		6.9	6.8		16.6	
Queue Delay		0.0	0.0		0.0	
Total Delay		6.9	6.8		16.6	
LOS		A	A		B	
Approach Delay		6.9	6.8		16.6	
Approach LOS		A	A		B	
Queue Length 50th (m)		7.5	8.0		13.8	
Queue Length 95th (m)		19.7	20.6		23.3	
Internal Link Dist (m)		73.1	3.0		50.6	
Turn Bay Length (m)						
Base Capacity (vph)		1855	1940		647	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.21	0.22		0.33	

Intersection Summary	
Cycle Length: 55	
Actuated Cycle Length: 55	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 8.9	Intersection LOS: A
Intersection Capacity Utilization 39.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Brookfield & 20 m W of Hobson