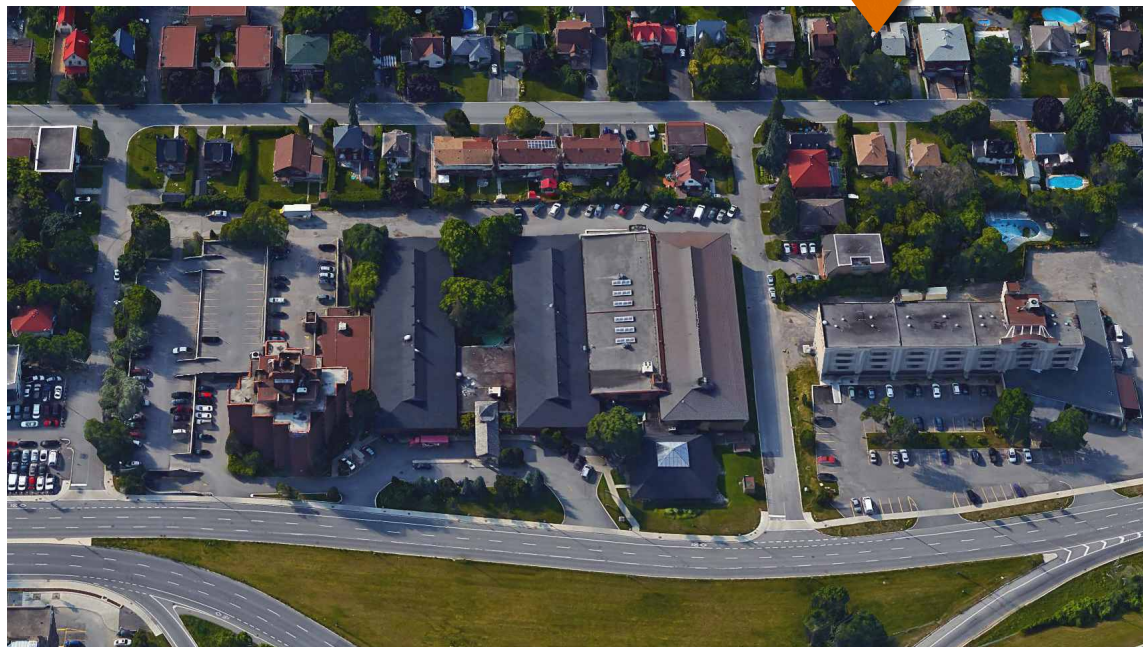


1354 Carling Avenue Community Transportation Study / Transportation Impact Study



1354 Carling Avenue

**Community Transportation Study/
Transportation Impact Study**

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Table of Contents

1.	INTRODUCTION	1
2.	EXISTING CONDITIONS	4
2.1.	AREA ROAD NETWORK	4
2.2.	PEDESTRIAN/CYCLING NETWORK.....	4
2.3.	TRANSIT NETWORK	5
2.4.	EXISTING STUDY AREA INTERSECTIONS	5
2.5.	EXISTING INTERSECTION OPERATIONS.....	7
2.6.	EXISTING ROAD SAFETY CONDITIONS	8
2.7.	SCREENLINE OPERATIONS.....	9
3.	DEMAND FORECASTING.....	10
3.1.	PLANNED STUDY AREA TRANSPORTATION NETWORK CHANGES	10
3.2.	OTHER AREA DEVELOPMENT	13
3.3.	BACKGROUND TRAFFIC GROWTH.....	15
3.4.	BACKGROUND TRAFFIC INTERSECTION PERFORMANCE.....	15
3.5.	SITE TRIP GENERATION	16
3.6.	VEHICLE TRAFFIC DISTRIBUTION AND ASSIGNMENT	18
4.	FUTURE TRAFFIC OPERATIONS	20
4.1.	PROJECTED 2019 CONDITIONS AT PHASE 1 SITE DEVELOPMENT	20
4.2.	PROJECTED 2024 CONDITIONS AT FULL SITE BUILD-OUT	21
4.2.1.	Carling Avenue Transit Priority Condition	23
4.3.	NEIGHBOURHOOD IMPACTS	25
5.	TRANSPORTATION DEMAND MANAGEMENT	25
6.	SITE PLAN REVIEW	25
7.	FINDINGS AND RECOMMENDATIONS	27

List of Appendices

- Appendix A: Existing Intersection Count Data
- Appendix B: SYNCHRO Capacity Analysis – Existing Conditions
- Appendix C: Collision Data and Analysis
- Appendix D: Screenline Classification and Occupancy Counts
- Appendix E: Traffic Growth Analysis
- Appendix F: Total Background 2024 Traffic Volumes and SYNCHRO Output
- Appendix G: Phase 1 and 2 Detailed Trip Generation
- Appendix H: SYNCHRO Capacity Analysis – Projected 2019
- Appendix I: SYNCHRO Capacity Analysis – Modified Projected 2019
- Appendix J: SYNCHRO Capacity Analysis – Projected 2024
- Appendix K: SYNCHRO Capacity Analysis – Modified Projected 2024

List of Figures

Figure 1: Local Context	1
Figure 2: Proposed Phase 1 Site Plan.....	2
Figure 3: Proposed Ultimate Site Plan	3
Figure 4: Area Transit Network.....	5
Figure 5: Existing Peak Hour Traffic Volumes.....	7
Figure 6: TMP Rapid Transit and Transit Priority – 2031 Affordable Network	10
Figure 7: HWY 417 Eastbound On-Ramps.....	11
Figure 8: Proposed Modifications at the Carling/Kirkwood and Carling/Saigon Intersections.....	12
Figure 9: Projected 2019 Area Development Traffic	14
Figure 10: Projected 2024 Area Development Traffic	14
Figure 11: Phase 1 ‘New’ and ‘Pass-by’ Site-Generated Traffic Volumes	19
Figure 12: Phase 1 and 2 ‘New’ and ‘Pass-by’ Site-Generated Traffic Volumes.....	19
Figure 13: Total Projected 2019 Peak Hour Traffic Volumes.....	20
Figure 14: Total Projected 2024 Peak Hour Traffic Volumes.....	22
Figure 15: Proposed Carling Avenue Transit Priority Plan	24

List of Tables

Table 1: Existing Performance at Study Area Intersections.....	8
Table 2: Existing Screenline Station Performance	9
Table 3: Merivale/Carling Historical Background Growth.....	15
Table 4: Projected Background 2024 Performance at Study Area Intersections	15
Table 5: ITE Trip Generation Rates.....	16
Table 6: Phase 1 Modified Person Trip Generation	17
Table 7: Phase 1 Condominium Modal Site Trip Generation	17
Table 8: Phase 1 Specialty Retail Modal Site Trip Generation	17
Table 9: Phase 1 Total Site Vehicle Trip Generation.....	18
Table 10: Phase 1 and 2 Total Site Vehicle Trip Generation.....	18
Table 11: Projected 2019 Performance of Study Area Intersections	21
Table 12: Projected 2024 Performance of Study Area Intersections	22
Table 13: Projected 2024 Performance of Study Area Intersections – Modified Signal Timing.....	23
Table 14: Projected 2024 Performance of Study Area Intersections – Reduced Carling Avenue Cross-Section	24

Community Transportation Study/Transportation Impact Study

1. INTRODUCTION

Holloway Lodging is proposing a new residential development consisting of four buildings on the properties municipally known as 1376 and 1354 Carling Avenue. Two buildings (Buildings A and B) front Carling Avenue and are both proposed with 20 storeys and two 9 storey buildings (Buildings C and D) are proposed further south on the site. The total number of residential units is 914 within the four buildings. Approximately 2,440 m² (26,200 ft²) of commercial is proposed fronting Carling Avenue as part of Buildings A and B.

The site is currently occupied by a hotel (Travelodge) and parking structure with multiple (3) driveway connections to Carling Avenue and to a private road at the south end of the site. Access to the future development is proposed via one right-in/right-out driveway to Carling Avenue, four full-movement driveways to Meath Street and four full-movement driveways to Archibald Street (underground and surface parking lot accesses). Within the vicinity of HWY 417, the east and westbound sections of Carling Avenue are divided. As such, all access to/from Carling Avenue at this location will operate as right-in/right-out in the eastbound direction. The local context of the site is provided as Figure 1 and the proposed Phase 1 Site Plan and Ultimate Site Plan are provided as Figures 2 and 3, respectively.

Figure 1: Local Context



The site is planned to be developed in two phases. The first phase will consist of Building 'B' and Building 'D' (identified on the Site Plan) and the existing hotel will remain. The Ultimate Phase will include all four buildings and the removal of the existing hotel. For the purpose of this assessment, horizon years will be analyzed for the year 2019 representing full occupancy of Phase 1, and at the year 2024, representing ultimate build out. The study area will consist of the signalized and unsignalized intersections of Carling EB/Kirkwood South, Carling WB/Kirkwood North, Carling/Westgate Shopping Centre, Carling/Merivale, and the unsignalized Merivale/Thames.

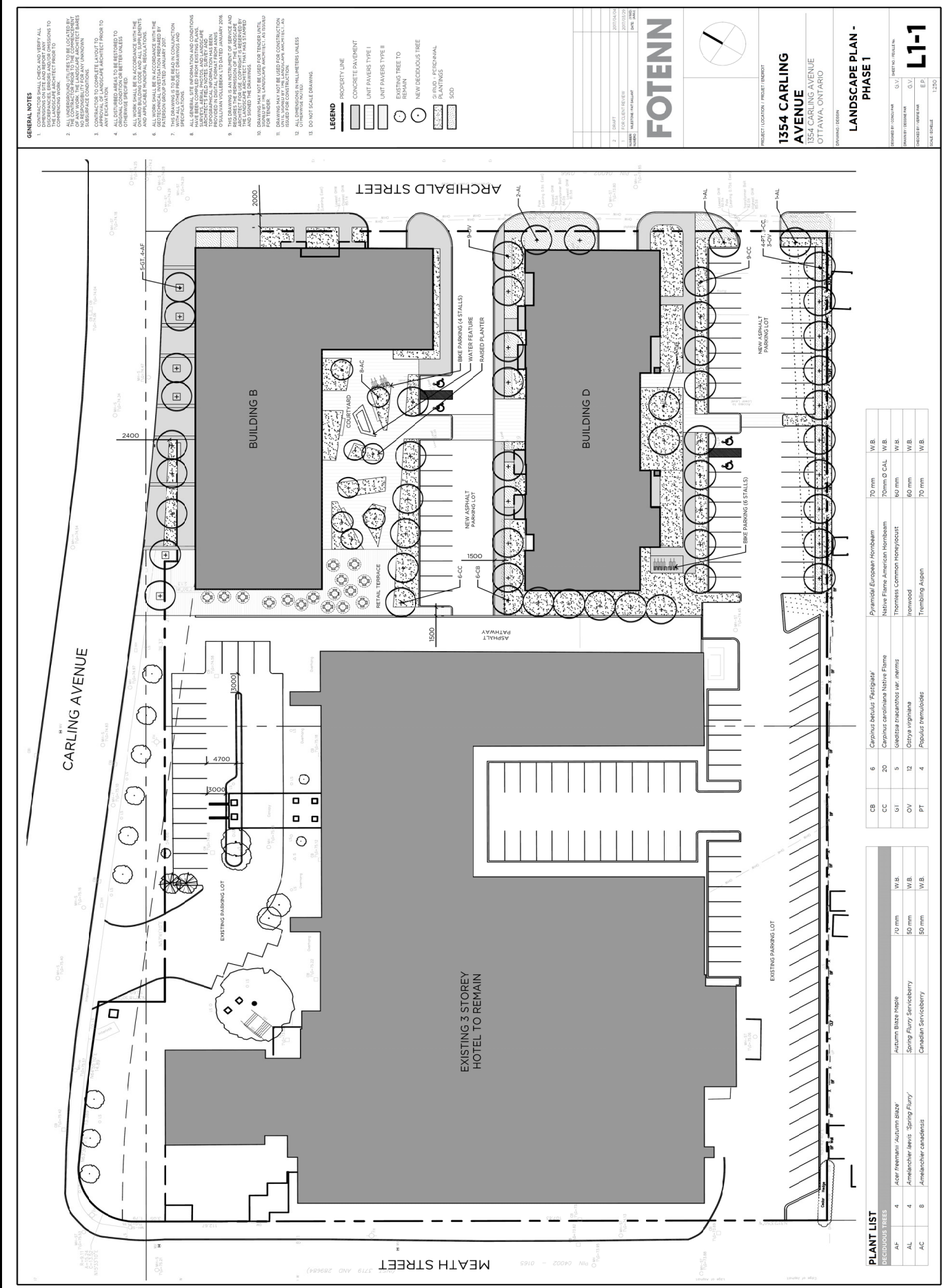


Figure 2: Proposed Phase 1 Site Plan

1354 Carling Avenue



SITE STATISTICS	
Lot	4.18 Bld m2
Site Area:	
Building A	20 storeys
Building Height	33 569 m2
Building Area (above grade)	1580 m2
Ground Floor Commercial	410
Total Residential Units	205
Residential Parking Required (50%)	83
Visitor Parking Required	38
Parking at Grade	
Building B	
Building Height	20 Storeys
Building Area (above grade)	19125 m2
Ground Floor Commercial	877 m2
Total Residential Units	218
Residential Parking Required (50%)	109
Visitor Parking Required	21
Parking at Grade	27
Building C	
Building Height	9 Storeys
Building Area (above grade)	3718 m2
Ground Floor Commercial	124
Total Residential Units	62
Residential Parking Required (50%)	12
Visitor Parking Required	38
Parking at Grade	
Building D	
Building Height	9 Storeys
Building Area (above grade)	13 839 m2
Ground Floor Commercial	162
Total Residential Units	81
Residential Parking Required (50%)	12
Visitor Parking Required	45
Parking at Grade	

2			
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PRELIMINARY



1354 Carling Avenue
Design Concept
Site Plan Proposal

As part of the rezoning and Site Plan Application processes, the City of Ottawa requires a submission of a formal Transportation Impact Assessment (TIA) consistent with their guidelines dated October 2006. With respect to these guidelines and for a rezoning/Site Plan application, a Community Transportation Study (CTS)/Transportation Impact Study (TIS) is considered the appropriate type of study. As such, a combined CTS/TIS is provided in support of the proposed development.

2. EXISTING CONDITIONS

2.1. AREA ROAD NETWORK

Carling Avenue is an east-west arterial roadway with a six-lane cross-section and a 44.5 m right-of-way (ROW) within the study area. It extends from March Road in the west and Bronson Avenue in the east. Within the study area, the unposted speed limit is understood to be 50 km/h.

Merivale Road is a north-south arterial roadway with a two-lane cross-section and a 30 m ROW within the study area. It extends from Island Park Drive in the north and Prince of Wales Drive in the south. Within the study area, the posted speed limit is 50 km/h.

Kirkwood Avenue is a north-south arterial roadway with a four-lane cross-section within the study area. It extends from Wilber Avenue in the north and Merivale Road in the south. Within the study area, the posted speed limit is 50 km/h.

Meath Street and Archibald Street are north-south local roadways with two-lane cross-sections and on-street parking permitted along the west side of the streets. Both roadways form 'T'-intersections with Carling Avenue, permitting northbound right and eastbound right turning movements only. A private roadway connects these roads directly south of the subject site. South of this private roadway, both Meath Street and Archibald Street operate as one-way roadways in the northbound direction. It is assumed that this restriction was put in place to prevent 'cut-through' traffic from Carling Avenue to Merivale Road, via Thames Street. The unposted speed limit along these roadways is understood to be 50 km/h.

Thames Street is an east-west local roadway with a two-lane cross-section and on-street parking permitted along the south side of the roadway. Thames Street forms a 'T'-intersection with Merivale Road and is cul-de-sac at the west end. The unposted speed limit is understood to be 50 km/h.

Highway 417 is an east-west Provincial Freeway with a six-lane cross-section within the study area. This highway is part of the Trans-Canada Highway and extends beyond the borders of Ottawa in both the west and east ends. The posted speed limit is 100 km/h. Access/egress to/from HWY 417 is provided via multiple on/off ramps on Carling Avenue within the vicinity of the Carling/Kirkwood intersections.

2.2. PEDESTRIAN/CYCLING NETWORK

Sidewalk facilities in the vicinity of the site are provided along both sides of Carling Avenue, Kirkwood Avenue, and Merivale Road. No sidewalks are provided along the local roadways Archibald Street, Meath Street and Thames Street. Dedicated bicycle facilities are currently provided in the form of bike lanes in both directions along Carling Avenue (west of Merivale Road) and along Merivale Road (north of Carling Avenue). Kirkwood Avenue is identified as a 'suggested route'.

According to the City's Cycling Plan, Merivale Road and Carling Avenue are classified as "Spine Routes" and Kirkwood Avenue is classified as a "Local Route".

2.3. TRANSIT NETWORK

Transit service within the vicinity of the site is currently provided by OC Transpo Routes #85, 101, 103, and 151. Regular/Local Routes #85, 101, 151 provide frequent all-day service and Peak Hour Route #103 provides service during the weekday peak hours only. Bus stops for all routes are located along Carling Avenue within 150 m walking distance from the proposed development.

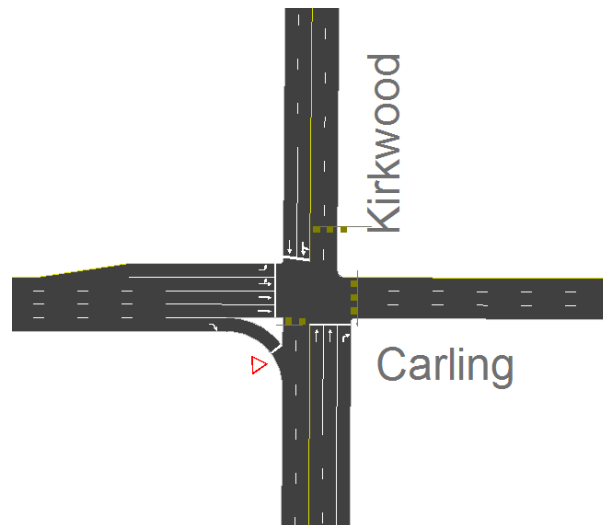
Figure 4: Area Transit Network



2.4. EXISTING STUDY AREA INTERSECTIONS

Carling EB/Kirkwood South

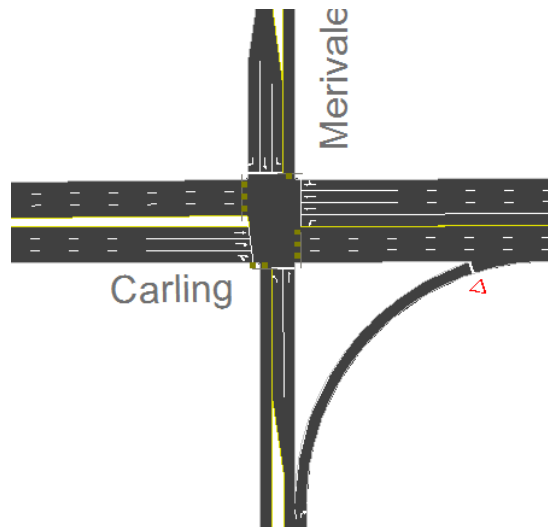
The Carling EB/Kirkwood S intersection is a signalized four-legged intersection. The eastbound approach consists of a single channelized right-turn lane, two through lanes, a shared through/left-turn lane and a left-turn lane. The southbound approach consists of a shared through/left-turn lane and a single through lane. The northbound approach consists of two through lanes and a single right-turn lane. At this location, the only restricted movement is the 'no right-turn on red' in the northbound direction. Also, Carling Avenue operates in the eastbound direction only at this location.



PARSONS

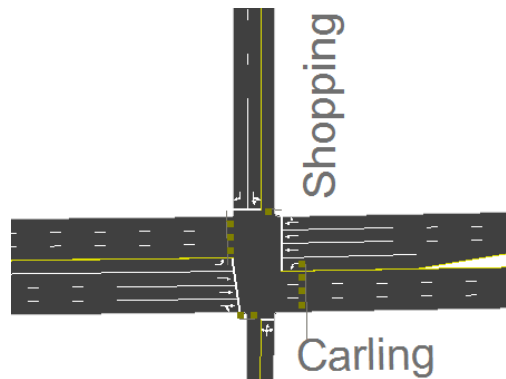
Merivale/Carling

The Merivale/Carling intersection is a signalized four-legged intersection. The westbound approach consists of a single left-turn lane, two through lanes and a shared through/right-turn lane. The eastbound approach consists of a two through lanes and a shared through/right-turn lane. The southbound approach consists of a single left-turn lane, a single through lane and a single right-turn lane. The northbound approach consists of a single left-turn lane, a single through lane and a single channelized right-turn lane. At this location, the eastbound left-turn movement is prohibited and all other movements are permitted.



Carling/Westgate Shopping Centre

The Carling/Westgate Shopping Centre intersection is a signalized four-legged intersection. The east and westbound approaches both consist of a single left-turn lane, two through lanes and a shared through/right-turn lane. The southbound approach consists of a shared through/left-turn lane and a single right-turn lane. The northbound approach consists of a single all-movement lane. At this location, there are no restricted or banned movements.



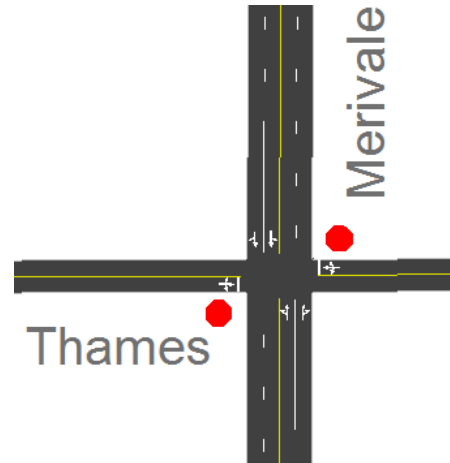
Carling WB/Kirkwood North

The Carling WB/Kirkwood N intersection is a signalized four-legged intersection. The westbound approach consists of a shared through/right-turn lane, a through lane, a shared through/left-turn lane and a left-turn lane. The southbound approach consists of a single right-turn lane and two through lanes. The northbound approach consists of a single through lane and a single left-turn lane. At this location, there are no restricted or banned movements; however, Carling Avenue operates in the westbound direction only.



Merivale/Thames

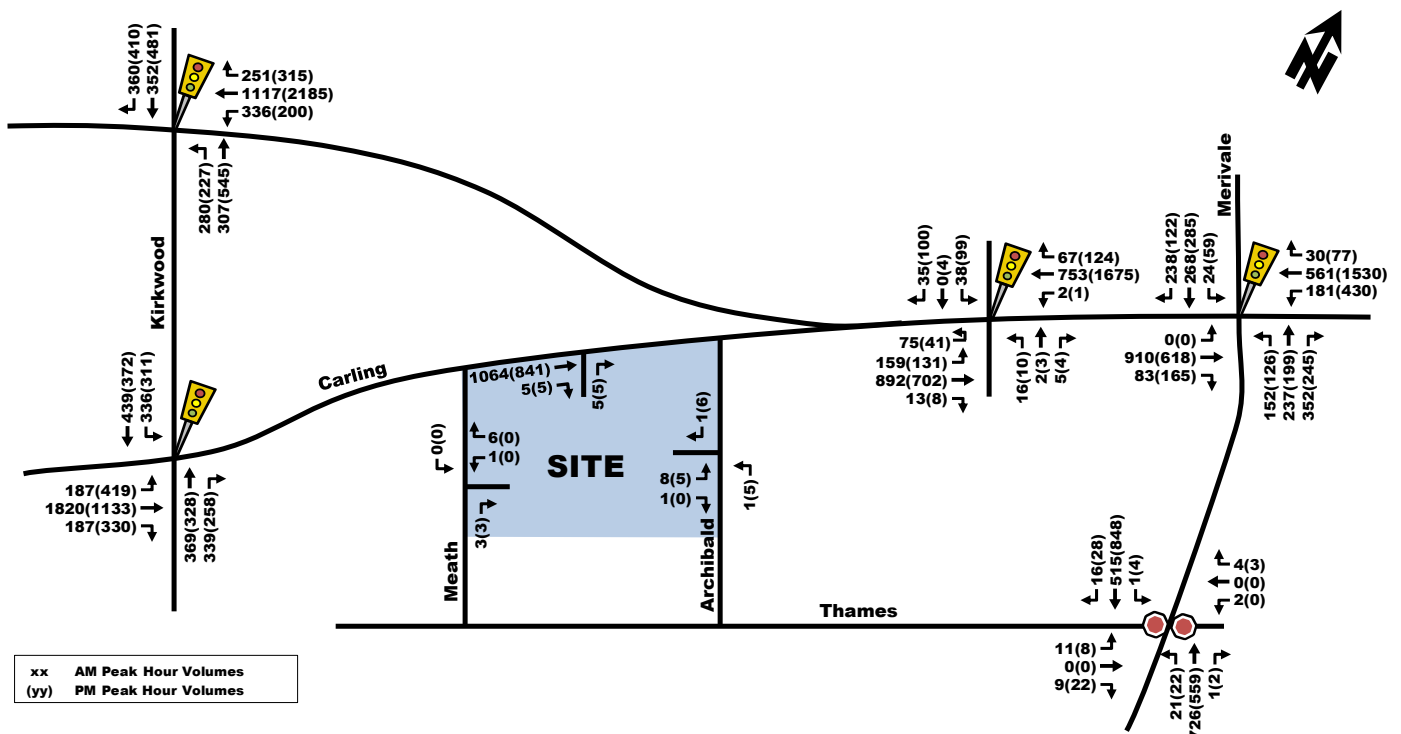
The Merivale/Thames intersection is an unsignalized four-legged intersection with STOP control on the minor approaches only. The north and southbound approaches consist of two through lanes, with turning movement permitted from the through lanes. The eastbound approach (Thames Street) consists of a single full-movement lane. The westbound approach is a short residential loop off Merivale Road that consists of a single full movement lane.



2.5. EXISTING INTERSECTION OPERATIONS

Illustrated as Figure 5, are the most recent weekday morning and afternoon peak hour traffic volumes obtained from the City of Ottawa for the signalized Carling/Kirkwood N, Carling/Kirkwood S, Carling/Shopping Centre, and Carling/Merivale intersections. The unsignalized Merivale/Thames intersection and the Travelodge driveway were counted by Parsons in March 2017. It is noteworthy that the existing access to the parking structure from Carling Avenue was under construction at the time and as such the traffic volumes from the private driveway were counted (off of Archibald and Meath). In addition, the Merivale/Carling intersection count data dated August 2016 is noted as being lower than the October 2015 count, and as such, the higher 2015 count was used as a conservative method. Peak hour traffic volumes are included as Appendix A.

Figure 5: Existing Peak Hour Traffic Volumes



The following Table 1 provides a summary of existing traffic operations at study area intersections based on the SYNCHRO (V9) traffic analysis software. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The subject intersections 'as a whole' were assessed based on a weighted v/c ratio. The unsignalized intersection was assessed in terms of delay and the corresponding Level of Service. The SYNCHRO model output of existing conditions is provided within Appendix B.

Table 1: Existing Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Kirkwood S/Carling EB	E(D)	0.91(0.88)	EBT(NBR)	35.4(26.0)	E(B)	0.91(0.68)
Merivale/Carling	B(F)	0.70(1.01)	NBL(WBL)	25.4(32.0)	A(C)	0.59(0.71)
Kirkwood N/Carling WB	D(F)	0.85(1.13)	SBR(WBT)	28.5(74.6)	C(F)	0.72(1.12)
Carling/Westgate SC	A(B)	0.54(0.67)	EBT(EBL)	4.4(9.9)	A(B)	0.50(0.63)
Merivale/Thames	C(C)	18.5(18.9)	EBL(EBL)	0.6(0.6)	-	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 1, the Merivale/Carling and Carling/Westgate Shopping Centre are currently operating overall at an acceptable LoS 'C' or better during morning and afternoon commuter peak hours. During the morning peak hour, the Kirkwood South/Carling EB intersection 'as a whole' is operating at capacity (LoS 'E') and during the afternoon peak hour, the Kirkwood North/Carling WB intersection 'as a whole' is operating above capacity (LoS 'F').

With regard to 'critical movements' at study area intersections, the eastbound through movement at the Kirkwood South/Carling EB intersection is currently operating at capacity (LoS 'E') during the morning peak hour. During the afternoon peak hour, the westbound through and westbound left-turn movements at the Kirkwood N/Carling WB and Merivale/Carling intersections are currently failing (LoS 'F'). All other 'critical movements' at study area intersections are currently operating at an acceptable LoS 'D' or better during peak hours with respect to the City's operating standard of LoS 'D' or better (v/c ≤ 0.90).

With regard to the unsignalized Merivale/Thames intersection, the SYNCHRO analysis indicates delays for side street traffic in the range of 16 to 18 seconds during morning and afternoon peak hours.

As mentioned previously, Archibald Street and Meath Street operate as one-way roadways in the northbound direction south of the site. Field observations noted one to two vehicles travelling southbound to Thames Street along both Archibald Street and Meath Street.

2.6. EXISTING ROAD SAFETY CONDITIONS

Collision history for study area roads (2013 to 2015, inclusive) was obtained from the City of Ottawa and most collisions (83%) involved only property damage, indicating low impact speeds, and 16% involved personal injuries. The remaining 1% were identified as "non-reportable", indicating the total damage to a vehicle was less than \$1,000.

The primary causes of collisions cited by police include; rear end (29%), turning movement (29%), sideswipe (25%), and angle (11%) type collisions.

A standard unit of measure for assessing collisions at an intersection is based on the number collisions per million entering vehicles (MEV). At intersections within the study area, reported collisions have historically taken place at a rate of:

- 1.35/MEV at the Carling/Kirkwood N intersection;

- 1.30/MEV at the Carling/Kirkwood S intersection;
- 0.35/MEV at the Carling/Westgate Shopping Centre intersection; and
- 0.97/MEV at the Carling/Merivale intersection.

The Carling/Kirkwood N intersection has experienced high numbers of collisions in the past years. Changes are proposed at the Carling/Kirkwood N intersection with the removal of the HWY 417 eastbound on-ramp (outlined in Section 3.1). These modifications will help reduce the amount of traffic from the highway attempting to merge over multiple lanes to turn left onto Kirkwood Avenue.

At the Merivale/Thames intersection, 2 collisions were reported in a 3-year period and there were no reported collisions at the Carling/Meath and Carling/Archibald intersection between 2013 to 2015. It is noteworthy that in 2012 there was a fatal accident involving a cyclist and a passenger vehicle at the Carling/Archibald intersection. In addition, between 2011 and 2013 there were 5 reported collisions involving cyclists within the study area along Carling Avenue. As part of the City's Transit Priority project along Carling Avenue, on-street cycling lanes (and cycle tracks approaching Carling/Kirkwood North) are proposed along the curb lane between the sidewalk and the Transit Lane within the study area (west of Merivale Road).

With regard to the Carling/Westgate Shopping Centre intersection, there is a notable volume of westbound U-turning vehicles. Within the 3-years of provided collision data, there are no collisions involving U-turn movements, however, there are 5 collisions involving vehicles turning eastbound left (which could indicate they were making a U-turn). One possible mitigative measure to reduce chances of collisions involving U-turns is to not allow southbound right-turns-on-red for the Westgate Shopping Centre. The source collision data as provided by the City of Ottawa and related analysis is provided as Appendix C.

2.7. SCREENLINE OPERATIONS

The relevant screenlines within the vicinity of the proposed development are:

- SL 28 CPR Line
 - Highway 417 station
- SL 27 CPR Line South
 - Carling Station

The City of Ottawa provided the most recent 2014 and 2016 Screenline count data, which is included as Appendix D. The existing performance of the relevant study area Screenline stations is summarized below in Table 2.

Table 2: Existing Screenline Station Performance

Screenline Station	Peak Directional Demand ¹ (PCU) ²		Directional Capacity ³ (PCU)	v/c	
	AM Peak Inbound	PM Peak Outbound		AM Peak	PM Peak
CPR Line South (SL#29) Carling Station	1,109	1,736	1,800	0.62 (LoS 'B')	0.96 (LoS 'E')
CPR Line (SL #28) Highway 417 Station	5,657	6,308	5,400	1.05 (LoS 'F')	1.17 (LoS 'F')
1. 2014 volumes obtained from the City of Ottawa 2. PCU (Passenger Car Units) were assumed to be the sum of autos and 2x heavy vehicles 3. Directional capacities were obtained from IBI's Road Network Development Report and the 2008 Road Infrastructure Needs Study					

As shown in Table 2, both Screenline stations at Carling and HWY417 are operating at or above capacity (LoS 'E' or 'F') in the afternoon peak hour in the outbound direction (westbound). During the morning peak hour, SL #28 HWY 417 Station is operating above capacity (v/c > 1.0) and the Carling Station is operating at an acceptable LoS 'B'.

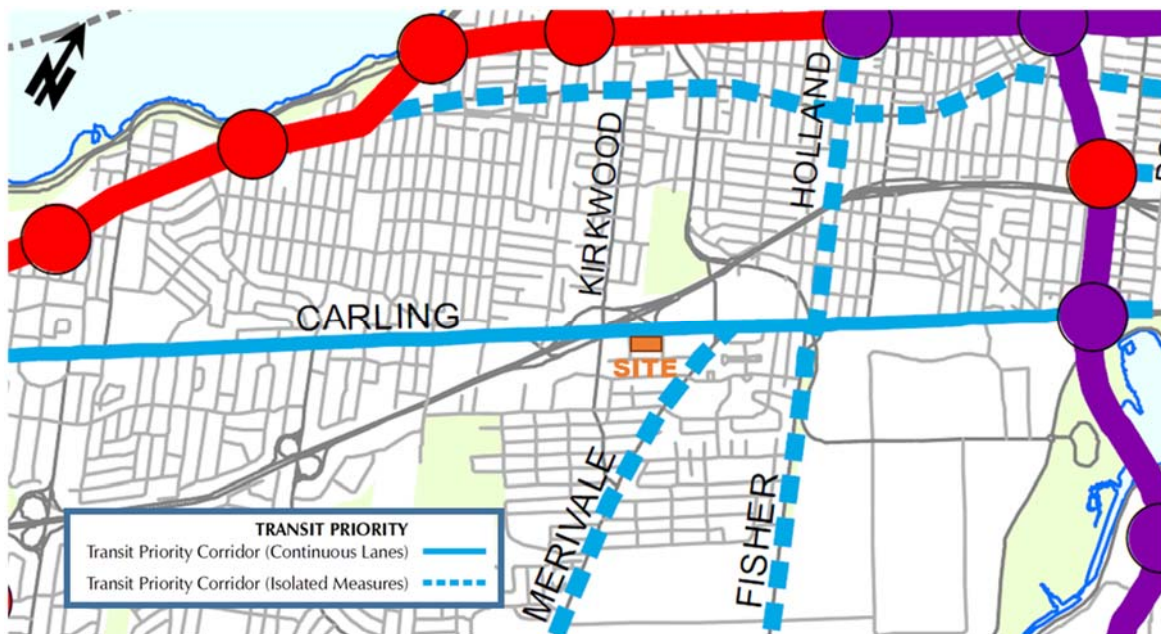
It is noteworthy that for SL #28, the assumed capacity of the station located at the HWY 417, between the Rochester and Parkdale interchanges, is considered low for a four-lane freeway facility. Given existing volumes exceed the assumed capacity, and given the assumed capacity is considered low, the performance of SL #28 is likely better than a v/c of 1.05 to 1.17. However, based on observations, it is reasonable to assume that SL #28 is operating close to or at capacity (v/c = 0.9 to 1.0). It should be noted that the implementation of the east-west Light Rail Transit (LRT) will provide additional person capacity and mitigate the existing capacity constraints across this screenline. In addition, the planned transit priority along Carling Avenue will increase person capacity along this corridor, although it will also reduce the automobile capacity (lane reductions).

3. DEMAND FORECASTING

3.1. PLANNED STUDY AREA TRANSPORTATION NETWORK CHANGES

Within the City's 2013 TMP and identified on the 2031 Affordable Network Plan, there are no plans to increase the existing auto capacity within the vicinity of the site on City roadways. HWY 417 between Maitland Avenue and Carling Avenue is planned to be widened from 6 lanes to 8 lanes, starting Summer 2017. In terms of planned network improvements for transit, Carling Avenue is identified as a future Transit Priority corridor and Merivale Road is identified to receive isolated Transit Priority measures as shown in Figure 6.

Figure 6: TMP Rapid Transit and Transit Priority – 2031 Affordable Network



Identified on the 2031 Network Concept Plan (planned network changes beyond the 2031 planning horizon year), further improvements to transit within the study area are planned. Carling Avenue is identified as a future Light Rail Transit (LRT) corridor with a station planned at the Merivale Road, and Merivale Road is identified as a future BRT corridor.

The MTO has indicated that as part of the planned widening of the highway from 6 lanes to 8 lanes between Maitland Avenue and Carling Avenue, the existing westbound Carling Avenue onramp to eastbound Highway 417 is planned to be closed. MTO has indicated that this is a relatively low-use ramp serving approximately 3,900 vehicles per day. The alternative route for these vehicles is to continue along Carling Avenue westbound, turn left at Kirkwood Avenue, and left onto Carling Avenue eastbound to the HWY 417 ramp. This route is shown in the following figure in green and the planned closed ramp is shown in red.

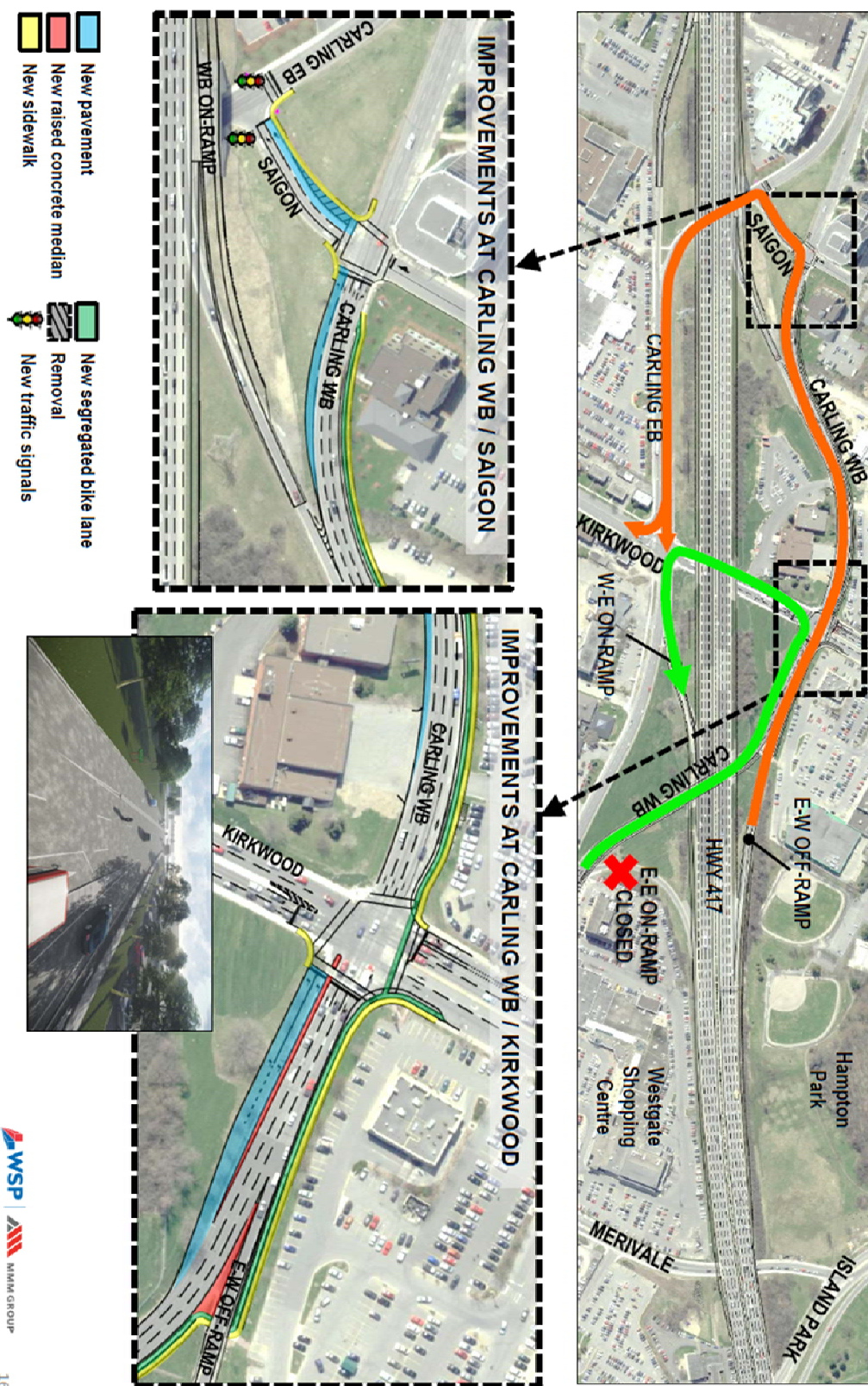
Figure 7: HWY 417 Eastbound On-Ramps



Given the projected increase in vehicle traffic at the Carling WB/Kirkwood N intersection, MTO along with the City of Ottawa, is proposing modifications to the Carling WB/Kirkwood N intersection to improve vehicle operations. There is an existing concern regarding vehicles exiting HWY 417 eastbound and ‘weaving’ across multiple lanes of traffic on Carling Avenue to turn left (heading southbound) on Kirkwood Avenue. To reduce the amount of ‘weaving’ vehicles, a concrete median is proposed separating the left-turn lanes from the through vehicles. This would prevent vehicles from HWY 417 turning left onto Kirkwood. Vehicles will instead turn left at the adjacent Carling/Saigon intersection.

Additional vehicle capacity in the form of a new westbound left-turn lane (double left-turn lanes) is proposed at the Carling WB/Kirkwood N intersection and additional left-turn lanes are proposed at both the Carling WB/Saigon and Carling EB/Saigon intersections. The Carling EB/Saigon intersection will also be signalized in the future. These proposed modifications are outlined in the following figure which is an excerpt of the MTO’s presentation to the City of Ottawa Transportation Committee.

Figure 8: Proposed Modifications at the Carling/Kirkwood and Carling/Saigon Intersections¹



1 Ministry of Transportation, WSP, MMM Group. (March 1, 2017). Proposed Highway 417 Carling Avenue E-E Ramp Closure [PDF]. Retrieved from <http://app05.ottawa.ca/sirepub/cache/2/2i0wuzwgfm1oodkghmkrmvz/43158603162017022838529.PDF>

3.2. OTHER AREA DEVELOPMENT

With respect to other area development, the following development applications have been submitted to the City of Ottawa in the vicinity of the proposed site:

Westgate Shopping Centre - 1309 Carling

The Westgate Shopping Centre is located approximately 200 m northeast of the subject development and is planned to be redeveloped in four phases, with Phase 1 occupancy planned for 2017 and Phase 2 and 3 occupancy planned for 2022. Phase 1 of the Site Plan consists of 187 residential units and approximately 24,500 ft² of commercial and Phases 2 and 3 consist of an additional 1,183 residential units and 96,250 ft² of commercial. The Community Transportation Study (prepared by Parsons) projected an increase in two-way vehicle traffic of 95 to 120 veh/h during the weekday commuter peak hours for Phase 1 of the development and a 'net' increase in two-way vehicle traffic of 308 to 348 veh/h for Phase 2 and 3 (taking into account the partial removal of existing mall-generated traffic).

The projected traffic distribution from Phase 1 of the development is included herein in the 2019 Horizon year, and the additional traffic generated by Phases 2 and 3 is included herein as part of the 2024 Horizon year as background traffic.

1335 Carling

1335 Carling Avenue, which is located approximately 75 m northeast of the subject development, is planned to be redeveloped on approximately the same timeline as the planned redevelopment of the Westgate Shopping Centre. The current proposal is to redevelop 1335 Carling Avenue to consist of an 11-storey office/commercial tower, totaling approximately 180,000 ft². The current site consists of a 6-storey building, totaling approximately 72,000 ft² of office/commercial. The Westgate Shopping Centre Redevelopment CTS outlines projected increases in traffic volumes for this development to be in the range of 100 veh/h and 80 veh/h during the weekday morning and afternoon peak hours, respectively.

The projected traffic distribution from this planned development is included herein in the 2019 Horizon year background traffic.

1400 Carling Avenue

The above-noted address is located directly adjacent to the west of the subject development. A request has been submitted to increase the existing retirement home from 10 storeys to 13 storeys. No Traffic Impact Study was prepared for this application.

900 Merivale Road

An expansion of the existing Community Health Centre is planned at the above-noted location, which is located approximately 250 m southeast of the subject development. The Transportation Overview (prepared by Parsons) projects an increase in two-way vehicle traffic of 40 to 50 veh/h during the weekday commuter peak hours.

999 Merivale Road

A residential building consisting of 14 condominium units is planned at the above-noted address, which is located approximately 500 m southeast of the subject development. The Transportation Overview (prepared by Novatech) projects an increase in two-way vehicle traffic of approximately 10 veh/h during the weekday commuter peak hours.

The projected traffic generated by the Westgate Shopping Centre redevelopment and by the 1335 Carling development was added as background traffic to the study area intersections. These combined traffic volumes are illustrated as Figure 9 for the Horizon year 2019 and Figure 10 for the Horizon year 2024.

Figure 9: Projected 2019 Area Development Traffic

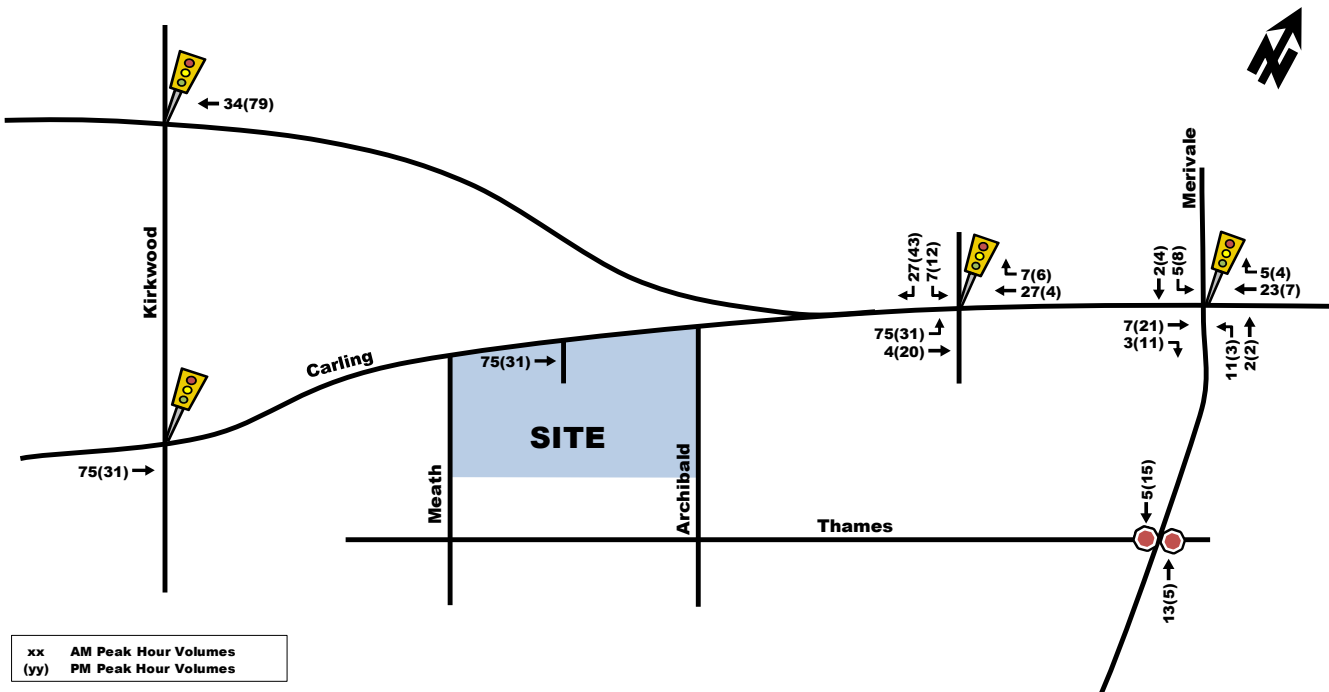
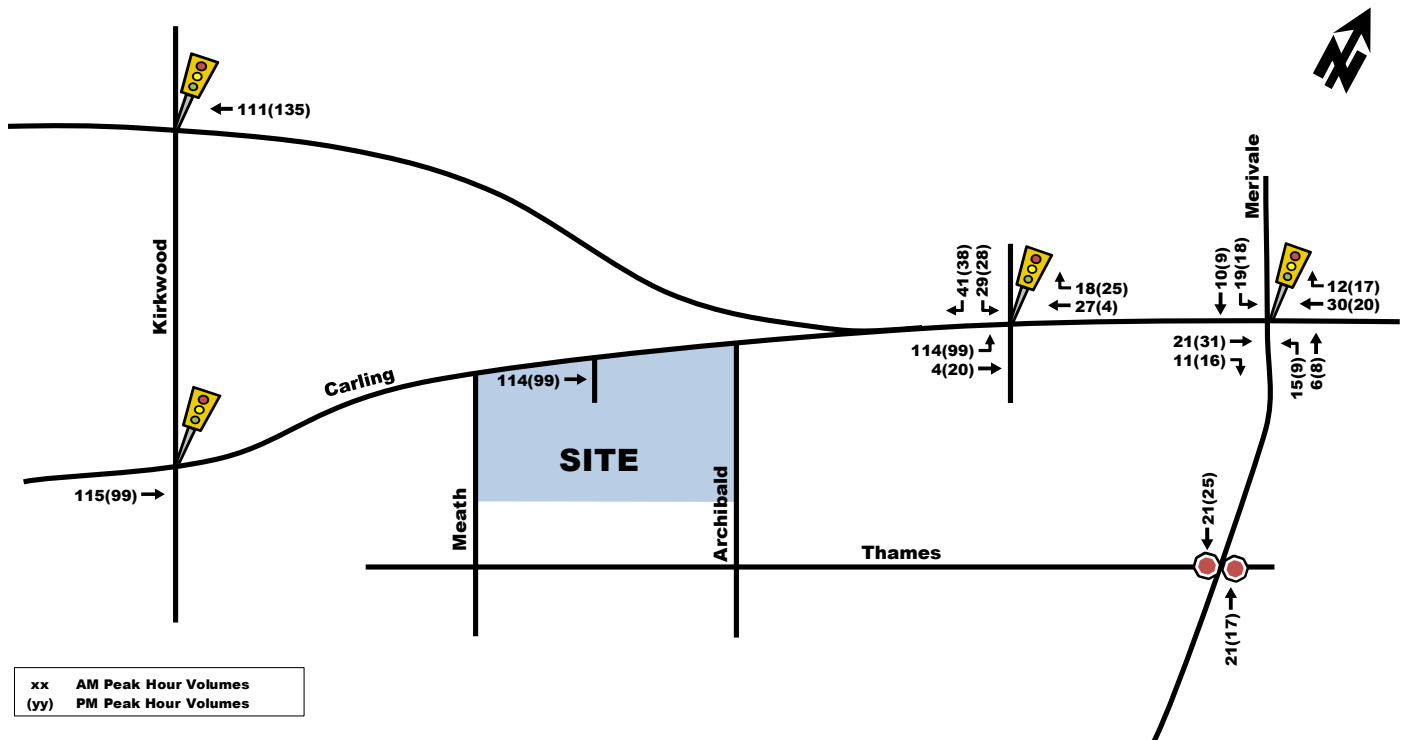


Figure 10: Projected 2024 Area Development Traffic



3.3. BACKGROUND TRAFFIC GROWTH

The following background traffic growth through the immediate study area (summarized in Table 3) was calculated based on historical traffic count data (years 2003, 2010, 2014, 2015, and 2016) provided by the City of Ottawa at the Merivale/Carling intersection. Detailed analysis is included as Appendix E.

Table 3: Merivale/Carling Historical Background Growth

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	-0.70%	-0.41%	0.48%	-0.34%	-0.12%
AM Peak	-1.58%	-0.97%	-0.88%	-1.02%	-1.04%
PM Peak	-1.69%	-0.84%	0.64%	-0.27%	-0.18%

As show in Table 3, the Merivale/Carling intersection has experienced no overall growth (calculated as a weighted average) in recent years. Therefore, no additional background traffic growth was assumed for the subsequent analysis of future traffic operations.

3.4. BACKGROUND TRAFFIC INTERSECTION PERFORMANCE

Prior to any development of the proposed site, the following Table 4 provides a summary of background 2024 traffic operations at study area intersections based on the SYNCHRO (V9) traffic analysis software. The area development traffic volumes, outlined in Figure 10, were added onto existing traffic volumes to calculate baseline background traffic volumes (illustrated as Appendix F). The SYNCHRO model assumes existing intersection geometry and signal timing except at the Kirkwood N/Carling intersection where modifications are planned. The following analysis assumes a double westbound left-turn lane at the Kirkwood N/Carling intersection associated with the closure of the HWY 417 eastbound on-ramp. The detailed SYNCHRO model output of projected background conditions is provided within Appendix F.

Table 4: Projected Background 2024 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	'Critical Movement'			Intersection 'as a Whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Kirkwood S/Carling EB	E(D)	0.96(0.88)	EBT(NBR)	38.9(26.6)	E(B)	0.95(0.65)
Merivale/Carling	C(F)	0.76(1.06)	NBL(WBL)	28.8(34.5)	B(C)	0.62(0.74)
Kirkwood N/Carling WB	D(F)	0.86(1.11)	SBR(WBT)	28.0(65.6)	C(F)	0.72(1.10)
Carling/Westgate SC	D(D)	0.90(0.82)	EBT(EBT)	11.7(14.8)	D(C)	0.85(0.79)
Merivale/Thames	C(C)	19.2(19.6)	EBT(EBT)	0.6(0.6)	-	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 4, the signalized study area intersections 'as a whole' are projected to continue to operate at an acceptable LoS 'D' or better, with the exception of the Kirkwood S/Carling EB intersection during the morning peak hour and the adjacent Kirkwood N/Carling WB intersection during the afternoon peak hour, which are projected to operate at or above capacity (LoS 'E' and LoS 'F'). This is similar to the existing condition.

With regard to the 'critical movements', similar to existing conditions, the eastbound through movement at the Kirkwood S/Carling EB intersection during the morning peak hour is projected to continue to operate at capacity (LoS 'E') and the westbound through and westbound left-turn movements at the Kirkwood N/Carling WB and Merivale/Carling intersections are projected to operate above capacity (LoS 'F') during the afternoon peak hour. The critical movements at the

Carling/Westgate SC intersection have decreased from LoS 'A' and 'B' to LoS 'D' as there is an increase in the turning movements into and out of the Westgate Shopping Centre development.

These results are similar to the intersection capacity analysis noted in the Westgate Shopping Centre Redevelopment CTS. As noted in the Westgate CTS, minimal mitigation to improve intersection performance is feasible given the physical constraints at the intersections, specifically those in close proximity to HWY 417 (Kirkwood/Carling intersections). In terms of storage length for turn lanes, the east and westbound left-turn lanes along Carling Avenue are currently constructed with as much storage as possible given the adjacent intersections.

With regard to the eastbound left-turn movement at the Carling/Westgate Shopping Centre, the existing and background volumes at this location are significant. As mentioned previously, the existing traffic volumes are 130 to 160 left turning vehicles with an additional 40 to 75 vehicles performing a U-turn, totally approximately 170 to 235 veh/h in this left-turn lane. With the addition of the traffic generated by the adjacent developments, the total volume projected to be in this lane is approximately 270 to 350 veh/h during the morning and afternoon peak hours. As such, this movement is projected to operate at LoS 'D' with projected 95th percentile queues of approximately 100 to 150 m with existing signal timing. The existing storage length at this location is approximately 75 m and as such, the 95th percentile queue is projected to spill back out of the turn lane given the background conditions.

With regard to the eastbound U-turn movement along Carling Avenue, the Carling/Westgate Shopping Centre intersection is the only intersection that permits left-turns and U-turns within the vicinity of the site. U-turns and left-turns are permitted further east at the Civic Hospital driveways (unsignalized) and at the signalized Carling/Holland intersection (which is located 700 m east of the Carling/Westgate Shopping Centre intersection). Given Carling Avenue's configuration within the study area, there is a high demand for vehicles to perform a U-turn to head westbound on Carling Avenue towards the HWY 417 on-off ramps. This is represented by the 40 to 75 veh/h that perform this U-turn today.

3.5. SITE TRIP GENERATION

Appropriate trip generation rates for the proposed development consisting of approximately 914 residential units and 26,230 ft² of ground floor commercial (assumed to be retail) were obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual, which are summarized in Table 5.

Table 5: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Condominiums	ITE 230	$T = 0.44(du);$ $\ln(T) = 0.80 \ln(du) + 0.26$	$T = 0.52(du);$ $\ln(T) = 0.82 \ln(du) + 0.32$
Specialty Retail Centre	ITE 826	$T = 1.36(X);$ $T = 1.20(X) + 10.74$	$T = 2.71(X);$ $T = 2.40(X) + 21.48$
Notes: T = Average Vehicle Trip Ends X = 1000 ft ² Gross Floor Area du = dwelling units Specialty Retail AM Peak is assumed to be 50% of the PM Peak			

As ITE trip generation surveys only record vehicle trips and typically reflect highly suburban locations (with little to no access by travel modes other than private automobiles), adjustment factors appropriate to the more urban study area context were applied to attain estimates of person trips for the proposed development. This approach is considered appropriate within the industry for urban infill developments.

To convert ITE vehicle trip rates to person trips, an auto occupancy factor and a non-auto trip factor were applied to the ITE vehicle trip rates. Our review of available literature suggests that a combined factor of approximately 1.3 is considered

reasonable to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%.

For Phase 1 of the development, the existing hotel will remain and two of the buildings will be constructed on the east side of the site. As such, Phase 1 of the development will consist of approximately 342 residential units and 9,440 ft² of commercial. The person trip generation for the proposed Phase 1 of the development is summarized in Table 6.

Table 6: Phase 1 Modified Person Trip Generation

Land Use	Area	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Condominiums	342 du	30	150	180	143	71	214
Specialty Retail	9,440 ft ²	16	13	29	25	32	57
Total Person Trips		46	163	209	168	103	271
<i>Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%</i>							

The person trips shown in Table 6 for the proposed site were then reduced by modal share values, including a reduction for 'pass-by' trips based on the site's location and proximity to adjacent communities, employment, other shopping uses and transit availability. Modal share and 'pass-by' values for condominiums and specialty retail uses within the proposed Phase 1 development are summarized in Tables 7 and 8, respectively, with the total Phase 1 site-generated vehicle traffic summarized in Table 9.

Table 7: Phase 1 Condominium Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	50%	15	75	90	72	36	108
Auto Passenger	10%	3	15	18	15	8	23
Transit	25%	8	38	46	35	17	52
Non-motorized	15%	4	22	26	21	10	31
Total Person Trips	100%	30	150	180	143	71	214
Total 'New' Auto Trips		15	75	90	72	36	108

Table 8: Phase 1 Specialty Retail Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	50%	8	7	15	13	16	29
Auto Passenger	15%	3	2	5	4	5	9
Transit	15%	2	2	4	3	5	8
Non-motorized	20%	3	2	5	5	6	11
Total Person Trips	100%	16	13	29	25	32	57
Less Retail 25% Pass-By		-2	-2	-4	-4	-4	-8
Total 'New' Auto Trips		6	5	11	9	12	21

Table 9: Phase 1 Total Site Vehicle Trip Generation

Land Use	AM Peak (veh/h)			PM Peak (veh/h)		
	In	Out	Total	In	Out	Total
Condominiums	15	75	90	72	36	108
Specialty Retail	8	7	15	13	16	29
Retail Pass-By (30%)	-2	-2	-4	-4	-4	-8
Total 'New' Auto Trips	21	80	101	81	48	129

As shown in Table 9, the resulting number of potential 'new' two-way vehicle trips for the proposed Phase 1 development is approximately 100 and 130 veh/h during the weekday morning and afternoon peak hours, respectively.

The ultimate development is planned to consist of four buildings with a total of 914 residential units and approximately 26,200 ft² of ground floor commercial, assumed to be ground floor retail for this study. In the ultimate scenario, the hotel will be demolished and as such, traffic generated from the hotel will be removed from the roadway network. As shown in Figure 5 – 'Existing Peak Hour Traffic Volumes', the total amount of vehicle traffic travelling to/from the hotel during the peak hours is approximately 30 veh/h. Following the same method outlined above, the total Phase 1 and 2 site-trip generation is summarized in Table 10 and detailed in Appendix G.

Table 10: Phase 1 and 2 Total Site Vehicle Trip Generation

Land Use	AM Peak (veh/h)			PM Peak (veh/h)		
	In	Out	Total	In	Out	Total
Condominiums	33	164	197	161	80	241
Specialty Retail	15	13	28	24	31	55
Retail Pass-By (30%)	-4	-4	-8	-7	-7	-14
Total 'New' Auto Trips	44	173	217	178	104	282
Less Existing Hotel Trips	-10	-21	-31	-19	-10	-29
Total 'Net' New Auto Trips	34	152	186	159	94	253

As shown in Table 10, the resulting number of potential 'new' two-way vehicle trips for the proposed development is approximately 215 and 280 veh/h during the weekday morning and afternoon peak hours, respectively. With the removal of the existing vehicle trips to/from the hotel site, the net increase in vehicle traffic is projected to be 185 to 253 veh/h during the weekday morning and afternoon peak hours, respectively.

3.6. VEHICLE TRAFFIC DISTRIBUTION AND ASSIGNMENT

Traffic distribution was based existing volume splits at study area intersections and our knowledge of the surrounding area. As Carling Avenue operates as a one-way roadway at the site access and as the on/off ramps for HWY 417 are located to the west of the site, the distribution for vehicles leaving the site is assumed to be slightly different than the distribution for vehicles entering the site. For example, it is assumed that more eastbound vehicles, exiting the site, will elect to travel along Carling Avenue to their destination or to the next on-ramp to HWY 417 to avoid performing a U-turn along Carling Avenue. However, when arriving to the site, most drivers will exit the on/off ramps at Carling Avenue and continue eastbound on Carling to the site. The resultant distribution is outlined as follows:

From the Site

- 10% to eastbound HWY 417
- 20% to westbound HWY 417;
- 50% to the east via Carling Avenue;
- 5% to the west via Carling Avenue; and
- 15% to the south via Merivale Road;
- 100%

To the Site

- 40% from eastbound HWY 417
- 20% from westbound HWY 417;
- 20% from the east via Carling Avenue;
- 10% from the west via Carling Avenue; and
- 10% from the south via Merivale Road;
- 100%

Based on these distributions, 'new' and 'pass-by' site-generated trips were assigned to study area intersections, which are illustrated as Figure 11 for Phase 1 site-generated traffic and Figure 12 for Phase 1 and 2 site-generated traffic.

Figure 11: Phase 1 'New' and 'Pass-by' Site-Generated Traffic Volumes

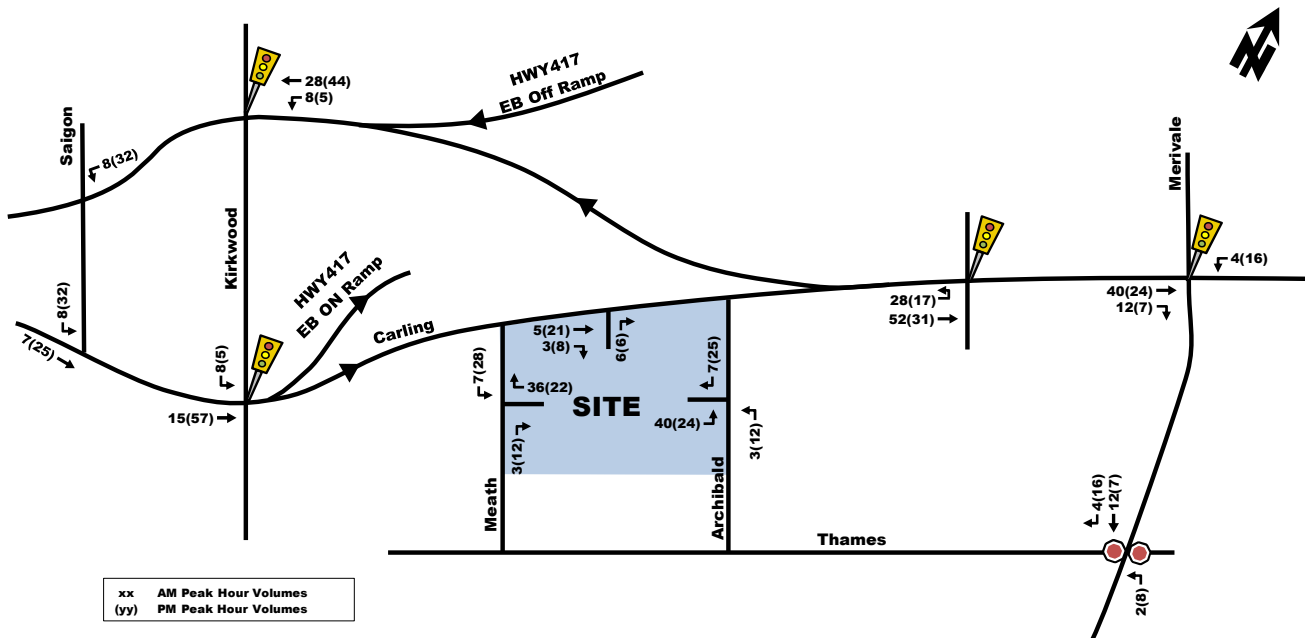
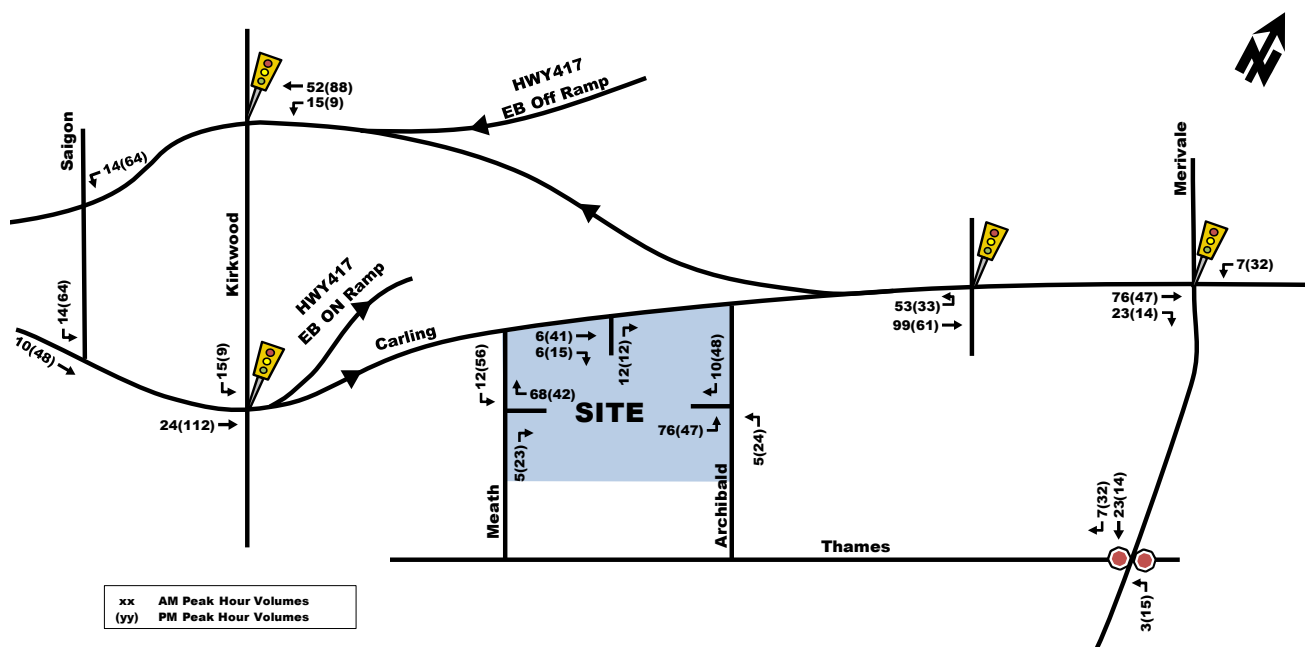


Figure 12: Phase 1 and 2 'New' and 'Pass-by' Site-Generated Traffic Volumes

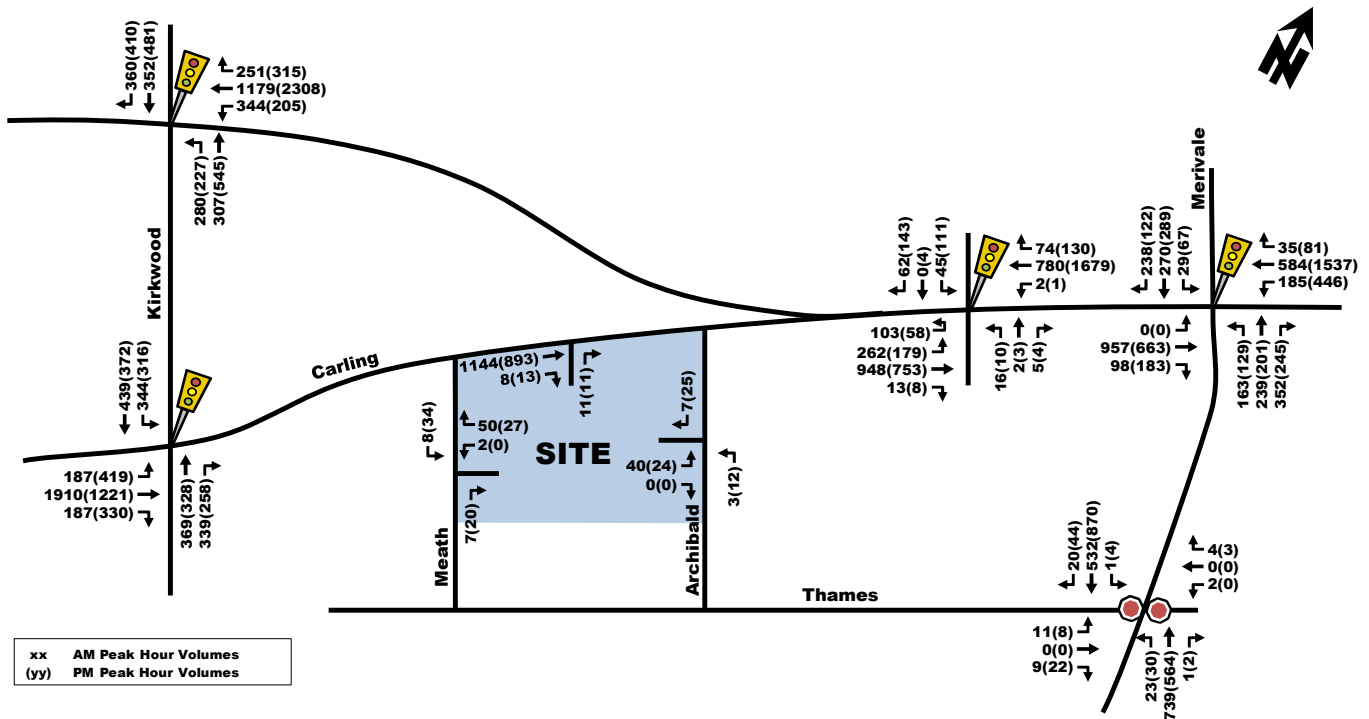


4. FUTURE TRAFFIC OPERATIONS

4.1. PROJECTED 2019 CONDITIONS AT PHASE 1 SITE DEVELOPMENT

The total projected 2019 volumes associated with the proposed development were derived by superimposing Phase 1 'new' and 'pass-by' site-generated traffic volumes (Figure 11) and 2019 area development traffic (Figure 9) onto existing traffic volumes (Figure 5). The resulting total projected 2019 volumes are illustrated as Figure 13.

Figure 13: Total Projected 2019 Peak Hour Traffic Volumes



The Carling/Kirkwood N and Carling/Kirkwood S intersections will have significant changes to the turning movement volumes given the proposed plan to close the HWY 417 eastbound on-ramp. It is anticipated that there will be an increase in vehicle volume travelling through both intersections as Carling Avenue westbound vehicles destined for HWY 417 eastbound will travel through both Carling/Kirkwood intersections or find a different route. Given the relatively significant amount of unknown factors that would affect the traffic patterns within the study area, the existing traffic volumes were assumed as background traffic for the purpose of this study.

The following Table 11 provides a projected performance summary for study area intersections, based on total projected 2019 traffic volumes. The proposed modifications to the Carling/Kirkwood N intersection are included in there ensuing analysis. The detailed SYNCHRO model output of projected 2019 conditions is provided within Appendix H.

Table 11: Projected 2019 Performance of Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a Whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Kirkwood S/Carling EB	E(D)	0.95(0.88)	EBT(NBR)	38.3(26.3)	E(B)	0.94(0.64)
Merivale/Carling	C(F)	0.74(1.09)	NBL(WBL)	26.7(35.6)	B(C)	0.63(0.75)
Kirkwood N/Carling WB	D(F)	0.85(1.11)	SBR(WBT)	27.7(69.6)	B(F)	0.70(1.10)
Carling/Westgate SC	D(C)	0.88(0.80)	EBT(EBL)	7.6(12.5)	D(C)	0.84(0.77)
Merivale/Thames	C(C)	19.2(20.1)	EBT(EBT)	0.6(0.7)	-	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 11, the study area intersections are projected to operate 'as a whole' with acceptable levels of service LoS 'D' or better during the peak hours, with the exception of the Carling/Kirkwood intersections. This is similar to existing and background 2024 conditions.

With regard to the 'critical movements', the eastbound through movement at the Carling/Kirkwood S intersection is projected to continue to operate at capacity (LoS 'E') during the morning peak hour. During the afternoon peak hour, the westbound left-turn movement at the Carling/Merivale intersection and the westbound through movement at the Carling/Kirkwood N intersection are projected to operate above capacity (LoS 'F'), similar to existing conditions.

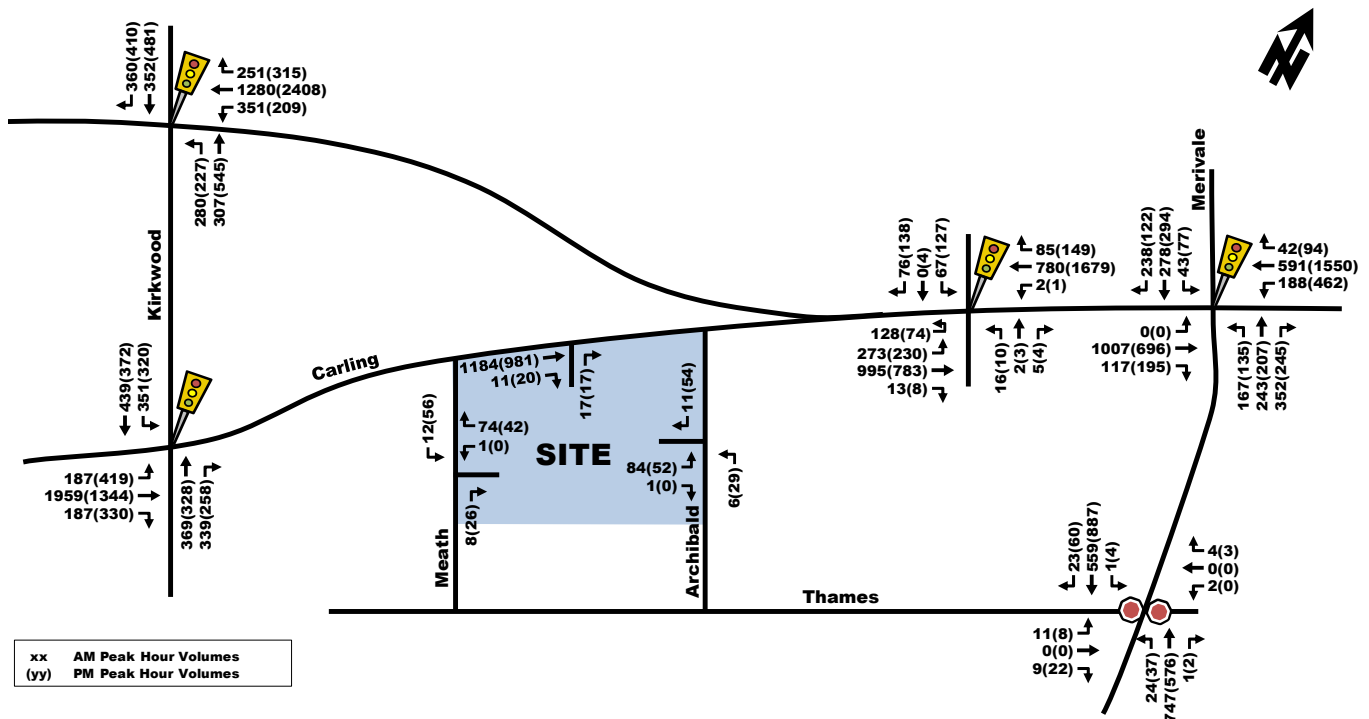
As mentioned in Section 3.4 Background Traffic Intersection Performance, the mitigative measures to improve performance at the study area intersections are relatively restricted given the current geometry. Signal timing adjustments can help improve some of the critical movements, however, most critical movements continue to operate in the range of LoS 'D' to LoS 'F'. The SYNCHRO model output of these changes is provided within Appendix I.

As mentioned previously, significant traffic pattern changes are anticipated with the removal of the HWY 417 eastbound on-ramp. In addition, the future transit priority corridor will help reduce the reliance on passenger automobiles, ultimately reducing the number of vehicles on the roadway. As such, and given the roadway geometry constraints, minimal mitigation is possible, and traffic volumes are expected to change and/or be reduced in the future with the planned network changes.

4.2. PROJECTED 2024 CONDITIONS AT FULL SITE BUILD-OUT

The total projected 2024 volumes associated with the proposed development were derived by superimposing Phase 1 and 2 'new' and 'pass-by' site-generated traffic volumes (Figure 12) and 2024 area development traffic (Figure 10) onto existing traffic volumes (Figure 5). The resulting total projected 2024 volumes are illustrated as Figure 14.

Figure 14: Total Projected 2024 Peak Hour Traffic Volumes



The following Table 12 provides a projected performance summary for study area intersections, based on total projected 2024 traffic volumes. The detailed SYNCHRO model output of projected 2024 conditions is provided within Appendix J.

Table 12: Projected 2024 Performance of Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a Whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Kirkwood S/Carling EB	E(D)	0.97(0.88)	EBT(NBR)	40.4(27.2)	E(B)	0.96(0.69)
Merivale/Carling	C(F)	0.76(1.18)	NBL(WBL)	28.7(39.8)	B(C)	0.67(0.79)
Kirkwood N/Carling WB	D(F)	0.86(1.15)	SBR(WBT)	26.2(75.2)	C(F)	0.74(1.14)
Carling/Westgate SC	F(D)	1.04(0.82)	EBL(WBT)	14.5(20.7)	A(C)	0.48(0.76)
Merivale/Thames	C(C)	20.1(21.2)	EBT(EBT)	0.6(0.8)	-	-

Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.

As shown in Table 12, the study area intersections are projected to operate 'as a whole' with acceptable levels of service LoS 'D' or better during the peak hours, with the exception of the Carling/Kirkwood intersections. This is similar to existing and background 2024 conditions.

With regard to the 'critical movements', the eastbound through movement at the Carling/Kirkwood S intersection is projected to continue to operate at capacity (LoS 'E') during the morning peak hour. During the afternoon peak hour, the westbound left-turn movement at the Carling/Merivale intersection and the westbound through movement at the Carling/Kirkwood N intersection are projected to operate above capacity (LoS 'F'). The eastbound left-turn movement at the Carling/Westgate Shopping Centre intersection is projected to operate above capacity (LoS 'F') during the morning peak hour.

As mentioned previously, signal timing adjustments can be made to improve the vehicle performance for certain movements. These modifications include:

- Optimized signal timing at all study area intersections;
- Provide protected/permitted eastbound left-turn phase at the Carling/Westgate Shopping Centre intersection; and
- Double westbound left-turn lanes at the Kirkwood N/Carling WB intersection as per the MTO and City's plans associated with the closure of the HWY 417 eastbound on-ramp.

Given these modifications, the resulting study area intersection performance is outlined in Table 13 and the SYNCHRO model output is provided at Appendix K.

Table 13: Projected 2024 Performance of Study Area Intersections – Modified Signal Timing

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a Whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Kirkwood S/Carling EB	D(D)	0.90(0.88)	EBT(NBR)	36.6(27.0)	D(B)	0.90(0.69)
Merivale/Carling	C(E)	0.76(0.92)	NBL(WBL)	32.1(33.5)	B(C)	0.67(0.80)
Kirkwood N/Carling WB	D(F)	0.85(1.06)	SBR(SBR)	29.2(57.4)	C(F)	0.74(1.03)
Carling/Westgate SC	C(D)	0.77(0.81)	EBL(EBL)	13.6(20.4)	C(C)	0.74(0.78)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown, with some adjustments to timing, most study area intersection are projected to operate with acceptable levels of service. The Kirkwood N/Carling WB intersection continues to operate above capacity during the afternoon peak hour.

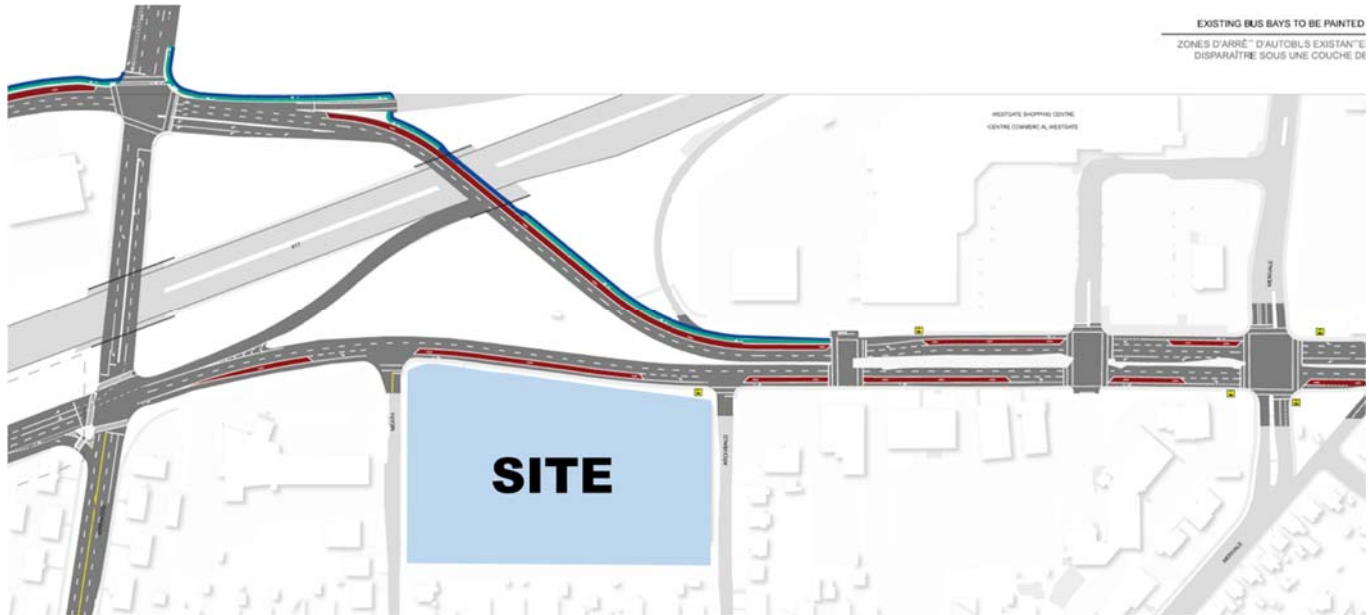
The total amount of vehicles that are projected to perform a U-turn at the Carling/Westgate Shopping Centre intersection ranges from 75 to 130 veh/h during the peak hours. As there is an existing protected/permitted left-turn phase at this location during the afternoon peak hour (and recommended during the morning peak hour), there is sufficient capacity for the left-turn and U-turn vehicles to operate at LoS 'D'. As mentioned previously, consideration could be given to restricting the southbound right-turn movement to 'no-right-on-red' to help prevent collisions associated with heavy U-turn traffic.

With regard to queues at the Carling/Westgate Shopping Centre intersection, the eastbound left-turn lane 95th percentile queue is projected to be approximately 85 to 115 m, which spills out past the provided 75 m storage lane. This is similar to Background 2024 traffic volume scenario as there is a significant amount of traffic using the left-turn lane for left-turn as well as U-turn movements. With the future modifications to Carling Avenue, both the closure of the HWY 417 eastbound on-ramp and the future transit priority lanes, significant changes to traffic conditions are anticipated within this network. With the closure of the eastbound on-ramp, drivers may elect to continue eastbound along Carling Avenue instead of performing the U-turn movement. In addition, with the implementation of transit priority, passenger vehicle traffic is likely to decrease given the more reliable transit service and the reduction of vehicle lane capacity on Carling Avenue.

4.2.1. CARLING AVENUE TRANSIT PRIORITY CONDITION

The City of Ottawa project to provide transit priority continuous lanes along Carling Avenue is identified in the 2013 TMP as part of the affordable network. The Open House for this project was held in February 2017 and illustrates the proposed plan along Carling Avenue. The following Figure 15 illustrates the plan for Carling Avenue within the vicinity of the site.

Figure 15: Proposed Carling Avenue Transit Priority Plan



As shown in the above figure, the proposed cross-section of Carling Avenue would consist of two vehicle travel lanes and a 'transit only' lane along the curb side. This will reduce passenger vehicle capacity along the corridor. The total projected 2024 traffic volume scenario was assessed with this new configuration and the results as summarized in Table 14. These results include the mitigative measures outlined above.

Table 14: Projected 2024 Performance of Study Area Intersections – Reduced Carling Avenue Cross-Section

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a Whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Kirkwood S/Carling EB	D(D)	0.90(0.88)	EBT(NBR)	36.5(27.6)	D(B)	0.90(0.69)
Merivale/Carling	D(D)	0.83(0.90)	EBT(WBL)	49.9(55.4)	C(D)	0.79(0.85)
Kirkwood N/Carling WB	D(F)	0.86(1.05)	SBR(WBT)	29.6(52.9)	C(F)	0.74(1.05)
Carling/Westgate SC	C(F)	0.74(1.01)	EBL(WBT)	15.5(47.7)	A(E)	0.51(0.95)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 17, the study area intersections 'as a whole' are projected to operate at an acceptable LoS 'D' or better during the peak hours, with the exception of the Kirkwood N/Carling WB and Carling/Westgate Shopping Centre intersection during the afternoon peak hour. With regard to the critical movements, the westbound through movements at the Kirkwood N/Carling WB and Carling/Westgate Shopping Centre intersections are projected to operate above capacity (LoS 'F') given the reduced vehicle travel lanes. All other critical movements are projected to operate with acceptable levels of service given the signal timing plan modifications outlined above.

It is noteworthy, providing a transit priority corridor along Carling Avenue will ultimately reduce the number of passenger vehicles on the roadway, as more people will be inclined to take transit with improved travel times. With a reduction of passenger vehicles, the levels of service for the study area intersection will improve.

4.3. NEIGHBOURHOOD IMPACTS

Based on the location of the proposed development and its connections to Carling Avenue (arterial road), there is minimal site-generated traffic projected to travel along local streets within the vicinity of the subject site. Given the one-way configuration of Archibald Street and Meath Street, site-generated traffic can use these streets to access the development, however, they are restricted from using Archibald Street and Meath Street to travel southbound to Thames Street to exit the site. Approximately 30% of inbound traffic to the site is projected to travel via Thames Street, Archibald Street and Meath Street, which equates to approximately 10 to 50 veh/h during peak hours for the ultimate condition. This amount of traffic represents less than 1 vehicle each minute on average and the total traffic travelling along Thames Street in the westbound direction is less than 100 veh/h during the afternoon peak hour, which is appropriate for a local roadway.

With respect to neighbourhood transit, the site is projected to generate an approximate total of 105 and 135 new two-way person transit trips during the weekday morning and afternoon peak hours, respectively, for the ultimate condition. This amount of person traffic can be easily accommodated by the proposed transit priority corridor.

5. TRANSPORTATION DEMAND MANAGEMENT

Depending on the nature of a development, Transportation Demand Management (TDM) strategies have the potential to be an integral part of a planned development in order to address and support the City's policies with regard to TDM. For this particular site, its proximity to the existing transit service is considered very advantageous in lessening the reliance on the private automobile. A number of other TDM measures could also be considered, including:

- Improving the quality and safety of pedestrian facilities, such as enhanced sidewalks/lighting;
- Provide quality and safe cycling facilities, such as storage facilities;
- Provide change area/shower facilities for any on-site employees;
- Providing transit information in common areas or/and enhance bus shelters to encourage transit use; and
- Provide appropriate car sharing programs/facilities to reduce auto ownership and attract residents who do not own a vehicle.

TDM strategies are important in encouraging active modes of transportation to/from the site, further lessening the reliance on the private automobile.

6. SITE PLAN REVIEW

This section provides an overview of site access, parking requirements, pedestrian circulation and transit accessibility. The proposed Phase 1 and Ultimate Site Plans were previously illustrated as Figures 2 and 3.

Parking

Parking is planned to be provided at grade with access to/from Carling Avenue, Archibald Street and Meath Street. In addition, underground parking is planned with access to/from Archibald Street and Meath Street. A total of 457 parking spaces are required for the residential units, 92 are required for the visitor parking and depending on the land use of the commercial parcels additional parking may be required. Currently the Ultimate Site Plan indicates a total of 148 surface level parking spaces and the parking garage plan indicates a total of 537 parking spaces, for a total of 685 parking spaces. This amount of parking meets the City's By-Law requirements for Area Y (Inner Urban Mainstreet) as identified on Schedule 1A. The surface parking space dimensions are noted as 5.4 m in length and 2.7 m in width, and the underground parking space dimensions are noted as 5.3 m in length and 2.6 m in width, which satisfies the City's By-Law requirements.

Site Circulation

With regard to on-site circulation, the proposed parking lot is laid out effectively, such that two-way traffic can be efficiently accommodated. The proposed drive aisles are noted as 6.7 m in width, which meets the City's By-Law requirements. There

are four proposed ramps to/from the underground parking, which will minimize conflicts within the parking garage and on the ramps.

There are three separate surface level parking lots. The one serving the two buildings fronting Carling Avenue (Buildings A and B) has three driveway connections to public streets (one to Archibald, one to Carling and one to Meath). Each of the 9 storey buildings (Buildings C and D) have individual surface parking lots with one driveway connection to the local street. Providing multiple driveways to the parking garages and parking lots will minimize the amount of vehicles conflicts and reduce speeds on-site.

The ramp providing access to the lower level parking should be equal to or less than 2% grade for 9 m from the property line. Appropriate transitions grades should be provided at the top and bottom of the ramps.

Truck routes or loading areas are not identified on the proposed Site Plan; however, sufficient turning radii on-site and at the site driveway connections should be provided for fire, garbage and delivery truck circulation.

Access Requirements

Based on projected volumes and proximity to adjacent intersections, additional traffic control/auxiliary turn lanes are not warranted or required at the proposed driveway connections.

The proposed Site Plan has one driveway connection to Carling Avenue, 4 driveway connections to Meath Street and 4 driveway connections to Archibald Street. According to the Private Approach By-Law the maximum number of private approaches allowed on each frontage is 2 two-way private approaches. As such, the number of driveways on Meath Street and Archibald Street exceed the maximum allowed by the Private Approach By-Law. In addition, driveways to the same property should be distanced at least 9 m apart according to the Private Approach By-Law. All driveways meet this By-Law with the exception of the Building B accesses which has two driveways that are spaced approximately 7.5 m apart. This was done to maximize the distance of the driveways from the arterial roadway (Carling Avenue).

Given the Site Plan design, providing an underground parking access for each building will minimize on site vehicle conflicts and reduce speeds within the parking garage. In addition, as the surface parking lots are not all connected on site, and as each parking lot serves an individual building, providing an access to each parking lot is considered appropriate. In addition, the traffic volumes along Archibald Street and Meath Street were observed to be very low, in the range of 20 to 30 veh/h two-way, which equates to approximately 1 vehicle every 2 to 3 minutes. As such, off-site conflicts with vehicles exiting and entering the site are projected to be low. Based on the foregoing, the proposed amount of driveways is considered acceptable.

Pedestrians/Transit

To connect pedestrians to transit service and other nearby employment, shopping and recreation opportunities, sidewalks are provided along both sides of Carling Avenue, Merivale Road and Kirkwood Avenue. Pedestrian pathways are planned connecting the parking lots to/from the four proposed buildings and a pedestrian crossing is proposed crossing the drive aisle that connects to Carling Avenue.

Transit service within the vicinity of the site is currently provided by OC Transpo Routes #85, 101, 103, and 151. Regular/Local Routes #85, 101, 151 provide frequent all-day service and Peak Hour Route #103 provides service during the weekday peak hours only. Bus stops for all routes are located along Carling Avenue within 150 m walking distance from the proposed development. Carling Avenue is planned to have transit priority lanes adjacent to the site in the future.

Bicycles

A total of 458 underground bicycle parking spaces are proposed to serve the development, which is sufficient with respect to the City's By-Law requirements for the proposed site. Surface bicycle parking, located in well-lit areas, close to main building entrances, should also be provided for the commercial portion of the site.

7. FINDINGS AND RECOMMENDATIONS

Based on the foregoing analysis of the proposed development, the following transportation-related conclusions are offered:

EXISTING CONDITIONS

- The study area intersections adjacent to the site are currently operating ‘as a whole’ with an overall LoS ‘D’ or better during the weekday morning and afternoon peak hours, with the exception on the Carling/Kirkwood North and South intersections;
- With regard to ‘critical movements’ at study area intersections, the eastbound through movement at the Kirkwood South/Carling EB intersection is currently operating at capacity (LoS ‘E’) during the morning peak hour. During the afternoon peak hour, the westbound through and westbound left-turn movements at the Kirkwood N/Carling WB and Merivale/Carling intersections are currently failing (LoS ‘F’). All other movements are operating at acceptable LoS ‘D’ or better during peak hours;
- Based on the available collision data, Carling/Kirkwood N intersection has experienced high numbers of collisions in the past years. Changes are proposed at the Carling/Kirkwood N intersection with the removal of the HWY 417 eastbound on-ramp to help mitigate issues with weaving vehicles;
- Between the year 2011 to 2013 there were several collisions involving cyclists along Carling Avenue;

PROJECTED CONDITIONS

- Based on historic counts at the Carling/Merivale intersection, the study area has experienced no overall growth in recent years;
- There are several proposed developments within the study area, and traffic from the major developments (Westgate Shopping Centre redevelopment and 1335 Carling Avenue) has been accounted for in the background traffic volumes;
- Carling Avenue is planned to have transit priority lanes in both directions, which will reduce the number of passenger vehicle lanes along Carling Avenue from 6-lanes to 4-lanes;
- The MTO has plans to close the HWY 417 eastbound on-ramp along Carling Avenue as part of the HWY 417 widening. Modifications to the Carling/Kirkwood N intersection are planned to mitigate future traffic pattern changes;
- The proposed development is projected to generate ‘new’ two-way vehicle volumes of approximately 100 and 130 veh/h during the weekday morning and afternoon peak hours, respectively for Phase 1 of the development and 185 to 253 veh/h for the ultimate development;
- At Phase 1 site occupancy (year 2019), study area intersections continue to operate with some capacity constraints for certain movements. Mitigation in the form of signal timing adjustments is recommended as there are minimal possible geometric improvements given the existing geometry. Signal timing adjustments result in most critical movements operating at LoS ‘D’ to LoS ‘F’;
- At full occupancy (year 2024), the results are similar to year 2019 results with minimal mitigation recommended;
- Significant traffic pattern changes are anticipated with the removal of the HWY 417 eastbound on-ramp and the implementation of the transit priority corridor along Carling Avenue. In addition, the future transit priority corridor

will help reduce the reliance on passenger automobiles, ultimately reducing the number of vehicles on the roadway;

- The total projected 2024 traffic volume scenario was assessed with a 4-lane cross section along Carling Avenue and results reveal some capacity constraints for the east and westbound movements, given the reduced passenger vehicle capacity. As mentioned, the transit priority design plans for Carling Avenue will ultimately help reduce the number of vehicles on the roadways;
- There is a significant amount of existing and projected U-turning vehicles at the Carling/Westgate Shopping Centre intersection. There is a high demand for vehicles to turn around to access HWY 417. The total projected 2024 volume scenario indicates that this movement is projected to operate at LoS 'D' with 95th percentile queues that extend past the provided storage lane;
 - With future modifications to the road network, travel patterns are expected to change significantly and the queues at this intersection may be reduced;
 - A protected/permitted eastbound left-turn signal phase is recommended during the morning peak hour (already implemented during the afternoon peak hour);
 - Implementing a 'no-right-on-red' restriction for the southbound movement would likely reduce the amount of vehicle conflicts with U-turning vehicles;

SITE PLAN

- Based on projected volumes and proximity to adjacent intersections, additional traffic control/auxiliary turn lanes are not warranted or required at the proposed driveway connections;
- The proposed vehicle / bicycle parking supply and dimensioning; and the proposed drive aisles widths of 6.7m are sufficient with respect to the City's By-Law requirements;
- The proposed driveway connections meet the City's Private Approach By-Law requirements with respect to spacing, with the exception of the Building B accesses, which have been placed closer together in order to maximize the distance from Carling Avenue; and
- The proposed number of accesses exceeds that recommended in the Private Approach By-Law. However, this plan is recommended as it separates the underground garage accesses from the surface parking lot entrances, reducing the number of conflict points on the site, while having a minimal impact on the adjacent streets.

Based on the foregoing, the proposed development fits well into the context of the surrounding area, and its location and design serves to promote use of walking, cycling, and transit modes, thus supporting City of Ottawa policies, goals and objectives with respect to redevelopment, intensification and modal share.

Therefore, the proposed 1354 Carling Avenue residential development is recommended from a transportation perspective.

Prepared By:


André Jane Sponder, B.A.Sc.
Engineering Associate, Transportation

Reviewed By:


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Senior Project Manager, Transportation



Appendix A

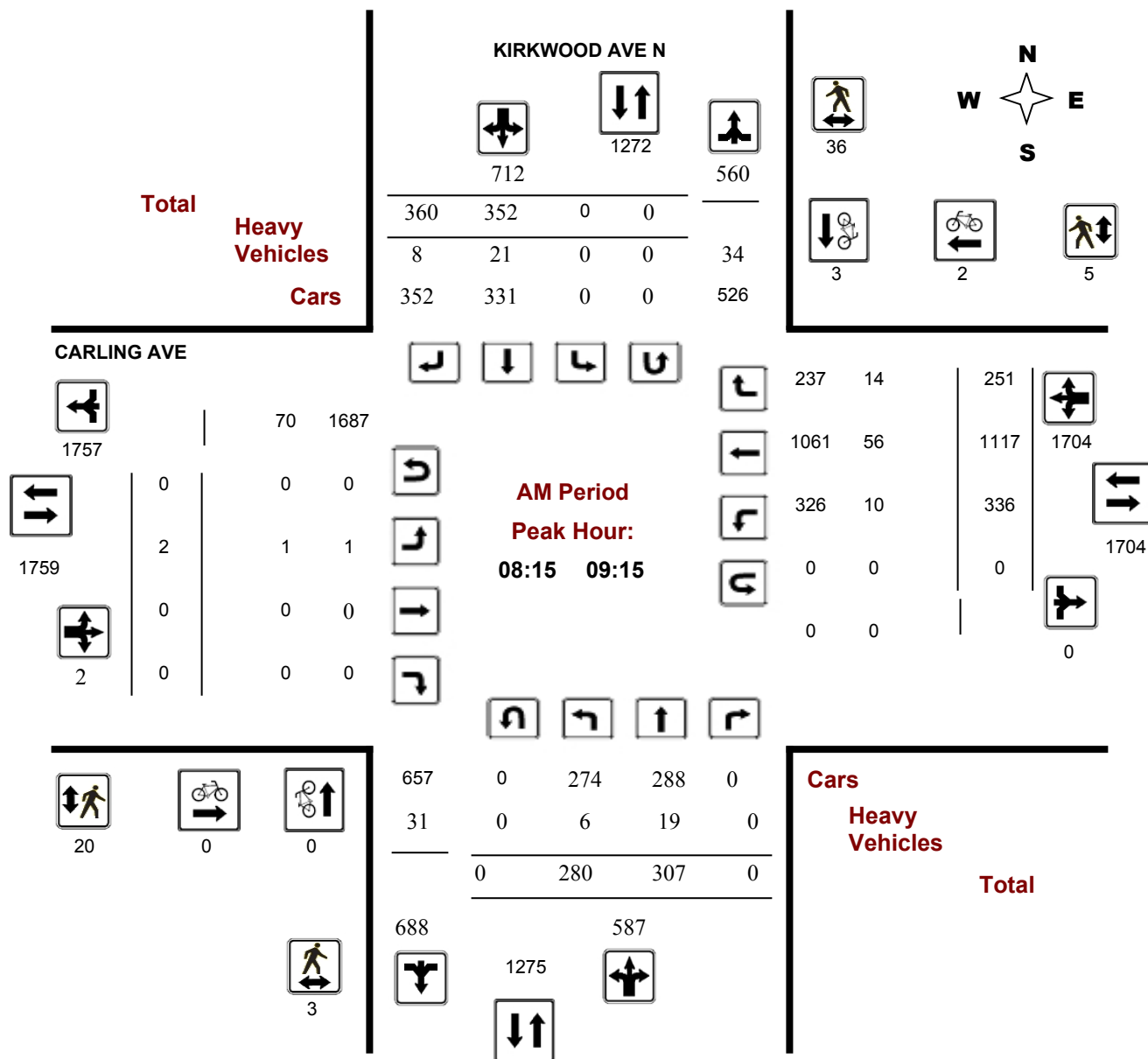
Existing Intersection Count Data

Survey Date: Wednesday, May 04, 2016

Start Time: 07:00

WO No: 35895

Device: Miovision

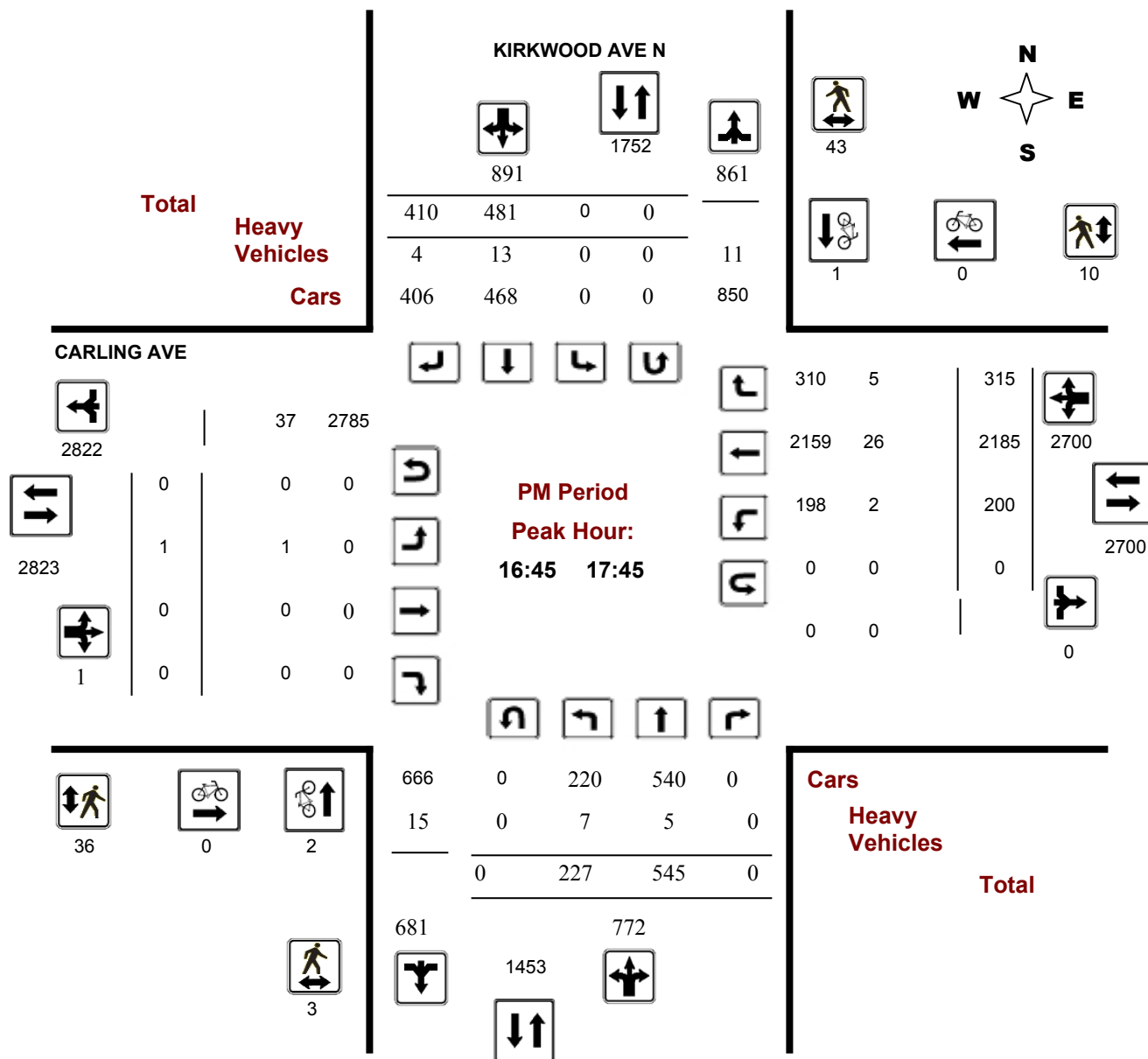


Survey Date: Wednesday, May 04, 2016

Start Time: 07:00

WO No: 35895

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

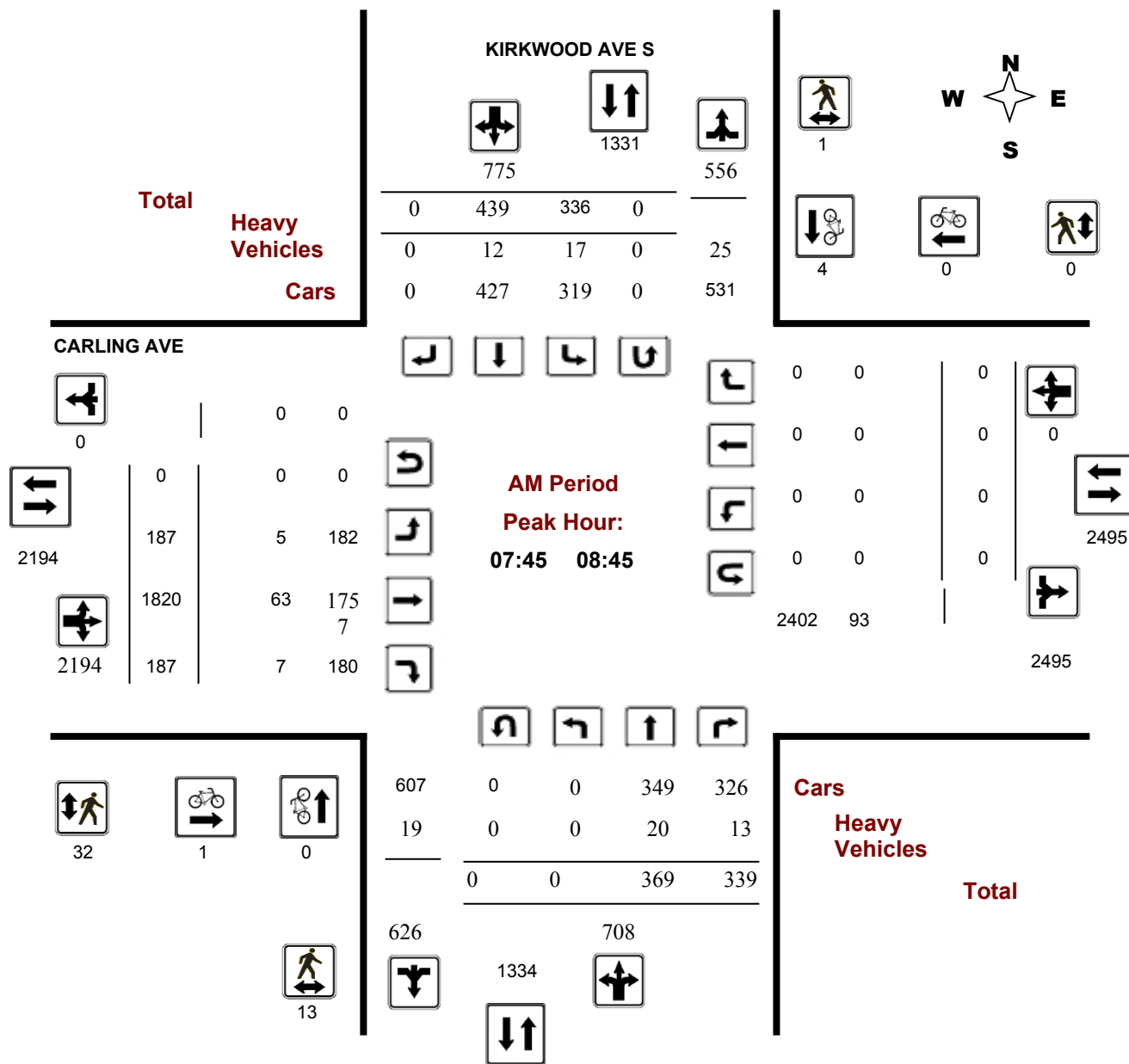
CARLING AVE @ KIRKWOOD AVE S

Survey Date: Wednesday, May 04, 2016

Start Time: 07:00

WO No: 35894

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

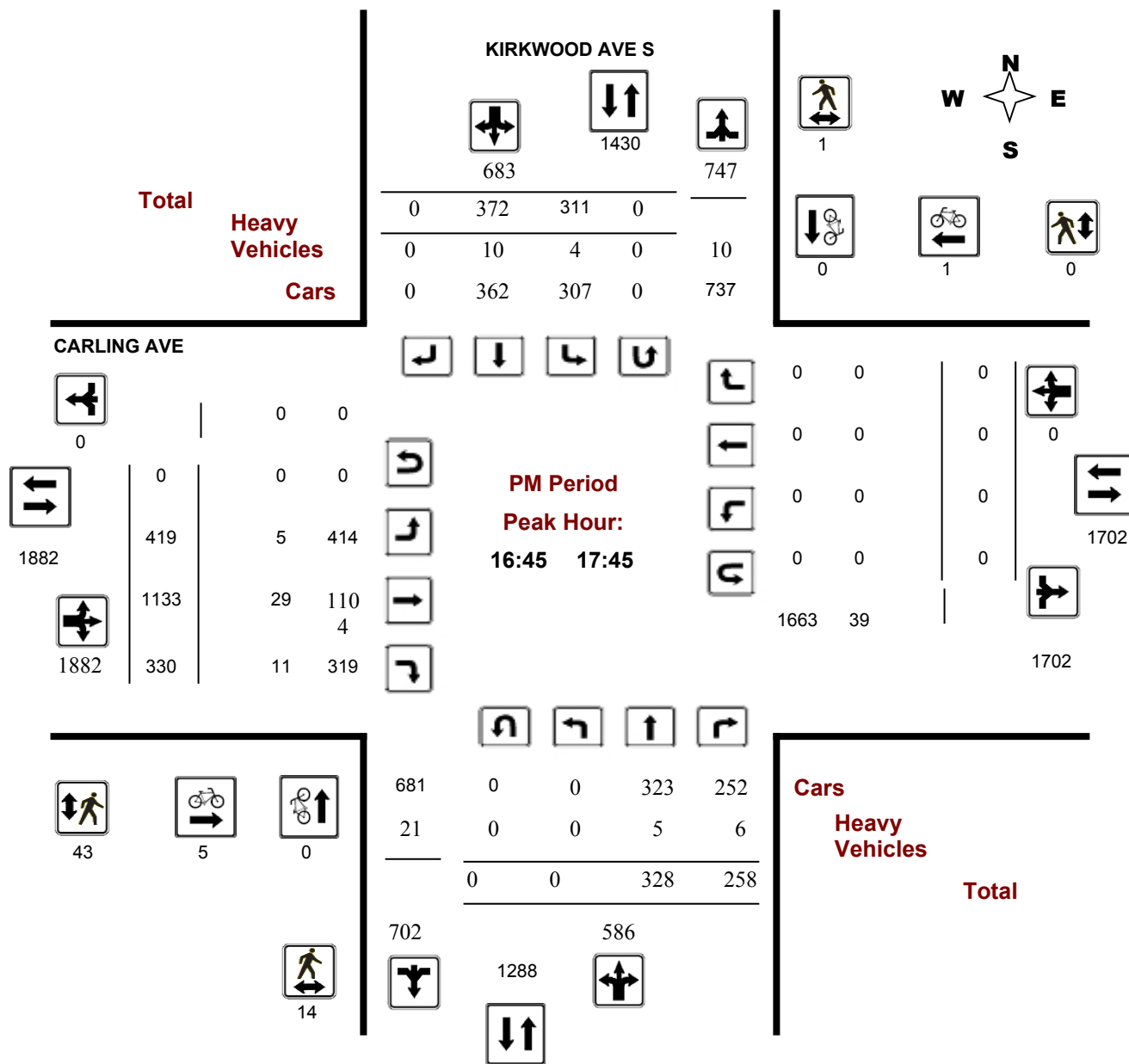
CARLING AVE @ KIRKWOOD AVE S

Survey Date: Wednesday, May 04, 2016

Start Time: 07:00

WO No: 35894

Device: Miovision



Turning Movement Count - 15 Minute Summary Report

CARLING AVE @ MERIVALE RD

Survey Date: Thursday, August 04, 2016

Total Observed U-Turns

Northbound: 1 Southbound: 0
Eastbound: 2 Westbound: 32

MERIVALE RD

CARLING AVE

Time Period	Northbound			N TOT	Southbound			S TOT	STR TOT	Eastbound			E TOT	Westbound			W TOT	STR TOT	Grand Total
	LT	ST	RT		LT	ST	RT			LT	ST	RT		LT	ST	RT			
07:00 07:15	16	26	36	78	6	49	56	111	189	0	107	9	116	21	58	6	86	202	391
07:15 07:30	26	29	43	98	4	55	48	107	205	0	117	9	126	15	62	3	80	206	411
07:30 07:45	22	38	57	117	8	53	46	107	224	1	151	15	167	23	91	6	120	287	511
07:45 08:00	23	55	67	145	4	51	62	117	262	0	169	10	179	33	94	5	134	313	575
08:00 08:15	34	39	51	124	3	52	62	117	241	0	198	11	209	30	102	8	140	349	590
08:15 08:30	42	53	69	164	9	53	51	113	277	0	164	17	181	26	109	9	145	326	603
08:30 08:45	30	56	56	142	5	52	48	105	247	1	183	12	196	50	132	2	184	380	627
08:45 09:00	42	40	57	139	9	57	47	113	252	0	145	8	153	32	146	13	191	344	596
09:00 09:15	17	27	53	97	9	53	59	121	218	0	149	12	161	30	117	6	155	316	534
09:15 09:30	36	34	33	103	7	60	64	131	234	0	136	24	161	32	126	10	172	333	567
09:30 09:45	21	38	38	97	11	46	60	117	214	0	141	20	161	24	119	12	157	318	532
09:45 10:00	27	32	35	94	11	52	67	130	224	0	105	32	137	26	114	8	149	286	510
11:30 11:45	38	55	32	125	21	67	62	150	275	2	101	25	128	36	145	10	191	319	594
11:45 12:00	40	46	49	135	12	55	53	120	255	0	123	20	143	39	143	12	194	337	592
12:00 12:15	34	52	46	132	8	62	61	131	263	0	117	17	134	31	169	13	213	347	610
12:15 12:30	36	49	44	129	15	50	51	116	245	1	142	18	161	37	147	7	191	352	597
12:30 12:45	34	56	40	130	15	43	58	116	246	0	140	26	166	44	147	8	200	366	612
12:45 13:00	40	41	39	120	18	45	37	100	220	0	139	18	157	42	150	16	209	366	586
13:00 13:15	33	38	38	109	10	47	48	105	214	0	150	27	177	33	147	14	194	371	585
13:15 13:30	41	49	41	131	20	54	48	122	253	0	110	20	130	35	134	19	190	320	573
15:00 15:15	27	67	46	140	5	76	65	146	286	0	117	22	139	51	222	14	291	430	716
15:15 15:30	15	47	37	99	7	63	52	122	221	0	138	32	170	62	276	10	349	519	740
15:30 15:45	42	52	48	142	25	80	55	160	302	0	112	31	143	50	294	12	359	502	804
15:45 16:00	23	34	43	100	20	61	46	127	227	0	158	30	188	64	313	7	386	574	801
16:00 16:15	35	54	43	133	18	68	66	152	285	0	270	16	286	75	321	7	403	689	974
16:15 16:30	25	39	45	109	11	67	30	108	217	0	203	30	233	82	341	10	433	666	883
16:30 16:45	25	53	43	121	12	71	44	127	248	0	150	25	175	74	279	9	363	538	786
16:45 17:00	38	48	49	135	10	58	48	116	251	0	151	29	180	81	353	14	448	628	879
17:00 17:15	31	50	52	133	19	69	49	137	270	0	147	28	176	78	314	11	404	580	850
17:15 17:30	21	40	54	115	11	58	49	118	233	0	157	27	184	73	312	9	395	579	812
17:30 17:45	38	38	37	113	9	61	30	100	213	0	114	27	141	62	174	7	244	385	598
17:45 18:00	23	32	53	108	7	49	39	95	203	0	122	24	146	60	179	5	245	391	594
TOTAL:	975	1407	1474	3857	359	1837	1661	3857	7714	5	4626	671	5304	1451	5830	302	7615	12919	20633

Note: U-Turns are included in Totals.

Comment:

Turning Movement Count - Full Study Peak Hour Diagram

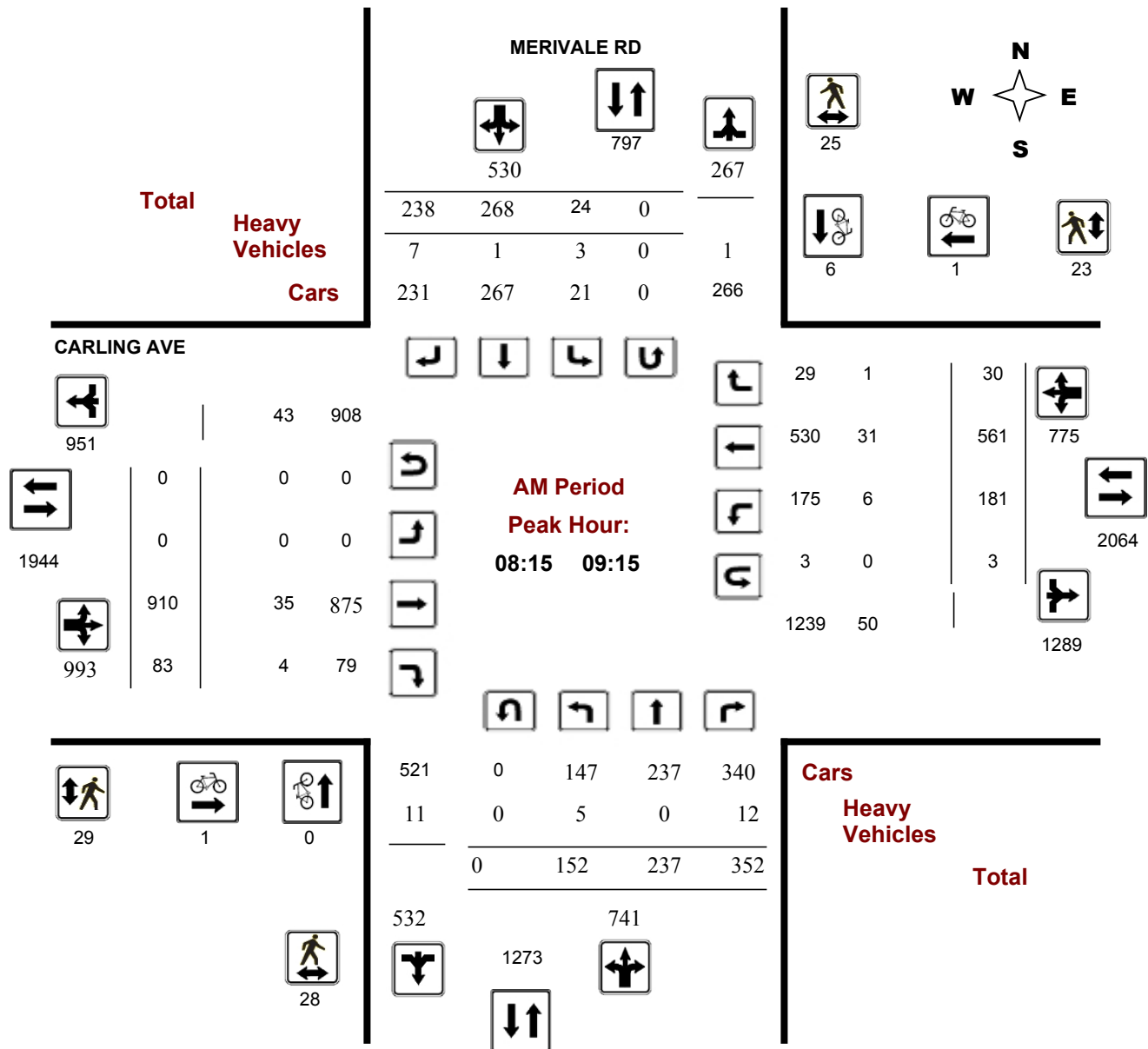
CARLING AVE @ MERIVALE RD

Survey Date: Thursday, October 15, 2015

Start Time: 07:00

WO No: 35461

Device: Miovision



Turning Movement Count - Full Study Peak Hour Diagram

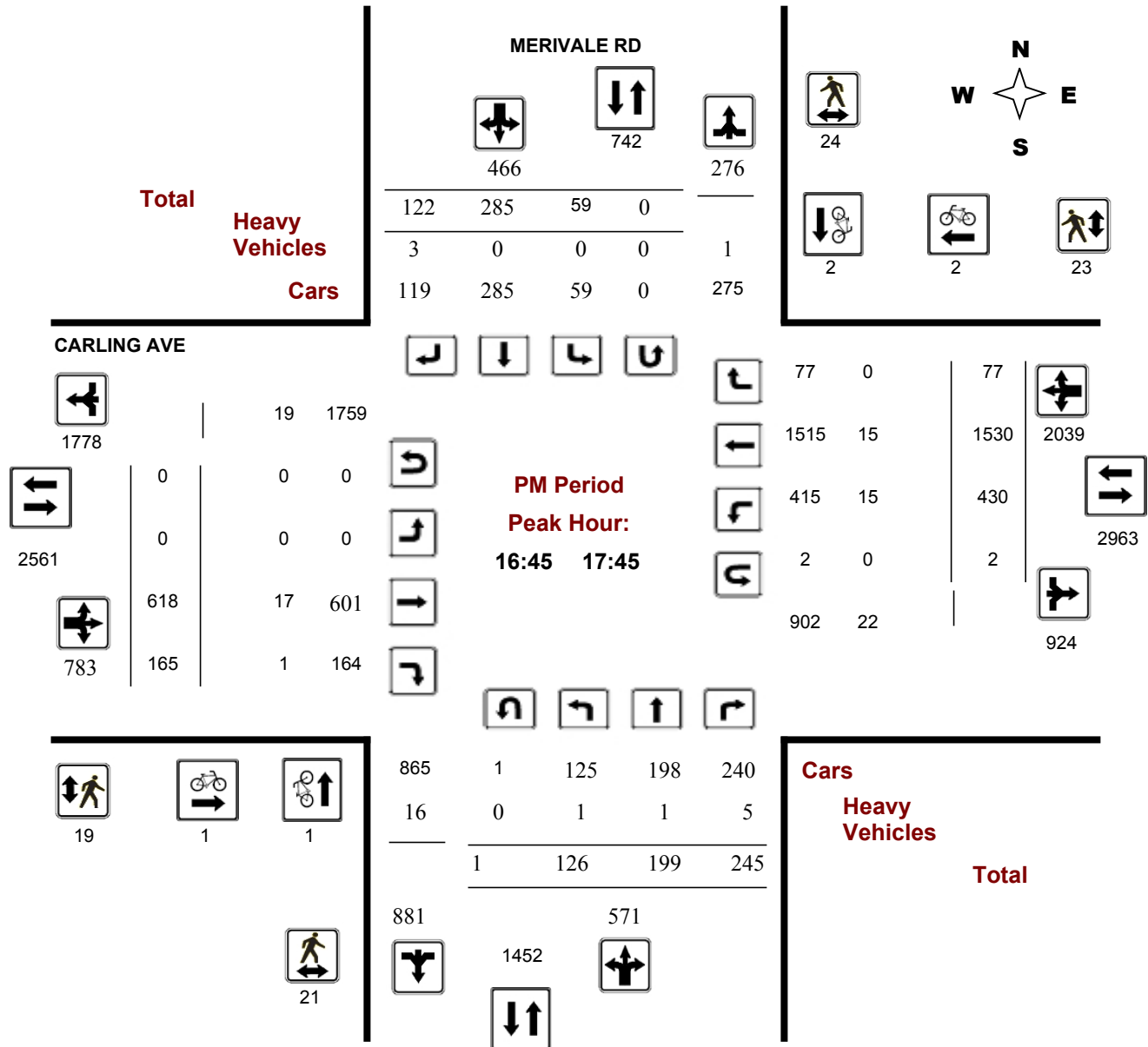
CARLING AVE @ MERIVALE RD

Survey Date: Thursday, October 15, 2015

Start Time: 07:00

WO No: 35461

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

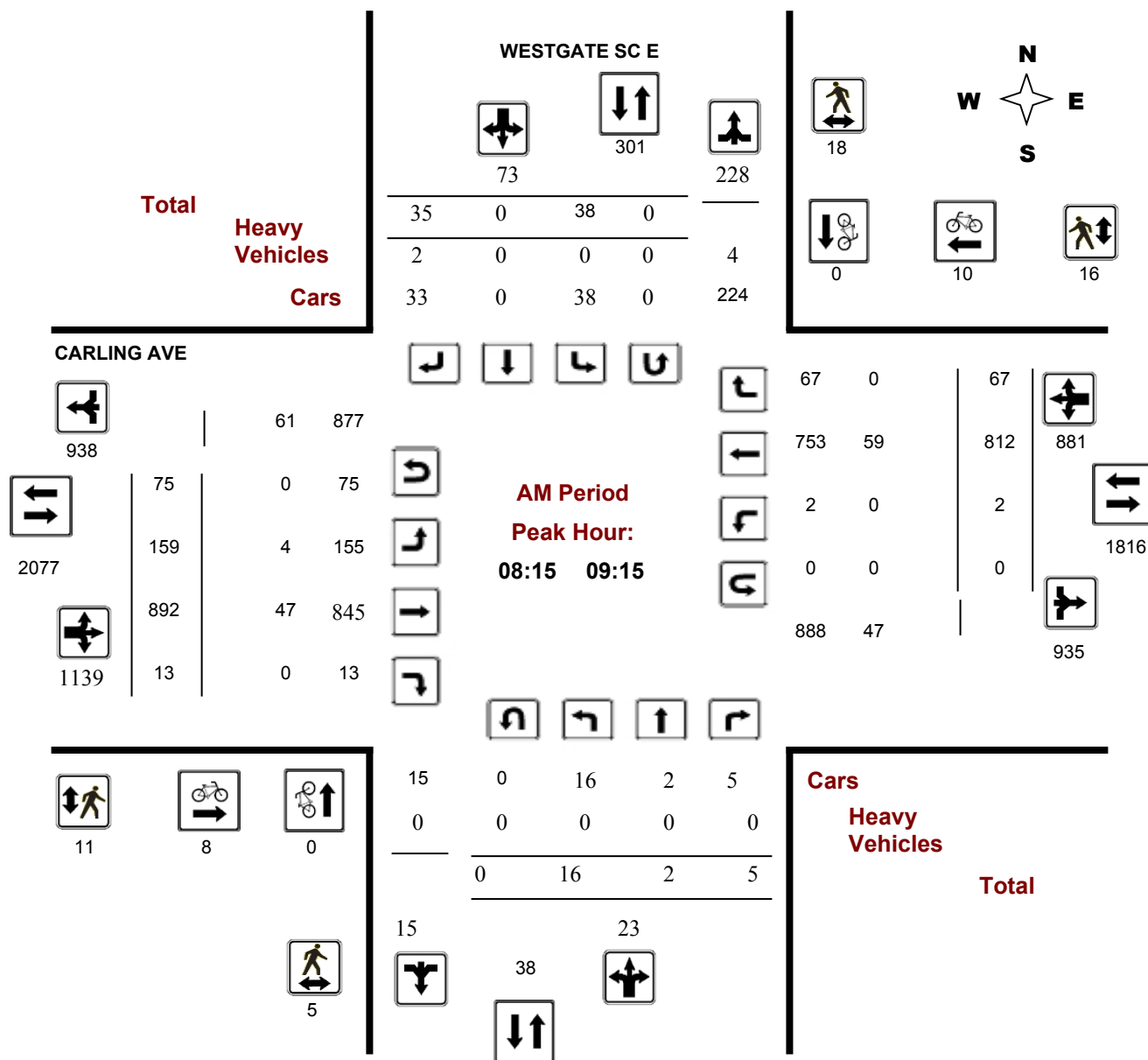
CARLING AVE @ WESTGATE SC E

Survey Date: Wednesday, June 17, 2015

Start Time: 07:00

WO No: 34721

Device: Jamar Technologies, Inc





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

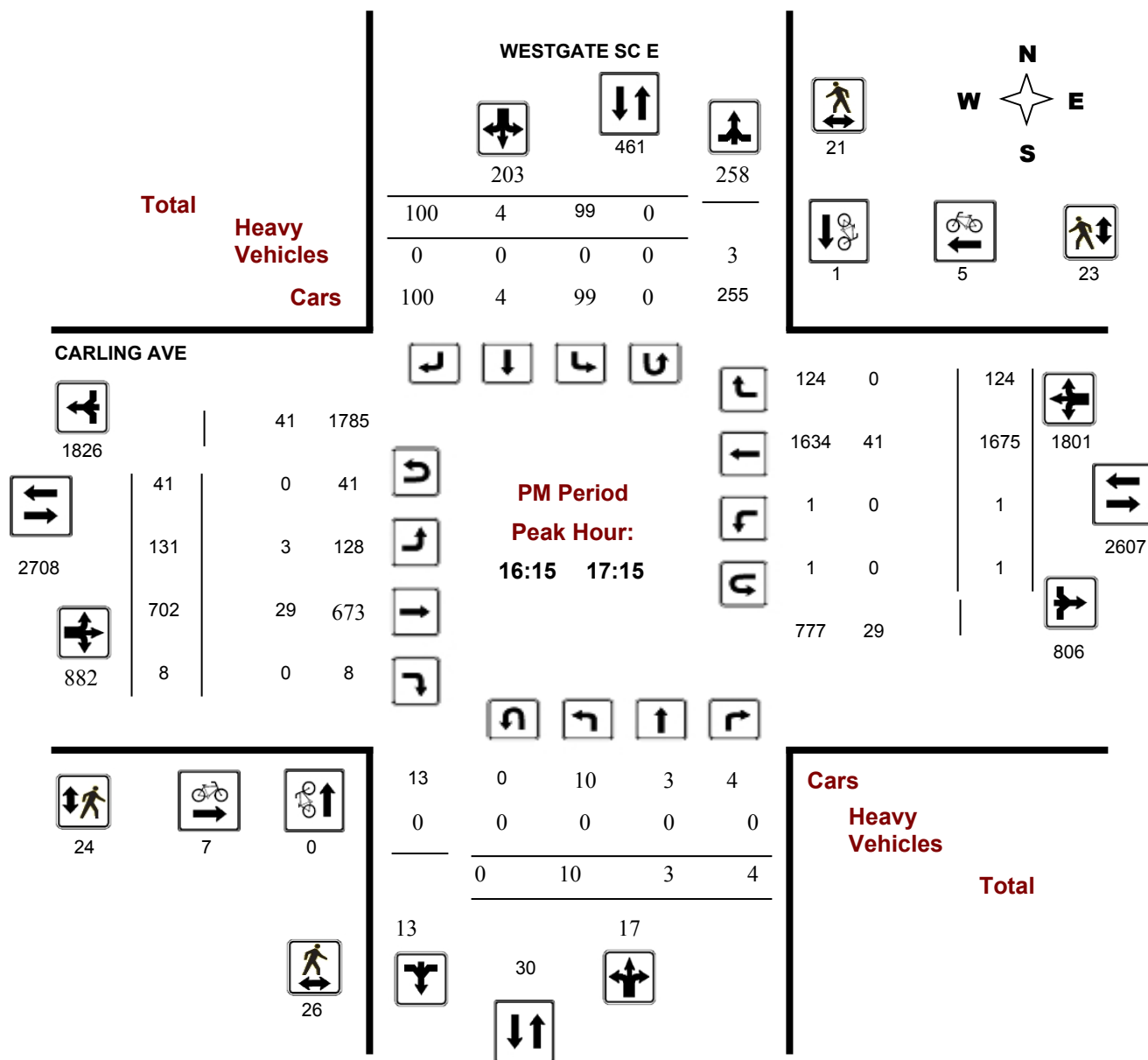
CARLING AVE @ WESTGATE SC E

Survey Date: Wednesday, June 17, 2015

Start Time: 07:00

WO No: 34721

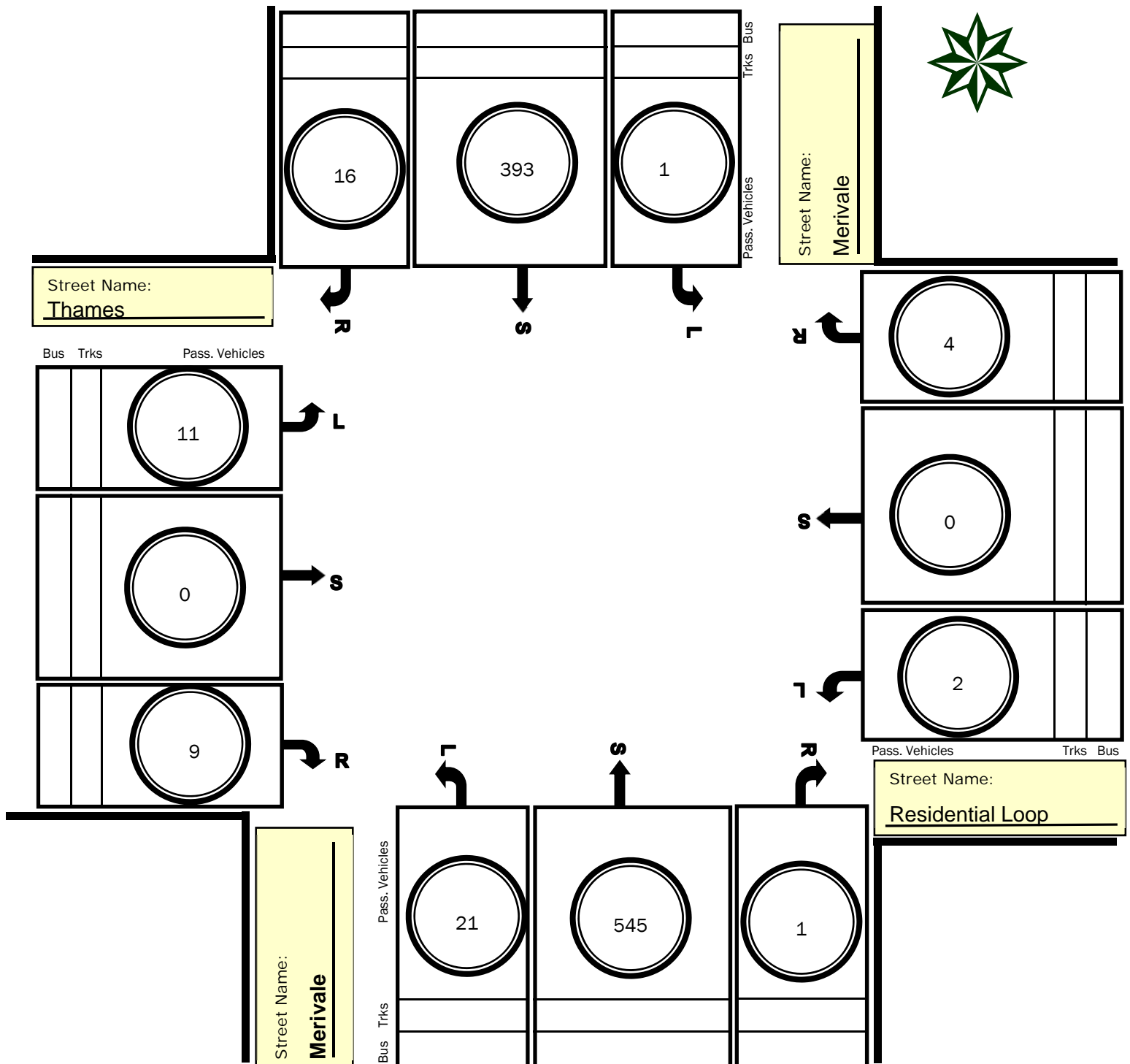
Device: Jamar Technologies, Inc



Intersection: Thames at Merivale
DATE: Day: 16 Month: March Year: 2017 Day of Week: Thursday
Observer: Matt Mantle Weather: Clear

TIME PERIOD: From: 8 : 15 To: 9 : 15

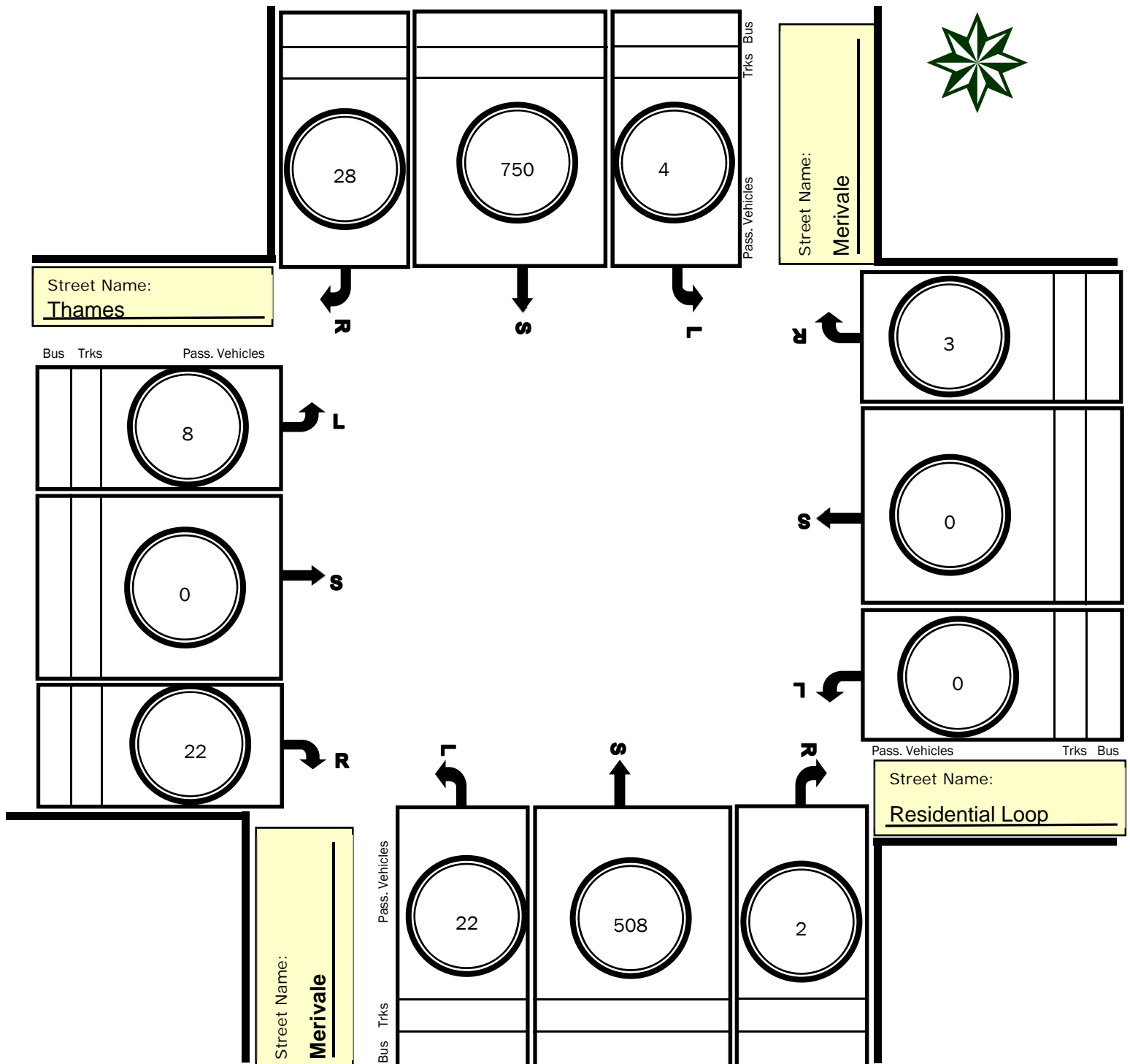
N



Intersection: Thames at Merivale
DATE: Day: 16 Month: March Year: 2017 Day of Week: Thursday
Observer: Matt Mantle Weather: Clear

TIME PERIOD: From: 4 : 00 To: 5 : 00















N



Appendix B

SYNCHRO Capacity Analysis – Existing Conditions

Existing AM
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	187	1820	187	369	339	336	439
Future Volume (vph)	187	1820	187	369	339	336	439
Lane Group Flow (vph)	177	1936	197	388	357	354	462
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	58.0	58.0	58.0	38.0	38.0	24.0	62.0
Total Split (%)	48.3%	48.3%	48.3%	31.7%	31.7%	20.0%	51.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	55.7	55.7	55.7	32.3	32.3	56.3	56.3
Actuated g/C Ratio	0.46	0.46	0.46	0.27	0.27	0.47	0.47
v/c Ratio	0.26	0.91	0.26	0.43	0.88	0.75	0.55
Control Delay	21.5	37.5	6.0	37.5	64.6	29.7	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	21.5	37.5	6.0	37.5	64.6	29.7	24.1
LOS	C	D	A	D	E	C	C
Approach Delay		33.6		50.5			26.5
Approach LOS		C		D			C
Queue Length 50th (m)	29.6	164.1	5.1	38.9	78.9	50.7	81.2
Queue Length 95th (m)	48.2	#194.8	18.6	53.2	#127.0	78.4	112.9
Internal Link Dist (m)		161.6		158.6			152.2
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	676	2136	751	960	429	474	862
Starvation Cap Reductn	0	0	0	0	0	0	127
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.91	0.26	0.40	0.83	0.75	0.63

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 35.4

Intersection LOS: D

Intersection Capacity Utilization 82.6%

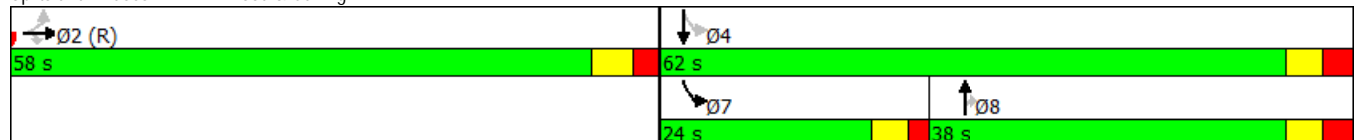
ICU Level of Service E

Analysis Period (min) 15



















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Existing AM
2: Merivale & Carling

									
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	910	181	561	152	237	352	24	268	238
Future Volume (vph)	910	181	561	152	237	352	24	268	238
Lane Group Flow (vph)	1045	191	623	160	249	371	25	282	251
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	49.0	12.0	61.0	21.0	38.0	38.0	21.0	38.0	38.0
Total Split (%)	40.8%	10.0%	50.8%	17.5%	31.7%	31.7%	17.5%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	49.2	64.9	64.9	16.1	38.4	38.4	9.6	27.1	27.1
Actuated g/C Ratio	0.41	0.54	0.54	0.13	0.32	0.32	0.08	0.23	0.23
v/c Ratio	0.53	0.66	0.24	0.70	0.44	0.54	0.18	0.70	0.52
Control Delay	22.6	30.2	15.5	66.9	35.3	8.3	54.0	51.9	13.1
Queue Delay	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	30.2	15.5	66.9	35.3	8.3	54.0	51.9	13.1
LOS	C	C	B	E	D	A	D	D	B
Approach Delay	22.9		19.0		28.9			34.5	
Approach LOS	C		B		C			C	
Queue Length 50th (m)	48.3	23.1	27.6	36.2	48.1	7.0	5.6	61.1	9.6
Queue Length 95th (m)	62.7	#56.7	39.4	#62.2	69.3	32.1	14.1	84.3	31.4
Internal Link Dist (m)	89.4		139.3		159.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1970	289	2605	240	570	690	240	505	551
Starvation Cap Reductn	381	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.66	0.24	0.67	0.44	0.54	0.10	0.56	0.46

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 25.4

Intersection LOS: C

Intersection Capacity Utilization 75.2%








ICU Level of Service D

Analysis Period (min) 15


















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Merivale & Carling

			
12 s	49 s	21 s	38 s
			
61 s		21 s	38 s

Existing AM
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	75	159	892	2	753	16	2	38	0	35
Future Volume (vph)	75	159	892	2	753	16	2	38	0	35
Lane Group Flow (vph)	0	246	953	2	864	0	24	0	40	37
Turn Type	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases			2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	2	2	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	23.6	23.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	83.0	83.0	83.0	83.0	83.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	69.2%	69.2%	69.2%	69.2%	69.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		99.1	99.1	99.1	99.1		17.1		17.1	17.1
Actuated g/C Ratio		0.83	0.83	0.83	0.83		0.14		0.14	0.14
v/c Ratio		0.54	0.24	0.00	0.22		0.12		0.22	0.15
Control Delay		5.7	1.9	5.0	3.5		35.7		45.4	12.9
Queue Delay		0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay		5.7	1.9	5.0	3.6		35.7		45.4	12.9
LOS		A	A	A	A		D		D	B
Approach Delay			2.7		3.6		35.7		29.8	
Approach LOS			A		A		D		C	
Queue Length 50th (m)		5.4	5.5	0.1	15.6		4.1		8.8	0.0
Queue Length 95th (m)		m16.2	m17.1	m0.4	29.2		10.0		16.0	8.1
Internal Link Dist (m)			168.6		89.4		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		454	4012	415	3951		381		357	433
Starvation Cap Reductn		0	0	0	1579		0		0	0
Spillback Cap Reductn		0	0	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.54	0.24	0.00	0.36		0.06		0.11	0.09

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 4.4

Intersection LOS: A

Intersection Capacity Utilization 72.8%

ICU Level of Service C

Analysis Period (min) 15













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

Splits and Phases: 3: Carling & Westgate SC

			
			
83 s			37 s
			
83 s			37 s

Existing AM

4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	336	1117	280	307	352	360
Future Volume (vph)	336	1117	280	307	352	360
Lane Group Flow (vph)	319	1475	295	323	371	379
Turn Type	Perm	NA	pm+pt	NA	NA	Perm
Protected Phases		6	3	8	4	
Permitted Phases	6		8			4
Detector Phase	6	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	35.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	58.0	58.0	24.0	62.0	38.0	38.0
Total Split (%)	48.3%	48.3%	20.0%	51.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	C-Max	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	57.7	57.7	54.3	54.3	31.2	31.2
Actuated g/C Ratio	0.48	0.48	0.45	0.45	0.26	0.26
v/c Ratio	0.46	0.69	0.64	0.40	0.42	0.85
Control Delay	24.5	26.2	20.2	15.3	38.0	49.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	26.2	20.2	15.3	38.0	49.6
LOS	C	C	C	B	D	D
Approach Delay		25.9		17.7	43.8	
Approach LOS		C		B	D	
Queue Length 50th (m)	60.2	105.1	48.9	53.8	37.0	63.8
Queue Length 95th (m)	90.5	124.2	m70.5	m76.2	51.0	#110.7
Internal Link Dist (m)		110.3		152.2	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	698	2139	467	862	960	478
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.69	0.63	0.37	0.39	0.79

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 28.5

Intersection LOS: C

Intersection Capacity Utilization 82.6%

ICU Level of Service E














Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

















Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Kirkwood & Carling WB















		
	Ø3	Ø4
	24 s	38 s
		
	Ø6 (R)	
	58 s	
		
	Ø8	
	62 s	

Existing AM
5: Merivale & Thames

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	9	2	0	4	21	726	1	1	515	16
Future Volume (Veh/h)	11	0	9	2	0	4	21	726	1	1	515	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	0	9	2	0	4	22	764	1	1	542	17
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											184	
pX, platoon unblocked												
vC, conflicting volume	982	1362	280	1090	1370	382	559			765		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	982	1362	280	1090	1370	382	559			765		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	99	99	100	99	98			100		
cM capacity (veh/h)	198	144	718	164	142	616	1008			844		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	21	6	404	383	272	288						
Volume Left	12	2	22	0	1	0						
Volume Right	9	4	0	1	0	17						
cSH	288	321	1008	1700	844	1700						
Volume to Capacity	0.07	0.02	0.02	0.23	0.00	0.17						
Queue Length 95th (m)	1.8	0.4	0.5	0.0	0.0	0.0						
Control Delay (s)	18.5	16.4	0.7	0.0	0.0	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	18.5	16.4	0.4		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.6									
Intersection Capacity Utilization			47.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Existing PM

1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	419	1133	330	328	258	311	372
Future Volume (vph)	419	1133	330	328	258	311	372
Lane Group Flow (vph)	392	1242	347	345	272	327	392
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	61.0	61.0	61.0	29.0	29.0	30.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	24.2%	24.2%	25.0%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	58.9	58.9	58.9	24.5	24.5	53.1	53.1
Actuated g/C Ratio	0.49	0.49	0.49	0.20	0.20	0.44	0.44
v/c Ratio	0.55	0.55	0.41	0.50	0.88	0.67	0.50
Control Delay	25.6	22.9	5.9	45.0	74.6	15.3	11.9
Queue Delay	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	22.9	5.9	45.0	74.6	15.3	11.9
LOS	C	C	A	D	E	B	B
Approach Delay		20.5		58.0			13.5
Approach LOS		C		E			B
Queue Length 50th (m)	75.1	79.4	8.8	37.9	62.3	20.0	73.2
Queue Length 95th (m)	110.9	94.3	27.9	52.7	#108.3	m57.4	m100.2
Internal Link Dist (m)		161.6		158.6			144.7
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	715	2256	844	712	318	500	817
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	52	109	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.58	0.41	0.48	0.86	0.65	0.48

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 81 (68%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 26.0

Intersection LOS: C

Intersection Capacity Utilization 95.8%

ICU Level of Service F

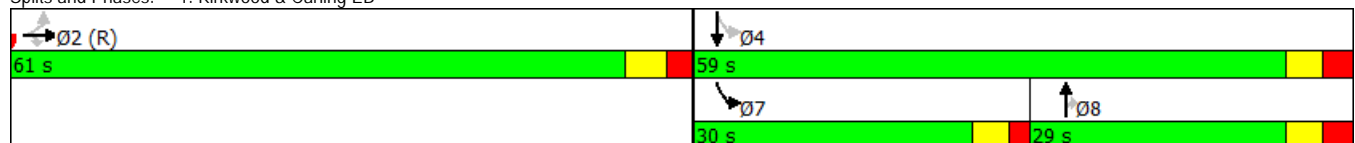
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Kirkwood & Carling EB



Existing PM
2: Merivale & Carling

	→	↖	←	↙	↑	↗	↘	↓	↕
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↑	↗	↖	↑	↗
Traffic Volume (vph)	618	430	1530	126	199	245	59	285	122
Future Volume (vph)	618	430	1530	126	199	245	59	285	122
Lane Group Flow (vph)	825	453	1692	133	209	258	62	300	128
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	42.0	20.0	62.0	20.0	38.0	38.0	20.0	38.0	38.0
Total Split (%)	35.0%	16.7%	51.7%	16.7%	31.7%	31.7%	16.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	38.0	65.4	65.4	14.8	33.0	33.0	12.0	27.8	27.8
Actuated g/C Ratio	0.32	0.54	0.54	0.12	0.28	0.28	0.10	0.23	0.23
v/c Ratio	0.54	1.01	0.64	0.64	0.43	0.44	0.37	0.73	0.29
Control Delay	26.7	71.3	21.5	64.1	38.9	6.5	55.7	52.7	6.8
Queue Delay	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	71.3	21.6	64.1	38.9	6.5	55.7	52.7	6.8
LOS	C	E	C	E	D	A	E	D	A
Approach Delay	27.4		32.1		30.5			41.1	
Approach LOS	C		C		C			D	
Queue Length 50th (m)	33.1	~87.1	100.5	29.9	40.9	0.0	13.9	65.4	0.0
Queue Length 95th (m)	42.1	#172.0	130.1	50.4	62.0	19.3	26.8	89.9	13.0
Internal Link Dist (m)	81.2		139.3		161.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1519	450	2630	226	511	602	226	505	510
Starvation Cap Reductn	340	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	104	0	0	0	0	0	2
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	1.01	0.67	0.59	0.41	0.43	0.27	0.59	0.25

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 32.0

Intersection LOS: C

Intersection Capacity Utilization 85.5%

ICU Level of Service E

Analysis Period (min) 15

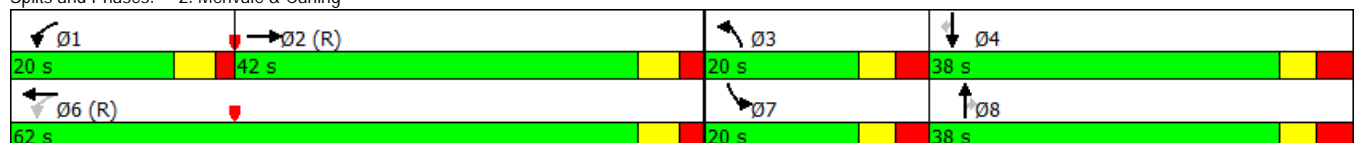
~ Volume exceeds capacity, queue is theoretically infinite.

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: 2: Merivale & Carling



Existing PM
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	41	131	702	1	1675	10	3	99	4	100
Future Volume (vph)	41	131	702	1	1675	10	3	99	4	100
Lane Group Flow (vph)	0	181	747	1	1894	0	18	0	108	105
Turn Type	pm+pt	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	5	2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	5	5	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.6	10.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	24.0	24.0	83.0	59.0	59.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	20.0%	20.0%	69.2%	49.2%	49.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		91.6	91.6	73.9	73.9		20.4		20.4	20.4
Actuated g/C Ratio		0.76	0.76	0.62	0.62		0.17		0.17	0.17
v/c Ratio		0.67	0.20	0.00	0.64		0.07		0.51	0.31
Control Delay		42.4	2.9	6.0	6.9		32.0		52.0	9.3
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay		42.4	2.9	6.0	6.9		32.0		52.0	9.3
LOS		D	A	A	A		C		D	A
Approach Delay			10.6		6.9		32.0		30.9	
Approach LOS			B		A		C		C	
Queue Length 50th (m)		22.6	9.7	0.0	20.5		2.9		23.8	0.0
Queue Length 95th (m)		m47.7	m16.3	m0.0	95.2		8.1		36.4	12.9
Internal Link Dist (m)			162.3		81.2		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		354	3709	379	2955		392		344	476
Starvation Cap Reductn		0	0	0	47		0		0	0
Spillback Cap Reductn		0	0	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.51	0.20	0.00	0.65		0.05		0.31	0.22

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 9.9

Intersection LOS: A

Intersection Capacity Utilization 95.6%

ICU Level of Service F

Analysis Period (min) 15













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

Splits and Phases: 3: Carling & Westgate SC



Existing PM

4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	200	2185	227	545	481	410
Future Volume (vph)	200	2185	227	545	481	410
Lane Group Flow (vph)	190	2653	239	574	506	432
Turn Type	Perm	NA	pm+pt	NA	NA	Perm
Protected Phases		6	3	8	4	
Permitted Phases	6		8			4
Detector Phase	6	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	35.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	67.0	67.0	20.0	53.0	33.0	33.0
Total Split (%)	55.8%	55.8%	16.7%	44.2%	27.5%	27.5%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	C-Max	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	63.0	63.0	49.0	49.0	29.5	29.5
Actuated g/C Ratio	0.52	0.52	0.41	0.41	0.25	0.25
v/c Ratio	0.25	1.13	0.71	0.79	0.61	1.05
Control Delay	16.7	91.6	34.2	39.9	43.9	93.6
Queue Delay	0.0	0.0	0.0	5.2	0.0	0.0
Total Delay	16.7	91.6	34.2	45.1	43.9	93.6
LOS	B	F	C	D	D	F
Approach Delay		86.6		41.9	66.8	
Approach LOS		F		D	E	
Queue Length 50th (m)	27.3	~279.9	47.7	135.6	56.2	~96.0
Queue Length 95th (m)	43.9	#309.3	66.0	177.9	74.2	#158.3
Internal Link Dist (m)		113.3		144.7	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	762	2353	345	728	834	412
Starvation Cap Reductn	0	0	0	102	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	1.13	0.69	0.92	0.61	1.05

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 74.6

Intersection LOS: E

Intersection Capacity Utilization 95.8%

ICU Level of Service F

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: Kirkwood & Carling WB



Existing PM
5: Merivale & Thames

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	22	0	0	3	22	559	2	4	848	28
Future Volume (Veh/h)	8	0	22	0	0	3	22	559	2	4	848	28
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	8	0	23	0	0	3	23	588	2	4	893	29
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)											186	
pX, platoon unblocked												
vC, conflicting volume	1258	1552	461	1112	1565	295	922			590		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1258	1552	461	1112	1565	295	922			590		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	96	100	100	100	97			100		
cM capacity (veh/h)	123	109	547	152	106	701	736			982		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	31	3	317	296	450	476						
Volume Left	8	0	23	0	4	0						
Volume Right	23	3	0	2	0	29						
cSH	290	701	736	1700	982	1700						
Volume to Capacity	0.11	0.00	0.03	0.17	0.00	0.28						
Queue Length 95th (m)	2.7	0.1	0.7	0.0	0.1	0.0						
Control Delay (s)	18.9	10.2	1.1	0.0	0.1	0.0						
Lane LOS	C	B	A		A							
Approach Delay (s)	18.9	10.2	0.6		0.1							
Approach LOS	C	B										
Intersection Summary												
Average Delay			0.6									
Intersection Capacity Utilization			48.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Appendix C

Collision Data and Analysis

Total Area

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	40	39	39	15	0	6	0	2	141
Non-fatal injury	9	10	4	3	0	2	0	0	28
Non reportable	1	0	0	0	0	0	0	0	1
Total	50	49	43	18	0	8	0	2	170
	#1 or 29%	#2 or 29%	#3 or 25%	#4 or 11%	#7 or 0%	#5 or 5%	#7 or 0%	#6 or 1%	

83%
16%
1%
100%

CARLING AVE/KIRKWOOD AVE N

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	64	43,304	1095	1.35

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	12	18	19	4	0	2	0	1	56
Non-fatal injury	2	3	1	1	0	1	0	0	8
Non reportable	0	0	0	0	0	0	0	0	0
Total	14	21	20	5	0	3	0	1	64
	22%	33%	31%	8%	0%	5%	0%	2%	

88%
13%
0%
100%

CARLING AVE/KIRKWOOD AVE S

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	56	39,305	1095	1.30

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	19	10	11	3	0	2	0	1	46
Non-fatal injury	4	2	2	1	0	1	0	0	10
Non reportable	0	0	0	0	0	0	0	0	0
Total	23	12	13	4	0	3	0	1	56
	41%	21%	23%	7%	0%	5%	0%	2%	

82%
18%
0%
100%

CARLING AVE/WESTGATE SC - E

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	11	28,640	1095	0.35

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	1	3	1	3	0	1	0	0	9
Non-fatal injury	1	1	0	0	0	0	0	0	2
Non reportable	0	0	0	0	0	0	0	0	0
Total	2	4	1	3	0	1	0	0	11
	18%	36%	9%	27%	0%	9%	0%	0%	

82%
18%
0%
100%

CARLING AVE/MERIVALE RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	36	33,814	1095	0.97

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	7	8	7	5	0	0	0	0	27
Non-fatal injury	2	4	1	1	0	0	0	0	8
Non reportable	1	0	0	0	0	0	0	0	1
Total	10	12	8	6	0	0	0	0	36
	28%	33%	22%	17%	0%	0%	0%	0%	

75%
22%
3%
100%



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2015

Location: ALPINE AVE @ CARLING AVE

Traffic Control: Traffic signal

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2015-Jun-10, Wed,07:20	Clear	Angle	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	
					West	Turning right	Automobile, station wagon	Other motor vehicle	

Location: CARLING AVE @ KIRKWOOD AVE S

Traffic Control: Traffic signal

Total Collisions: 44

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-07, Tue,05:56	Clear	Sideswipe	P.D. only	Wet	East	Turning left	Snow plow	Other motor vehicle	
					East	Stopped	Truck - closed	Other motor vehicle	
2014-Feb-01, Sat,17:30	Snow	Rear end	P.D. only	Loose snow	South	Slowing or stopping	Pick-up truck	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Mar-01, Sat,08:27	Clear	Turning movement	P.D. only	Slush	South	Turning left	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Passenger van	Other motor vehicle	
2014-Mar-31, Mon,08:20	Clear	Sideswipe	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	

2014-Mar-04, Tue,12:20	Unknown	Rear end	Non-fatal injury	Unknown	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Stopped	Passenger van	Other motor vehicle
2014-May-13, Tue,12:08	Clear	Sideswipe	P.D. only	Dry	East	Overtaking	Unknown	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle
2014-May-01, Thu,18:30	Clear	Turning movement	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle
2014-May-22, Thu,15:00	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2014-May-30, Fri,13:50	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2014-May-29, Thu,15:37	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2014-Jun-19, Thu,11:37	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Passenger van	Other motor vehicle

2014-Jun-28, Sat,07:00	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Pick-up truck	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2014-Sep-25, Thu,08:50	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2014-Sep-02, Tue,20:00	Rain	Rear end	P.D. only	Wet	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Stopped	Passenger van	Other motor vehicle
2014-Sep-08, Mon,11:35	Clear	Sideswipe	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle
					South	Going ahead	Truck - closed	Other motor vehicle
2014-Dec-05, Fri,20:16	Clear	Angle	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2014-Oct-20, Mon,11:15	Clear	Angle	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jan-22, Thu,17:54	Clear	Turning movement	P.D. only	Dry	South	Turning left	Pick-up truck	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2015-May-08, Fri,13:36	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle

					North	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Dec-23, Tue,13:15	Rain	Rear end	P.D. only	Wet	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Pick-up truck	Other motor vehicle
2014-Dec-22, Mon,14:30	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2015-Feb-14, Sat,09:23	Snow	Rear end	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jan-03, Sat,18:06	Snow	Turning movement	P.D. only	Loose snow	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Apr-09, Wed,18:35	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2015-Jan-16, Fri,23:07	Clear	Turning movement	P.D. only	Wet	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Feb-05, Thu,15:36	Clear	Other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Turning left	Truck - closed	Other motor vehicle

2015-Apr-09, Thu,10:55	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jan-14, Wed,15:15	Clear	Rear end	P.D. only	Dry	East	Changing lanes	Pick-up truck	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Mar-16, Mon,15:02	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2015-Feb-08, Sun,08:01	Snow	SMV other	P.D. only	Ice	East	Turning left	Automobile, station wagon	Pole (utility, power)
2014-Sep-24, Wed,08:30	Clear	Turning movement	P.D. only	Dry	East	Turning left	Truck and trailer	Other motor vehicle
					East	Going ahead	Passenger van	Other motor vehicle
2014-Dec-18, Thu,06:15	Snow	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2015-Jan-12, Mon,18:30	Snow	Rear end	P.D. only	Loose snow	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2015-May-05, Tue,17:27	Clear	Turning movement	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle

					East	Turning left	Automobile, station wagon	Other motor vehicle
2015-Feb-23, Mon,10:50	Clear	Rear end	P.D. only	Wet	East	Turning right	Tow truck	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle
2015-Aug-16, Sun,20:14	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jul-29, Wed,15:10	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle
					North	Stopped	Municipal transit bus	Other motor vehicle
2015-Aug-30, Sun,16:14	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2015-Oct-14, Wed,18:13	Clear	Rear end	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle
2015-Oct-12, Mon,18:39	Clear	Rear end	Non-fatal injury	Dry	South	Turning left	Passenger van	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2015-Jul-25, Sat,12:32	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Pick-up truck	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle

2015-Dec-17, Thu,07:42	Rain	Rear end	P.D. only	Wet	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle
2015-Dec-23, Wed,19:57	Rain	Rear end	P.D. only	Wet	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Stopped	Passenger van	Other motor vehicle
2015-Oct-30, Fri,16:59	Clear	Rear end	Non-fatal injury	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle

Location: CARLING AVE @ MERIVALE RD

Traffic Control: Traffic signal

Total Collisions: 23

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-15, Wed,07:31	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Feb-14, Fri,10:23	Clear	Turning movement	P.D. only	Loose snow	West	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Passenger van	Other motor vehicle	
2014-Feb-13, Thu,09:15	Clear	Rear end	P.D. only	Dry	East	Going ahead	Passenger van	Other motor vehicle	

					East	Turning right	Automobile, station wagon	Other motor vehicle
2014-Apr-06, Sun,16:04	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Feb-28, Fri,16:57	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2014-May-14, Wed,16:15	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Aug-05, Tue,15:39	Clear	Angle	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Passenger van	Other motor vehicle
2014-Oct-03, Fri,13:08	Clear	Rear end	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					East	Turning right	Truck - closed	Other motor vehicle
2014-Nov-20, Thu,17:31	Clear	Rear end	P.D. only	Wet	South	Going ahead	Pick-up truck	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2014-Oct-08, Wed,10:51	Clear	Turning movement	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle

2014-Aug-14, Thu,15:00	Rain	Turning movement	P.D. only	Wet	West	Turning right	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle
2015-Apr-24, Fri,22:09	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2015-Feb-20, Fri,13:24	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle
					North	Turning left	Automobile, station wagon	Other motor vehicle
2015-Jan-05, Mon,14:09	Clear	Rear end	P.D. only	Dry	East	Unknown	Unknown	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Mar-02, Mon,17:53	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jul-19, Sun,17:10	Clear	Turning movement	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2015-Feb-03, Tue,16:12	Snow	Angle	P.D. only	Loose snow	East	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle

2015-Apr-07, Tue,13:30	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Turning left	Passenger van	Other motor vehicle
2015-Apr-04, Sat,23:40	Clear	Angle	P.D. only	Dry	North	Going ahead	Police vehicle	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-May-27, Wed,16:41	Clear	Angle	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Feb-17, Tue,13:36	Clear	Sideswipe	Non-fatal injury	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Passenger van	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2015-May-26, Tue,15:00	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Dec-09, Wed,20:15	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle

Location: CARLING AVE @ WESTGATE SC E

Traffic Control: Traffic signal

Total Collisions: 6

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
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2014-Jun-02, Mon,09:21	Clear	Rear end	Non-fatal injury	Dry	East	Turning left	Pick-up truck	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle
2015-Feb-04, Wed,15:15	Snow	Angle	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Skidding/sliding
					South	Turning left	Automobile, station wagon	Other motor vehicle
2015-May-12, Tue,10:09	Clear	Angle	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					West	Stopped	Municipal transit bus	Other motor vehicle
2015-Sep-24, Thu,16:40	Clear	Angle	P.D. only	Dry	East	Going ahead	Passenger van	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2015-May-20, Wed,10:08	Clear	Turning movement	P.D. only	Dry	East	Turning left	Passenger van	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jan-03, Sat,19:34	Snow	Sideswipe	P.D. only	Packed snow	South	Turning right	Municipal transit bus	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle

Location: KIRKWOOD AVE N @ CARLING AVE

Traffic Control: Traffic signal

Total Collisions: 39

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
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2014-Jan-31, Fri,11:52	Clear	Turning movement	P.D. only	Dry	West	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Passenger van	Other motor vehicle
2014-Mar-27, Thu,14:57	Clear	Sideswipe	Non-fatal injury	Dry	West	Turning left	Pick-up truck	Other motor vehicle
					West	Turning left	Pick-up truck	Other motor vehicle
2014-Feb-27, Thu,10:47	Snow	Turning movement	P.D. only	Wet	West	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Truck - closed	Other motor vehicle
2014-Apr-28, Mon,14:37	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2014-Apr-19, Sat,14:15	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2014-May-21, Wed,11:39	Clear	Turning movement	P.D. only	Dry	West	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2014-May-16, Fri,17:50	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Jun-16, Mon,11:00	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Delivery van	Other motor vehicle

					West	Stopped	Pick-up truck	Other motor vehicle
2014-Jun-27, Fri,11:00	Clear	Sideswipe	P.D. only	Dry	West	Turning left	Unknown	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2014-Jun-18, Wed,10:08	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Passenger van	Other motor vehicle
					West	Going ahead	Passenger van	Other motor vehicle
2014-Feb-25, Tue,14:07	Clear	Turning movement	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Pick-up truck	Other motor vehicle
2014-Nov-02, Sun,13:15	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Turning right	Truck and trailer	Other motor vehicle
2014-Nov-02, Sun,13:30	Clear	Turning movement	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2014-Sep-07, Sun,19:57	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jan-13, Tue,09:12	Clear	Sideswipe	P.D. only	Loose snow	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle

2015-Jan-28, Wed,17:30	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2014-Oct-29, Wed,11:30	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Passenger van	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Dec-05, Fri,15:37	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Passenger van	Other motor vehicle
2015-Mar-03, Tue,10:32	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Passenger van	Other motor vehicle
					West	Turning left	Truck - closed	Other motor vehicle
2015-Apr-02, Thu,14:52	Clear	Turning movement	P.D. only	Dry	West	Turning left	Ambulance	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2015-Jul-07, Tue,18:11	Clear	Turning movement	P.D. only	Dry	West	Turning left	Passenger van	Other motor vehicle
					West	Going ahead	Passenger van	Other motor vehicle
2015-Jun-29, Mon,10:29	Rain	Sideswipe	P.D. only	Wet	West	Turning left	Truck and trailer	Other motor vehicle
					West	Turning left	Passenger van	Other motor vehicle

2015-Jun-30, Tue,21:59	Clear	Sideswipe	P.D. only	Dry	North	Turning left	Unknown	Other motor vehicle
					North	Turning left	Automobile, station wagon	Other motor vehicle
2015-Jan-06, Tue,12:30	Clear	Rear end	P.D. only	Dry	West	Changing lanes	Unknown	Other motor vehicle
					West	Turning left	Passenger van	Other motor vehicle
2014-Dec-19, Fri,13:40	Clear	Rear end	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Truck - dump	Other motor vehicle
2014-Dec-31, Wed,10:59	Clear	SMV other	P.D. only	Dry	North	Turning left	Automobile, station wagon	Animal - domestic
2015-Jan-13, Tue,06:05	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2015-Feb-16, Mon,17:34	Clear	Angle	Non-fatal injury	Wet	North	Going ahead	Passenger van	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Feb-27, Fri,13:17	Clear	Rear end	P.D. only	Wet	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2015-May-14, Thu,14:22	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle

					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-May-28, Thu,08:10	Clear	SMV other	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Curb
2015-Aug-09, Sun,21:30	Clear	Turning movement	P.D. only	Dry	West	Going ahead	Unknown	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2015-Dec-21, Mon,11:24	Freezing Rain	Sideswipe	P.D. only	Slush	West	Changing lanes	Passenger van	Other motor vehicle
					West	Going ahead	Truck - closed	Other motor vehicle
2015-Nov-13, Fri,20:03	Rain	Turning movement	P.D. only	Wet	West	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2015-Oct-09, Fri,14:38	Clear	Rear end	P.D. only	Wet	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2015-Dec-17, Thu,17:30	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Nov-24, Tue,10:20	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle

2015-Nov-25, Wed,18:12	Clear	Rear end	P.D. only	Dry	West	Unknown	Unknown	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2015-Dec-14, Mon,18:40	Clear	Turning movement	P.D. only	Wet	West	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2015

Location: MERIVALE RD @ THAMES ST

Traffic Control: Stop sign

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2015-Apr-13, Mon, 11:07	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Pick-up truck	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2013-01-01 TO: 2014-01-01

CARLING AVE & KIRKWOOD AVE N

Former Municipality: Ottawa

Traffic Control: Traffic signal

Number of Collisions: 25

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2013-01-21	Mo	20:45	Clear	Dark	Turning	Non-fatal	V1 W V2 W	Dry Dry	Turning left Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
2	2013-01-23	We	14:11	Clear	Daylight	Turning	P.D. only	V1 W V2 W	Dry Dry	Turning left Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
3	2013-01-24	Thu	08:17	Clear	Daylight	Rear end	P.D. only	V1 W V2 W	Ice Ice	Slowing or Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
4	2013-03-19	Tue	17:15	Clear	Daylight	Other	P.D. only	V1 N V2 S	Dry Dry	Reversing Stopped	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
5	COMMENTS: EXACT LOCATION UNKNOWN												
	2013-05-30	Thu	16:27	Clear	Daylight	Sideswipe	P.D. only	V1 S V2 S	Dry Dry	Merging Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
6	2013-06-12	We	18:30	Clear	Daylight	Rear end	P.D. only	V1 W V2 W	Dry Dry	Going ahead Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
7	2013-06-14	Fri	18:10	Clear	Daylight	Turning	P.D. only	V1 W V2 W	Dry Dry	Turning left Going ahead	Passenger van Automobile, station	Other motor vehicle Other motor vehicle	0
8	2013-06-24	Mo	12:29	Clear	Daylight	Rear end	P.D. only	V1 W V2 W	Dry Dry	Turning left Stopped	Passenger van Pick-up truck	Other motor vehicle Other motor vehicle	0
9	2013-07-10	We	18:56	Clear	Daylight	Turning	P.D. only	V1 E V2 E	Dry Dry	Turning left Going ahead	Pick-up truck Pick-up truck	Other motor vehicle Other motor vehicle	0
10	2013-07-17	We	10:00	Clear	Daylight	Sideswipe	P.D. only	V1 W V2 W	Dry Dry	Changing lanes Turning left	Unknown Pick-up truck	Other motor vehicle Other motor vehicle	0
11	2013-07-29	Mo	15:20	Clear	Daylight	Rear end	P.D. only	V1 W V2 W	Dry Dry	Going ahead Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
12	2013-08-07	We	17:29	Rain	Daylight	Rear end	P.D. only	V1 S V2 S	Wet Wet	Turning right Turning right	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
13	2013-08-19	Mo	18:03	Clear	Daylight	Turning	P.D. only	V1 W V2 W	Dry Dry	Turning right Going ahead	Automobile, station Municipal transit bus	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Thursday, March 23, 2017

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2013-01-01

TO: 2014-01-01

14	2013-08-21	We	17:15	Clear	Daylight	Rear end	Non-fatal	V1 N V2 N	Dry Dry	Going ahead Stopped	Pick-up truck Pick-up truck	Other motor vehicle Other motor vehicle	0
15	2013-09-06	Fri	08:50	Clear	Daylight	Sideswipe	P.D. only	V1 W V2 W	Dry Dry	Going ahead Going ahead	Unknown Automobile, station	Other motor vehicle Other motor vehicle	0
16	2013-09-11	We	14:45	Clear	Daylight	Sideswipe	P.D. only	V1 W V2 W	Dry Dry	Changing lanes Going ahead	Pick-up truck Automobile, station	Other motor vehicle Other motor vehicle	0
17	2013-10-02	We	11:11	Clear	Daylight	Single vehicle	Non-fatal	V1 W	Dry	Turning left	Municipal transit bus	Other Moveable	0
18	2013-10-03	Thu	12:01	Clear	Daylight	Sideswipe	P.D. only	V1 W V2 W	Dry Dry	Changing lanes Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
19	2013-10-20	Sun	15:22	Clear	Daylight	Rear end	P.D. only	V1 W V2 W	Dry Dry	Turning left Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
20	2013-10-27	Sun	17:46	Clear	Daylight	Sideswipe	P.D. only	V1 W V2 W	Dry Dry	Merging Going ahead	Truck - closed Passenger van	Other motor vehicle Other motor vehicle	0
21	2013-11-05	Tue	17:44	Clear	Dark	Sideswipe	P.D. only	V1 W V2 W	Dry Dry	Changing lanes Going ahead	Pick-up truck Pick-up truck	Other motor vehicle Other motor vehicle	0
22	2013-11-05	Tue	17:40	Clear	Dark	Turning	P.D. only	V1 W V2 W	Dry Dry	Going ahead Turning left	Unknown Automobile, station	Other motor vehicle Other motor vehicle	0
23	2013-12-18	We	13:00	Clear	Daylight	Rear end	P.D. only	V1 W V2 W	Slush Slush	Going ahead Slowing or	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
24	2013-12-19	Thu	13:20	Clear	Daylight	Rear end	Non-fatal	V1 W V2 W	Wet Wet	Turning right Turning right	Pick-up truck Automobile, station	Other motor vehicle Other motor vehicle	0
25	2013-12-20	Fri	06:48	Snow	Dark	Angle	P.D. only	V1 W V2 N	Loose snow Loose snow	Going ahead Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Thursday, March 23, 2017

Page 2 of 5

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2013-01-01 TO: 2014-01-01

CARLING AVE & KIRKWOOD AVE S

Former Municipality: Ottawa

Traffic Control: Traffic signal

Number of Collisions: 12

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
26	2013-01-07	Mo	09:50	Clear	Daylight	Sideswipe	P.D. only	V1 E V2 E	Wet Wet	Changing lanes Going ahead	Truck - dump Automobile, station	Other motor vehicle Other motor vehicle	0
27	2013-01-16	We	13:50	Clear	Daylight	Angle	Non-fatal	V1 E V2 S	Dry Dry	Going ahead Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
28	2013-01-25	Fri	08:11	Clear	Daylight	Sideswipe	P.D. only	V1 E V2 E	Ice Dry	Changing lanes Going ahead	Automobile, station Truck - dump	Other motor vehicle Other motor vehicle	0
29	2013-04-27	Sat	16:10	Clear	Daylight	Rear end	Non-fatal	V1 N V2 N	Dry Dry	Turning right Turning right	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
30	2013-05-03	Fri	15:12	Clear	Daylight	Rear end	P.D. only	V1 E V2 E	Dry Dry	Slowing or Stopped	Automobile, station Delivery van	Other motor vehicle Other motor vehicle	0
31	2013-05-07	Tue	11:08	Clear	Daylight	Sideswipe	Non-fatal	V1 E V2 E	Dry Dry	Turning left Turning left	Pick-up truck Motorcycle	Other motor vehicle Other motor vehicle	0
32	2013-06-09	Sun	20:48	Clear	Dusk	Single vehicle	P.D. only	V1 S	Dry	Turning left	Automobile, station	Curb	0
33	2013-09-12	Thu	09:06	Clear	Daylight	Sideswipe	P.D. only	V1 E V2 E	Dry Dry	Changing lanes Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
34	2013-10-14	Mo	18:36	Clear	Dark	Sideswipe	Non-fatal	V1 E V2 E	Dry Dry	Going ahead Stopped	Pick-up truck Automobile, station	Other motor vehicle Other motor vehicle	0
35	2013-10-30	We	15:09	Clear	Daylight	Single vehicle	Non-fatal	V1 S	Dry	Going ahead	Bicycle	Curb	0
36	2013-11-11	Mo	13:33	Rain	Daylight	Rear end	P.D. only	V1 N V2 N	Wet Wet	Turning right Turning right	Police vehicle Automobile, station	Other motor vehicle Other motor vehicle	0
37	2013-12-13	Fri	16:30	Clear	Dusk	Rear end	P.D. only	V1 E V2 E	Dry Dry	Changing lanes Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0

CARLING AVE & MERIVALE RD

Former Municipality: Ottawa

Traffic Control: Traffic signal

Number of Collisions: 13

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
38	2013-01-02	We	17:06	Snow	Dusk	Turning	Non-fatal	V1 E V2 W	Wet Wet	Going ahead Turning left	Automobile, station Passenger van	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Thursday, March 23, 2017

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2013-01-01

TO: 2014-01-01

39	2013-03-04	Mo	09:14	Clear	Daylight	Turning	P.D. only	V1 E V2 E	Dry Dry	Going ahead Making U-Turn	Automobile, station Ambulance	Other motor vehicle Other motor vehicle	0
40	2013-06-22	Sat	15:58	Rain	Daylight	Rear end	Non-fatal	V1 N V2 N	Wet Wet	Turning right Turning right	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
41	2013-06-24	Mo	13:53	Clear	Daylight	Turning	Non-fatal	V1 W V2 W	Dry Dry	Turning left Going ahead	Bicycle Automobile, station	Other motor vehicle Cyclist	0
42	2013-07-09	Tue	06:44	Clear	Daylight	Angle	P.D. only	V1 W V2 S	Dry Dry	Going ahead Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
43	2013-07-10	We	17:15	Clear	Daylight	Rear end	Non	V1 N V2 N	Dry Dry	Going ahead Stopped	Passenger van Pick-up truck	Other motor vehicle Other motor vehicle	0
44	2013-08-27	Tue	16:30	Clear	Daylight	Sideswipe	P.D. only	V1 W V2 W	Dry Dry	Changing lanes Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
45	2013-10-09	We	17:28	Clear	Daylight	Rear end	Non-fatal	V1 E V2 E	Dry Dry	Going ahead Stopped	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
46	2013-10-09	We	08:06	Clear	Daylight	Sideswipe	P.D. only	V1 E V2 E	Dry Dry	Going ahead Stopped	Pick-up truck Municipal transit bus	Other motor vehicle Other motor vehicle	0
47	2013-12-12	Thu	13:10	Clear	Daylight	Turning	P.D. only	V1 E V2 W	Dry Dry	Turning right Turning left	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
48	2013-12-16	Mo	15:00	Clear	Daylight	Sideswipe	P.D. only	V1 N V2 N	Loose snow Loose snow	Turning left Stopped	Unknown Automobile, station	Other motor vehicle Other motor vehicle	0
49	2013-12-19	Thu	13:30	Clear	Daylight	Turning	P.D. only	V1 E V2 W	Slush Slush	Making U-Turn Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
50	2013-12-24	Tue	14:30	Clear	Daylight	Turning	P.D. only	V1 E V2 W	Slush Slush	Turning left Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Thursday, March 23, 2017

Page 4 of 5

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2013-01-01 TO: 2014-01-01

CARLING AVE & WESTGATE SC - E

Former Municipality: Ottawa

Traffic Control: Traffic signal

Number of Collisions: 5

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
51	2013-01-11	Fri	12:12	Rain	Daylight	Turning	P.D. only	V1 E V2 W V3 S	Wet Wet Wet	Turning left Going ahead Going ahead	Automobile, station Automobile, station Automobile, station	Other motor vehicle Other motor vehicle Other motor vehicle	0
	COMMENTS: EXACT LOCATION UNKNOWN												
52	2013-05-22	We	21:37	Clear	Dark	Turning	Non-fatal	V1 E V2 W	Dry Dry	Turning left Slowing or	Automobile, station Bicycle	Cyclist Other motor vehicle	0
53	2013-06-25	Tue	16:30	Clear	Daylight	Rear end	P.D. only	V1 E V2 E	Wet Wet	Slowing or Stopped	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
	COMMENTS: EXACT LOCATION UNKNOWN.												
54	2013-08-04	Sun	18:37	Clear	Daylight	Single vehicle	P.D. only	V1 W	Wet	Turning right	Truck and trailer	Pole (utility, tower)	0
55	2013-08-20	Tue	18:02	Clear	Daylight	Turning	P.D. only	V1 E V2 W	Dry Dry	Turning left Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0

MERIVALE RD & THAMES ST

Former Municipality: Ottawa

Traffic Control: Stop sign

Number of Collisions: 1

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
56	2013-01-06	Sun	03:21	Snow	Dark	Single vehicle	P.D. only	V1 N	Packed snow	Going ahead	Automobile, station	Skidding/Sliding	0

(Note: Time of Day = "00:00" represents unknown collision time)

Thursday, March 23, 2017

Page 5 of 5

Appendix D

Screenline Classification and Occupancy Counts



Public Works - Traffic Services

Classification and Occupancy - All Vehicles Report

All Modes (15 Minute Increments)

Work Order

28090

HIGHWAY 417 btwn HWY417 IC122 RAMP15 & HWY417 IC121B RAMP51

Count Station : 50004

Screenline : 28

Survey Date : Wednesday, November 09, 2011

Full Study		Inbound								
		Pass. Vehicles		Trucks		All Buses		Bikes		Peds
Time Period		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	
06:00	06:15	481	485	49	53	0	0	0	0	0
06:15	06:30	822	822	46	46	0	0	0	0	0
06:30	06:45	1097	1097	63	64	1	1	0	0	0
06:45	07:00	1139	1139	82	82	1	1	0	0	0
6:00	7:00	3539	3543	240	245	2	2	0	0	0
07:00	07:15	1179	1179	69	69	2	2	0	0	0
07:15	07:30	1246	1246	68	68	7	7	0	0	0
07:30	07:45	1151	1152	53	53	2	2	0	0	0
07:45	08:00	1377	1377	91	91	1	1	0	0	0
7:00	8:00	4953	4954	281	281	12	12	0	0	0
08:00	08:15	1218	1218	75	75	1	1	0	0	0
08:15	08:30	1292	1292	58	58	1	1	0	0	0
08:30	08:45	1277	1277	64	64	0	0	0	0	0
08:45	09:00	1298	1298	87	94	0	0	0	0	0
8:00	9:00	5085	5085	284	291	2	2	0	0	0
09:00	09:15	1311	1311	75	75	3	3	0	0	0
09:15	09:30	1185	1185	107	107	0	0	0	0	0
09:30	09:45	1151	1151	96	96	2	2	0	0	0
09:45	10:00	1208	1216	93	93	1	1	0	0	0
9:00	10:00	4855	4863	371	371	6	6	0	0	0
15:00	15:15	1605	1605	66	66	2	2	0	0	0
15:15	15:30	1568	1596	93	93	1	1	0	0	0
15:30	15:45	1410	1410	51	51	0	0	0	0	0
15:45	16:00	1282	1351	52	52	1	1	0	0	0
15:00	16:00	5865	5962	262	262	4	4	0	0	0
16:00	16:15	1058	1058	43	43	1	1	0	0	0
16:15	16:30	1270	1270	39	39	0	0	0	0	0
16:30	16:45	1334	1334	44	44	2	2	0	0	0
16:45	17:00	1167	1182	39	39	1	1	0	0	0
16:00	17:00	4829	4844	165	165	4	4	0	0	0
17:00	17:15	1308	1308	25	25	2	2	0	0	0
17:15	17:30	1249	1249	57	57	1	1	0	0	0
17:30	17:45	1360	1360	33	33	2	2	0	0	0
17:45	18:00	1206	1206	31	31	8	8	0	0	0
17:00	18:00	5123	5123	146	146	13	13	0	0	0
18:00	18:15	1291	1291	33	33	3	3	0	0	0
18:15	18:30	1236	1236	37	37	0	0	0	0	0
18:30	18:45	1358	1358	32	32	2	2	0	0	0
18:45	19:00	1316	1316	13	13	1	1	0	0	0
18:00	19:00	5201	5201	115	115	6	6	0	0	0

Note: Any Inter-City Buses included have an assumed Outbound occupancy of 30.

*For School & Other Buses drivers are not considered occupants.

*Passenger Vehicles include Autos, Taxis and Other Vehicles.



Public Works - Traffic Services

Classification and Occupancy - All Vehicles Report

All Modes (15 Minute Increments)

Work Order

28090

HIGHWAY 417 btwn HWY417 IC122 RAMP15 & HWY417 IC121B RAMP51

Count Station : 50004

Screenline : 28

Survey Date : Wednesday, November 09, 2011

Full Study		Inbound								
		Pass. Vehicles		Trucks		All Buses		Bikes		Peds
Time Period		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	
DirectionTotal :		39450	39575	1864	1876	49	49	0	0	0
Full Study		Outbound								
		Pass. Vehicles		Trucks		All Buses		Bikes		Peds
Time Period		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	
06:00	06:15	854	854	57	57	0	0	0	0	0
06:15	06:30	1237	1237	87	87	0	0	0	0	0
06:30	06:45	1477	1477	76	76	1	1	0	0	0
06:45	07:00	1465	1465	65	66	1	1	0	0	0
6:00	7:00	5033	5033	285	286	2	2	0	0	0
07:00	07:15	1429	1429	85	85	1	1	0	0	0
07:15	07:30	1225	1225	82	82	0	0	0	0	0
07:30	07:45	1566	1566	81	82	1	1	0	0	0
07:45	08:00	1519	1519	68	68	3	3	0	0	0
7:00	8:00	5739	5739	316	317	5	5	0	0	0
08:00	08:15	1373	1373	53	53	3	3	0	0	0
08:15	08:30	1519	1519	96	96	1	1	0	0	0
08:30	08:45	1630	1630	60	61	5	6	0	0	0
08:45	09:00	1567	1567	76	77	3	3	0	0	1
8:00	9:00	6089	6089	285	287	12	13	0	0	1
09:00	09:15	1478	1478	84	84	8	8	0	0	0
09:15	09:30	1377	1377	102	102	11	11	0	0	0
09:30	09:45	1284	1284	103	108	8	8	0	0	0
09:45	10:00	1259	1259	127	127	6	6	0	0	0
9:00	10:00	5398	5398	416	421	33	33	0	0	0
15:00	15:15	1482	1482	146	149	8	8	0	0	0
15:15	15:30	1490	1490	84	87	7	7	0	0	0
15:30	15:45	1202	1202	77	77	5	5	0	0	0
15:45	16:00	1254	1254	110	110	3	3	0	0	0
15:00	16:00	5428	5428	417	423	23	23	0	0	0
16:00	16:15	977	977	92	92	5	5	0	0	0
16:15	16:30	584	584	54	54	2	2	0	0	0
16:30	16:45	809	809	82	82	9	9	0	0	0
16:45	17:00	939	939	62	62	5	5	0	0	0
16:00	17:00	3309	3309	290	290	21	21	0	0	0
17:00	17:15	957	957	63	63	3	3	0	0	0
17:15	17:30	832	832	67	67	3	3	0	0	0
17:30	17:45	998	998	75	75	1	1	0	0	0
17:45	18:00	1311	1311	80	82	2	2	0	0	0

Note: Any Inter-City Buses included have an assumed Outbound occupancy of 30.

*For School & Other Buses drivers are not considered occupants.

*Passenger Vehicles include Autos, Taxis and Other Vehicles.



Public Works - Traffic Services

Classification and Occupancy - All Vehicles Report

All Modes (15 Minute Increments)

Work Order

28090

HIGHWAY 417 btwn HWY417 IC122 RAMP15 & HWY417 IC121B RAMP51

Count Station : 50004

Screenline : 28

Survey Date : Wednesday, November 09, 2011

Full Study		Outbound								
		Pass. Vehicles		Trucks		All Buses		Bikes		Peds
Time Period		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	
17:00	18:00	4098	4098	285	287	9	9	0	0	0
18:00	18:15	1015	1015	57	61	0	0	0	0	0
18:15	18:30	1257	1257	70	70	1	1	1	1	0
18:30	18:45	1226	1226	36	36	3	3	0	0	0
18:45	19:00	1218	1218	49	49	0	0	0	0	0
18:00	19:00	4716	4716	212	216	4	4	1	1	0
DirectionTotal :		39810	39810	2506	2527	109	110	1	1	1
Period Total :		79260	79385	4370	4403	158	159	1	1	1
Report Total :		79260	79385	4370	4403	158	159	1	1	1

Note: Any Inter-City Buses included have an assumed Outbound occupancy of 30.

*For School & Other Buses drivers are not considered occupants.

*Passenger Vehicles include Autos, Taxis and Other Vehicles.

Study Name 27 - 003813 - Carling at CPR Underpass - May - 25th
Start Date 05/25/2016
Start Time 7:00 AM
Site Code
Motorcycles

Channel Direction	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3
	Westbound	Westbound	Westbound	Eastbound	Eastbound	Eastbound
7:00 AM	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0
7:30 AM	0	1	0	0	0	2
7:45 AM	0	0	0	0	1	1
8:00 AM	0	0	0	0	0	0
8:15 AM	1	0	0	0	0	0
8:30 AM	0	0	0	0	0	0
8:45 AM	1	0	1	2	0	0
9:00 AM	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0
9:30 AM	1	0	1	1	0	0
9:45 AM	1	0	0	0	0	1
10:00 AM	0	0	0	0	0	0
10:15 AM	0	0	0	0	1	0
10:30 AM	0	0	0	0	0	0
10:45 AM	0	0	0	1	0	0
11:00 AM	0	0	0	1	0	0
11:15 AM	0	0	1	0	0	0
11:30 AM	0	0	0	0	0	1
11:45 AM	1	0	0	2	1	0
12:00 PM	0	0	1	0	1	0
12:15 PM	0	0	0	0	0	0
12:30 PM	0	0	0	0	2	0
12:45 PM	0	0	1	0	0	0
1:00 PM	1	1	0	0	0	2
1:15 PM	0	0	2	0	0	0
1:30 PM	0	0	0	1	0	1
1:45 PM	0	1	0	0	0	1
2:00 PM	0	1	0	1	0	1
2:15 PM	0	0	0	0	1	0
2:30 PM	0	0	1	0	0	0
2:45 PM	0	0	1	1	0	0
3:00 PM	1	0	2	1	0	0
3:15 PM	0	0	1	0	0	0
3:30 PM	0	2	1	1	0	0
3:45 PM	1	0	0	0	1	0
4:00 PM	1	1	1	0	0	0
4:15 PM	1	1	3	0	0	2
4:30 PM	0	0	0	1	1	2
4:45 PM	2	1	2	2	0	1
5:00 PM	0	1	1	0	0	0
5:15 PM	1	0	0	0	0	0
5:30 PM	0	1	1	1	0	0
5:45 PM	1	0	0	0	0	0
6:00 PM	0	0	2	0	1	0
6:15 PM	0	0	1	1	1	0
6:30 PM	0	0	0	0	0	1
6:45 PM	0	1	1	0	0	0

Study Name 27 - 003813 - Carling at CPR Underpass - May - 25th
Start Date 05/25/2016
Start Time 7:00 AM
Site Code
CARS

Channel Direction	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3
	Westbound	Westbound	Westbound	Eastbound	Eastbound	Eastbound
7:00 AM	33	46	19	57	71	77
7:15 AM	49	65	26	66	83	72
7:30 AM	59	60	37	69	75	105
7:45 AM	46	79	50	62	70	71
8:00 AM	53	78	38	51	67	63
8:15 AM	43	78	43	36	50	53
8:30 AM	42	82	55	44	62	52
8:45 AM	49	87	53	38	46	42
9:00 AM	54	81	50	24	39	39
9:15 AM	34	66	38	24	50	29
9:30 AM	19	73	36	39	60	41
9:45 AM	18	71	26	34	41	38
10:00 AM	4	66	26	37	50	32
10:15 AM	25	67	36	38	44	46
10:30 AM	22	51	28	40	62	38
10:45 AM	16	55	25	45	62	50
11:00 AM	23	66	27	38	53	55
11:15 AM	18	77	25	45	60	40
11:30 AM	27	82	40	39	62	50
11:45 AM	31	76	47	31	54	50
12:00 PM	28	85	38	36	52	35
12:15 PM	29	77	38	38	57	40
12:30 PM	21	93	57	39	53	47
12:45 PM	29	90	46	38	64	53
1:00 PM	31	73	52	42	59	42
1:15 PM	30	82	36	31	69	50
1:30 PM	21	63	42	40	55	42
1:45 PM	21	93	34	36	61	52
2:00 PM	34	65	35	66	71	58
2:15 PM	30	85	40	60	90	59
2:30 PM	25	82	47	67	85	80
2:45 PM	33	94	44	61	82	71
3:00 PM	20	104	59	77	76	75
3:15 PM	38	94	70	71	90	52
3:30 PM	46	113	106	92	71	72
3:45 PM	54	135	104	70	70	61
4:00 PM	65	131	118	69	60	57
4:15 PM	57	148	106	80	84	60
4:30 PM	79	153	146	69	69	52
4:45 PM	70	164	128	55	57	66
5:00 PM	90	163	161	47	52	34
5:15 PM	70	160	146	35	55	43
5:30 PM	93	145	148	38	51	34
5:45 PM	54	125	101	28	59	56
6:00 PM	46	138	107	40	51	38
6:15 PM	48	107	91	32	58	31
6:30 PM	38	91	58	25	47	32
6:45 PM	32	71	39	23	33	36

Study Name 27 - 003813 - Carling at CPR Underpass - May - 25th
Start Date 05/25/2016
Start Time 7:00 AM
Site Code
Light Trucks

Channel Direction	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3
	Westbound	Westbound	Westbound	Eastbound	Eastbound	Eastbound
7:00 AM	2	3	3	3	9	3
7:15 AM	1	7	3	3	5	3
7:30 AM	6	6	5	12	5	8
7:45 AM	1	5	4	3	2	5
8:00 AM	4	7	4	3	5	4
8:15 AM	4	3	2	2	8	7
8:30 AM	7	10	2	2	7	4
8:45 AM	6	5	1	3	7	10
9:00 AM	3	5	8	2	3	8
9:15 AM	2	4	0	1	8	7
9:30 AM	3	7	2	1	2	3
9:45 AM	3	3	2	5	7	3
10:00 AM	1	5	1	2	5	5
10:15 AM	0	6	5	5	13	7
10:30 AM	7	8	2	5	5	4
10:45 AM	3	11	5	2	5	3
11:00 AM	3	13	2	4	4	4
11:15 AM	0	4	4	1	6	2
11:30 AM	1	4	3	2	8	7
11:45 AM	2	6	1	1	4	5
12:00 PM	3	11	1	7	7	8
12:15 PM	3	9	2	3	6	4
12:30 PM	2	7	2	4	5	5
12:45 PM	7	5	4	5	9	2
1:00 PM	2	12	5	3	4	4
1:15 PM	3	4	4	4	4	5
1:30 PM	5	4	4	2	3	7
1:45 PM	6	8	6	4	2	4
2:00 PM	4	10	3	2	7	7
2:15 PM	2	9	3	7	5	6
2:30 PM	1	6	4	3	8	6
2:45 PM	6	8	4	1	2	9
3:00 PM	4	8	6	2	7	3
3:15 PM	4	7	3	3	7	10
3:30 PM	3	7	11	5	4	3
3:45 PM	3	6	4	3	3	4
4:00 PM	9	12	7	4	3	2
4:15 PM	4	7	15	5	5	3
4:30 PM	7	10	10	4	1	3
4:45 PM	2	10	7	1	4	2
5:00 PM	8	12	8	0	5	1
5:15 PM	6	8	5	5	1	1
5:30 PM	4	9	4	3	3	2
5:45 PM	3	6	8	0	3	2
6:00 PM	2	7	4	2	0	1
6:15 PM	2	8	2	0	1	1
6:30 PM	3	4	6	1	1	1
6:45 PM	0	6	4	0	5	0

Study Name 27 - 003813 - Carling at CPR Underpass - May - 25th
Start Date 05/25/2016
Start Time 7:00 AM
Site Code
Busses

Channel Direction	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3
	Westbound	Westbound	Westbound	Eastbound	Eastbound	Eastbound
7:00 AM	5	0	0	1	3	1
7:15 AM	5	2	0	3	0	1
7:30 AM	5	0	0	2	1	1
7:45 AM	6	0	0	2	2	0
8:00 AM	7	1	0	1	2	2
8:15 AM	6	0	0	1	3	1
8:30 AM	5	1	0	2	3	2
8:45 AM	6	0	0	2	1	2
9:00 AM	7	0	0	2	3	0
9:15 AM	4	3	1	2	0	1
9:30 AM	6	0	0	1	1	1
9:45 AM	4	1	0	3	1	0
10:00 AM	0	2	0	2	1	0
10:15 AM	3	1	0	0	1	0
10:30 AM	3	0	0	1	1	1
10:45 AM	2	0	0	2	0	1
11:00 AM	2	0	0	2	0	0
11:15 AM	2	1	0	0	1	1
11:30 AM	2	1	0	2	4	0
11:45 AM	2	1	0	1	0	0
12:00 PM	2	0	0	1	4	0
12:15 PM	3	1	0	1	0	0
12:30 PM	2	0	0	1	1	0
12:45 PM	2	1	0	3	0	3
1:00 PM	2	0	0	1	1	1
1:15 PM	1	2	0	1	0	1
1:30 PM	4	0	0	1	1	1
1:45 PM	2	2	0	1	1	0
2:00 PM	1	0	0	3	2	0
2:15 PM	4	1	0	2	2	1
2:30 PM	3	1	0	2	1	1
2:45 PM	1	2	0	3	1	2
3:00 PM	6	0	0	2	2	0
3:15 PM	1	2	0	2	0	2
3:30 PM	3	3	0	4	1	0
3:45 PM	1	0	0	1	1	0
4:00 PM	3	1	0	3	1	1
4:15 PM	5	1	0	1	0	1
4:30 PM	2	0	0	3	1	1
4:45 PM	2	0	0	2	0	1
5:00 PM	3	0	0	1	1	0
5:15 PM	4	0	0	0	0	1
5:30 PM	1	1	0	1	0	0
5:45 PM	2	0	0	2	1	0
6:00 PM	7	1	0	1	1	1
6:15 PM	3	1	0	1	0	1
6:30 PM	4	2	0	1	0	1
6:45 PM	2	0	0	0	0	0

Study Name 27 - 003813 - Carling at CPR Underpass - May - 25th

Start Date 05/25/2016

Start Time 7:00 AM

Site Code

Single Unit Trucks

Channel Direction	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3
	Westbound	Westbound	Westbound	Eastbound	Eastbound	Eastbound
7:00 AM	1	3	1	0	2	2
7:15 AM	0	4	0	1	2	4
7:30 AM	0	2	1	1	6	0
7:45 AM	0	2	1	0	1	1
8:00 AM	0	1	0	0	2	0
8:15 AM	0	4	0	3	2	1
8:30 AM	1	4	1	0	1	2
8:45 AM	3	1	0	1	3	3
9:00 AM	1	3	0	0	1	1
9:15 AM	0	2	0	0	1	1
9:30 AM	0	2	0	2	2	1
9:45 AM	1	2	0	4	1	2
10:00 AM	1	1	0	0	1	1
10:15 AM	1	1	0	0	2	1
10:30 AM	1	2	1	0	0	1
10:45 AM	4	2	1	0	0	1
11:00 AM	5	0	0	0	1	2
11:15 AM	1	3	3	0	0	0
11:30 AM	2	3	0	0	1	0
11:45 AM	2	2	1	0	1	3
12:00 PM	1	0	1	0	1	3
12:15 PM	1	0	2	3	2	2
12:30 PM	1	2	0	0	1	0
12:45 PM	2	2	0	0	2	0
1:00 PM	0	3	1	0	4	0
1:15 PM	0	3	0	1	2	2
1:30 PM	2	3	0	0	1	0
1:45 PM	0	0	0	1	1	0
2:00 PM	2	3	0	1	2	0
2:15 PM	2	0	0	0	3	2
2:30 PM	1	1	2	1	3	1
2:45 PM	1	1	1	0	2	1
3:00 PM	2	1	0	0	2	1
3:15 PM	1	1	2	0	2	1
3:30 PM	0	2	0	0	2	1
3:45 PM	1	1	0	0	2	0
4:00 PM	1	0	0	1	0	0
4:15 PM	0	3	2	0	1	0
4:30 PM	0	4	0	1	1	1
4:45 PM	1	3	0	0	0	0
5:00 PM	1	2	0	0	0	0
5:15 PM	2	0	1	0	1	0
5:30 PM	0	0	1	0	0	0
5:45 PM	0	1	0	0	0	0
6:00 PM	0	0	0	0	2	0
6:15 PM	1	0	0	0	0	0
6:30 PM	1	0	0	0	0	0
6:45 PM	0	1	0	0	1	0

Study Name 27 - 003813 - Carling at CPR Underpass - May - 25th

Start Date 05/25/2016

Start Time 7:00 AM

Site Code

Heavy Trucks

Channel Direction	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3
	Westbound	Westbound	Westbound	Eastbound	Eastbound	Eastbound
7:00 AM	0	0	0	0	1	0
7:15 AM	0	0	0	0	0	0
7:30 AM	0	1	0	0	0	0
7:45 AM	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0
8:15 AM	0	0	0	0	1	0
8:30 AM	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0
9:00 AM	0	1	0	0	0	0
9:15 AM	0	0	0	0	0	0
9:30 AM	0	1	0	0	0	0
9:45 AM	0	0	0	0	0	1
10:00 AM	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0
10:45 AM	0	1	0	0	0	0
11:00 AM	0	0	0	0	0	0
11:15 AM	0	2	0	0	1	0
11:30 AM	0	0	0	0	0	0
11:45 AM	0	1	0	0	0	0
12:00 PM	0	1	0	0	0	0
12:15 PM	0	1	0	0	0	0
12:30 PM	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0
2:00 PM	0	1	0	0	0	0
2:15 PM	0	0	0	0	0	0
2:30 PM	0	1	0	0	0	1
2:45 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0
3:30 PM	0	1	0	0	0	0
3:45 PM	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	1
5:45 PM	0	1	0	0	0	0
6:00 PM	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0

Appendix E

Traffic Growth Analysis

Carling/Merivale
8 hrs

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2003	18-Jun	3815	2261	4383	4435	8072	6884	6264	8954	45068
2010	16-Jul	3453	2070	3984	3363	6524	4943	4103	7688	36128
2014	18-Aug	3248	1860	3304	4001	7269	5109	4807	7658	37256
2015	15-Oct	3818	2001	4620	4741	9319	7641	6234	9608	47982
2016	4-Aug	3857	1709	3857	3959	7615	7663	5304	8466	42430

North Leg

Year	Counts				% Change			
	NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
2003	2261	3815	6076	45068				
2010	2070	3453	5523	36128	-8.4%	-9.5%	-9.1%	-19.8%
2014	1860	3248	5108	37256	-10.1%	-5.9%	-7.5%	3.1%
2015	2001	3818	5819	47982	7.6%	17.5%	13.9%	28.8%
2016	1709	3857	5566	42430	-14.6%	1.0%	-4.3%	-11.6%

Regression Estimate 2003 2282 3683 5965
Regression Estimate 2016 1826 3615 5441
Average Annual Change -1.70% -0.14% -0.70%

West Leg

Year	Counts				% Change			
	EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
2003	6264	8954	15218	45068				
2010	4103	7688	11791	36128	-34.5%	-14.1%	-22.5%	-19.8%
2014	4807	7658	12465	37256	17.2%	-0.4%	5.7%	3.1%
2015	6234	9608	15842	47982	29.7%	25.5%	27.1%	28.8%
2016	5304	8466	13770	42430	-14.9%	-11.9%	-13.1%	-11.6%

Regression Estimate 2003 5674 8551 14225
Regression Estimate 2016 5173 8436 13608
Average Annual Change -0.71% -0.10% -0.34%

East Leg

Year	Counts				% Change			
	EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
2003	6884	8072	14956	45068				
2010	4943	6524	11467	36128	-28.2%	-19.2%	-23.3%	-19.8%
2014	5109	7269	12378	37256	3.4%	11.4%	7.9%	3.1%
2015	7641	9319	16960	47982	49.6%	28.2%	37.0%	28.8%
2016	7663	7615	15278	42430	0.3%	-18.3%	-9.9%	-11.6%

Regression Estimate 2003 6080 7549 13628
Regression Estimate 2016 6636 7868 14504
Average Annual Change 0.68% 0.32% 0.48%

South Leg

Year	Counts				% Change			
	NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
2003	4383	4435	8818	45068				
2010	3984	3363	7347	36128	-9.1%	-24.2%	-16.7%	-19.8%
2014	3304	4001	7305	37256	-17.1%	19.0%	-0.6%	3.1%
2015	4620	4741	9361	47982	39.8%	18.5%	28.1%	28.8%
2016	3857	3959	7816	42430	-16.5%	-16.5%	-16.5%	-11.6%

Regression Estimate 2003 4292 4129 8421
Regression Estimate 2016 3895 4085 7980
Average Annual Change -0.74% -0.08% -0.41%

Carling/Merivale
AM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2003	18-Jun	535	341	736	453	773	1181	937	1006	5962
2010	16-Jul	478	254	608	437	644	867	661	833	4782
2014	18-Aug	431	258	437	437	712	698	642	829	4444
2015	15-Oct	530	267	741	532	775	1289	993	951	6078
2016	4-Aug	448	221	569	400	659	949	739	845	4830

Year	Counts				% Change			
	NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
2003	341	535	876	5962				
2010	254	478	732	4782	-25.5%	-10.7%	-16.4%	-19.8%
2014	258	431	689	4444	1.6%	-9.8%	-5.9%	-7.1%
2015	267	530	797	6078	3.5%	23.0%	15.7%	36.8%
2016	221	448	669	4830	-17.2%	-15.5%	-16.1%	-20.5%

Regression Estimate 2003 332 527 859
Regression Estimate 2016 236 463 698
Average Annual Change -2.60% -0.99% -1.58%

Year	Counts				% Change			
	EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
2003	937	1006	1943	5962				
2010	661	833	1494	4782	-29.5%	-17.2%	-23.1%	-19.8%
2014	642	829	1471	4444	-2.9%	-0.5%	-1.5%	-7.1%
2015	993	951	1944	6078	54.7%	14.7%	32.2%	36.8%
2016	739	845	1584	4830	-25.6%	-11.1%	-18.5%	-20.5%

Regression Estimate 2003 866 972 1838
Regression Estimate 2016 758 852 1610
Average Annual Change -1.03% -1.01% -1.02%

Year	Counts				% Change			
	EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
2003	1181	773	1954	5962				
2010	867	644	1511	4782	-26.6%	-16.7%	-22.7%	-19.8%
2014	698	712	1410	4444	-19.5%	10.6%	-6.7%	-7.1%
2015	1289	775	2064	6078	84.7%	8.8%	46.4%	36.8%
2016	949	659	1608	4830	-26.4%	-15.0%	-22.1%	-20.5%

Regression Estimate 2003 1096 746 1842
Regression Estimate 2016 946 696 1642
Average Annual Change -1.13% -0.53% -0.88%

Year	Counts				% Change			
	NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
2003	736	453	1189	5962				
2010	608	437	1045	4782	-17.4%	-3.5%	-12.1%	-19.8%
2014	437	437	874	4444	-28.1%	0.0%	-16.4%	-7.1%
2015	741	532	1273	6078	69.6%	21.7%	45.7%	36.8%
2016	569	400	969	4830	-23.2%	-24.8%	-23.9%	-20.5%

Regression Estimate 2003 712 450 1162
Regression Estimate 2016 570 453 1023
Average Annual Change -1.69% 0.04% -0.97%

Carling/Merivale
PM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2003	18-Jun	584	302	588	824	1605	962	938	1627	7430
2010	16-Jul	437	311	576	540	1356	653	561	1426	5860
2014	18-Aug	446	202	408	683	1492	719	649	1391	5990
2015	15-Oct	466	276	571	881	2039	924	783	1778	7718
2016	4-Aug	503	234	497	676	1646	1005	874	1605	7040

North Leg	Year	Counts				% Change			
		NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
	2003	302	584	886	7430				
	2010	311	437	748	5860	3.0%	-25.2%	-15.6%	-21.1%
	2014	202	446	648	5990	-35.0%	2.1%	-13.4%	2.2%
	2015	276	466	742	7718	36.6%	4.5%	14.5%	28.8%
	2016	234	503	737	7040	-15.2%	7.9%	-0.7%	-8.8%

Regression Estimate 2003 314 552 866
Regression Estimate 2016 240 454 694
Average Annual Change -2.04% -1.49% -1.69%

West Leg	Year	Counts				% Change			
		EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
	2003	938	1627	2565	7430				
	2010	561	1426	1987	5860	-40.2%	-12.4%	-22.5%	-21.1%
	2014	649	1391	2040	5990	15.7%	-2.5%	2.7%	2.2%
	2015	783	1778	2561	7718	20.6%	27.8%	25.5%	28.8%
	2016	874	1605	2479	7040	11.6%	-9.7%	-3.2%	-8.8%

Regression Estimate 2003 829 1552 2382
Regression Estimate 2016 726 1572 2298
Average Annual Change -1.02% 0.10% -0.27%

East Leg	Year	Counts				% Change			
		EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
	2003	962	1605	2567	7430				
	2010	653	1356	2009	5860	-32.1%	-15.5%	-21.7%	-21.1%
	2014	719	1492	2211	5990	10.1%	10.0%	10.1%	2.2%
	2015	924	2039	2963	7718	28.5%	36.7%	34.0%	28.8%
	2016	1005	1646	2651	7040	8.8%	-19.3%	-10.5%	-8.8%

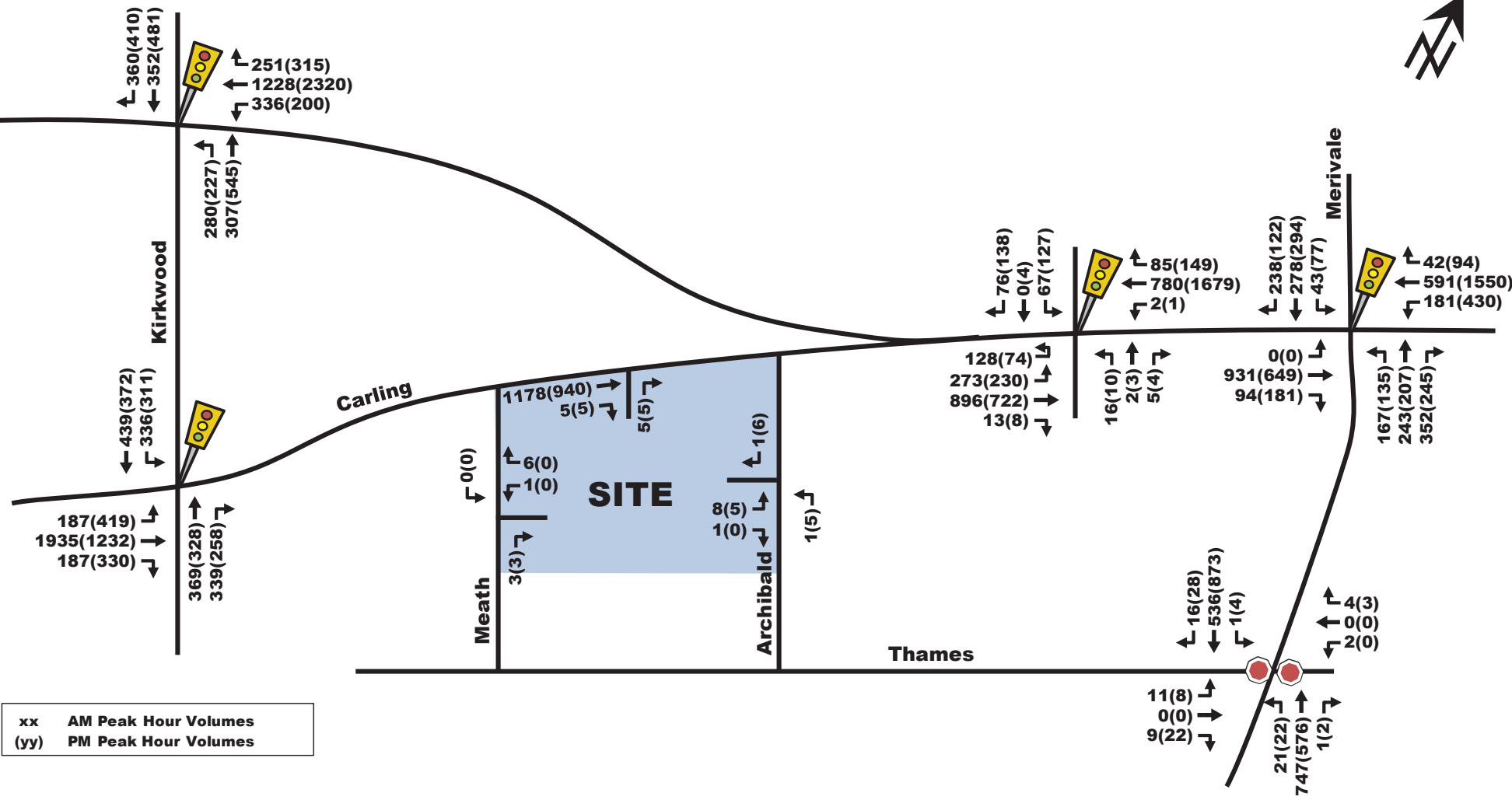
Regression Estimate 2003 855 1492 2347
Regression Estimate 2016 851 1697 2548
Average Annual Change -0.03% 0.99% 0.64%

South Leg	Year	Counts				% Change			
		NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
	2003	588	824	1412	7430				
	2010	576	540	1116	5860	-2.0%	-34.5%	-21.0%	-21.1%
	2014	408	683	1091	5990	-29.2%	26.5%	-2.2%	2.2%
	2015	571	881	1452	7718	40.0%	29.0%	33.1%	28.8%
	2016	497	676	1173	7040	-13.0%	-23.3%	-19.2%	-8.8%

Regression Estimate 2003 594 747 1341
Regression Estimate 2016 494 708 1202
Average Annual Change -1.41% -0.41% -0.84%















Appendix F

Total Background 2024 Traffic Volumes and SYNCHRO Output



xx AM Peak Hour Volumes
(yy) PM Peak Hour Volumes

Background 2024 AM
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	187	1935	187	369	339	336	439
Future Volume (vph)	187	1935	187	369	339	336	439
Lane Group Flow (vph)	177	2057	197	388	357	354	462
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	58.0	58.0	58.0	38.0	38.0	24.0	62.0
Total Split (%)	48.3%	48.3%	48.3%	31.7%	31.7%	20.0%	51.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	55.7	55.7	55.7	32.3	32.3	56.3	56.3
Actuated g/C Ratio	0.46	0.46	0.46	0.27	0.27	0.47	0.47
v/c Ratio	0.26	0.96	0.26	0.43	0.88	0.75	0.55
Control Delay	21.5	44.2	6.8	37.5	64.6	31.5	25.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	21.5	44.2	6.8	37.5	64.6	31.5	25.6
LOS	C	D	A	D	E	C	C
Approach Delay		39.5		50.5			28.1
Approach LOS		D		D			C
Queue Length 50th (m)	29.6	182.7	6.4	38.9	78.9	71.7	96.7
Queue Length 95th (m)	48.2	#224.7	20.4	53.2	#127.0	100.4	129.6
Internal Link Dist (m)		161.6		158.6			152.2
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	676	2138	745	960	429	474	862
Starvation Cap Reductn	0	0	0	0	0	0	123
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.96	0.26	0.40	0.83	0.75	0.63

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 39.2

Intersection LOS: D

Intersection Capacity Utilization 84.4%

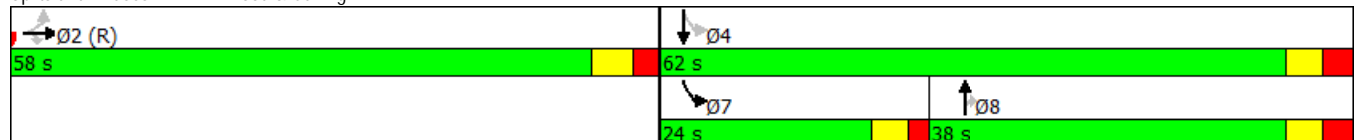
ICU Level of Service E

Analysis Period (min) 15



















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Background 2024 AM
2: Merivale & Carling

									
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	931	181	591	167	243	352	43	278	238
Future Volume (vph)	931	181	591	167	243	352	43	278	238
Lane Group Flow (vph)	1079	191	666	176	256	371	45	293	251
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	49.0	12.0	61.0	21.0	38.0	38.0	21.0	38.0	38.0
Total Split (%)	40.8%	10.0%	50.8%	17.5%	31.7%	31.7%	17.5%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	48.3	64.0	64.0	16.4	35.5	35.5	10.9	27.6	27.6
Actuated g/C Ratio	0.40	0.53	0.53	0.14	0.30	0.30	0.09	0.23	0.23
v/c Ratio	0.56	0.68	0.26	0.76	0.49	0.58	0.29	0.71	0.53
Control Delay	27.9	31.9	16.0	71.1	38.5	11.9	55.0	52.1	15.7
Queue Delay	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	31.9	16.0	71.1	38.5	11.9	55.0	52.1	15.7
LOS	C	C	B	E	D	B	D	D	B
Approach Delay	28.3		19.6		33.3			36.8	
Approach LOS	C		B		C			D	
Queue Length 50th (m)	75.4	23.4	30.0	40.2	50.2	13.5	10.1	63.4	13.5
Queue Length 95th (m)	90.2	#58.2	42.1	#71.5	73.5	42.5	21.2	87.7	36.2
Internal Link Dist (m)	89.4		139.3		159.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1931	281	2563	240	533	642	240	505	537
Starvation Cap Reductn	370	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.68	0.26	0.73	0.48	0.58	0.19	0.58	0.47

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 28.8

Intersection LOS: C

Intersection Capacity Utilization 77.0%








ICU Level of Service D

Analysis Period (min) 15


















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Merivale & Carling

			
12 s	49 s	21 s	38 s
			
61 s		21 s	38 s

Background 2024 AM
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	75	273	896	2	780	16	2	67	0	76
Future Volume (vph)	75	273	896	2	780	16	2	67	0	76
Lane Group Flow (vph)	0	366	957	2	910	0	24	0	71	80
Turn Type	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases			2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	2	2	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	23.6	23.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	83.0	83.0	83.0	83.0	83.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	69.2%	69.2%	69.2%	69.2%	69.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		93.8	93.8	93.8	93.8		18.2		18.2	18.2
Actuated g/C Ratio		0.78	0.78	0.78	0.78		0.15		0.15	0.15
v/c Ratio		0.90	0.25	0.01	0.24		0.11		0.36	0.27
Control Delay		40.8	4.4	5.0	4.2		34.6		48.6	10.4
Queue Delay		0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay		40.8	4.4	5.0	4.3		34.6		48.6	10.4
LOS		D	A	A	A		C		D	B
Approach Delay			14.5		4.3		34.6		28.4	
Approach LOS			B		A		C		C	
Queue Length 50th (m)		44.3	15.5	0.1	17.2		4.0		15.7	0.0
Queue Length 95th (m)		#153.5	38.8	m0.4	31.4		10.0		25.1	11.6
Internal Link Dist (m)			168.6		89.4		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		405	3799	388	3728		382		357	464
Starvation Cap Reductn		0	0	0	1470		0		0	0
Spillback Cap Reductn		0	140	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.90	0.26	0.01	0.40		0.06		0.20	0.17

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 11.7

Intersection LOS: B

Intersection Capacity Utilization 80.4%

ICU Level of Service D









Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Carling & Westgate SC

										
										
83 s									37 s	
										
83 s									37 s	

Background 2024 AM
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	336	1228	280	307	352	360
Future Volume (vph)	336	1228	280	307	352	360
Lane Group Flow (vph)	354	1557	295	323	371	379
Turn Type	Prot	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6	3	8	4	
Permitted Phases			8			4
Detector Phase	1	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	16.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	16.3	58.0	24.0	62.0	38.0	38.0
Total Split (%)	13.6%	48.3%	20.0%	51.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	57.6	57.6	54.4	54.4	31.3	31.3
Actuated g/C Ratio	0.48	0.48	0.45	0.45	0.26	0.26
v/c Ratio	0.22	0.69	0.64	0.40	0.42	0.86
Control Delay	19.5	26.1	20.2	15.3	37.9	51.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	26.1	20.2	15.3	37.9	51.2
LOS	B	C	C	B	D	D
Approach Delay		24.8		17.7	44.6	
Approach LOS		C		B	D	
Queue Length 50th (m)	25.9	104.8	49.1	53.9	37.0	65.3
Queue Length 95th (m)	35.9	122.7	m70.2	m75.9	51.0	#112.9
Internal Link Dist (m)		110.3		152.2	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1578	2268	468	862	960	473
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.69	0.63	0.37	0.39	0.80

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 28.0

Intersection LOS: C

Intersection Capacity Utilization 84.4%

ICU Level of Service E






Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

















Queue shown is maximum after two cycles.

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















Splits and Phases: 4: Kirkwood & Carling WB

		
Ø1	Ø3	Ø4
16.3 s	24 s	38 s
		
Ø6 (R)	Ø8	
58 s	62 s	

Background 2024 AM
5: Merivale & Thames

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	9	2	0	4	21	747	1	1	536	16
Future Volume (Veh/h)	11	0	9	2	0	4	21	747	1	1	536	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	0	9	2	0	4	22	786	1	1	564	17
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											184	
pX, platoon unblocked												
vC, conflicting volume	1016	1406	290	1124	1414	394	581			787		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1016	1406	290	1124	1414	394	581			787		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	99	99	100	99	98			100		
cM capacity (veh/h)	188	135	706	155	133	606	989			828		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	21	6	415	394	283	299						
Volume Left	12	2	22	0	1	0						
Volume Right	9	4	0	1	0	17						
cSH	274	308	989	1700	828	1700						
Volume to Capacity	0.08	0.02	0.02	0.23	0.00	0.18						
Queue Length 95th (m)	1.9	0.5	0.5	0.0	0.0	0.0						
Control Delay (s)	19.2	16.9	0.7	0.0	0.0	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	19.2	16.9	0.4		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.6									
Intersection Capacity Utilization			47.8%		ICU Level of Service				A			
Analysis Period (min)			15									

Background 2024 PM
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	419	1232	330	328	258	311	372
Future Volume (vph)	419	1232	330	328	258	311	372
Lane Group Flow (vph)	392	1346	347	345	272	327	392
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	61.0	61.0	61.0	29.0	29.0	30.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	24.2%	24.2%	25.0%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	58.9	58.9	58.9	24.5	24.5	53.1	53.1
Actuated g/C Ratio	0.49	0.49	0.49	0.20	0.20	0.44	0.44
v/c Ratio	0.55	0.60	0.41	0.50	0.88	0.67	0.50
Control Delay	25.6	23.8	5.9	45.0	74.6	16.9	13.3
Queue Delay	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	23.9	5.9	45.0	74.6	16.9	13.3
LOS	C	C	A	D	E	B	B
Approach Delay		21.2		58.0			14.9
Approach LOS		C		E			B
Queue Length 50th (m)	75.1	88.9	8.8	37.9	62.3	20.1	73.3
Queue Length 95th (m)	110.9	104.8	27.9	52.7	#108.3	90.4	108.0
Internal Link Dist (m)		161.6		158.6			144.7
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	715	2256	844	712	318	500	817
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	51	108	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.63	0.41	0.48	0.86	0.65	0.48

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 81 (68%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 26.6

Intersection LOS: C

Intersection Capacity Utilization 108.3%

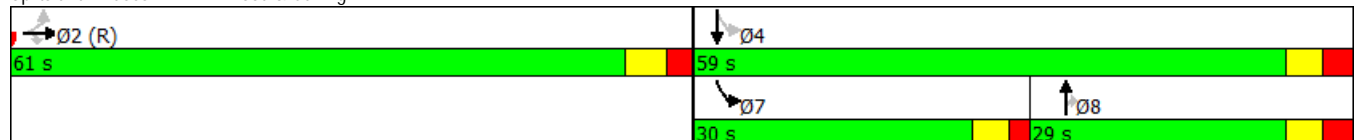
ICU Level of Service G

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Background 2024 PM
2: Merivale & Carling

	→	↖	←	↙	↑	↗	↘	↓	↕
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↑	↗	↖	↑	↗
Traffic Volume (vph)	649	430	1550	135	207	245	77	294	122
Future Volume (vph)	649	430	1550	135	207	245	77	294	122
Lane Group Flow (vph)	874	453	1731	142	218	258	81	309	128
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	42.0	20.0	62.0	20.0	38.0	38.0	20.0	38.0	38.0
Total Split (%)	35.0%	16.7%	51.7%	16.7%	31.7%	31.7%	16.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	38.0	64.8	64.8	15.0	32.8	32.8	13.0	28.2	28.2
Actuated g/C Ratio	0.32	0.54	0.54	0.12	0.27	0.27	0.11	0.24	0.24
v/c Ratio	0.58	1.06	0.67	0.67	0.45	0.44	0.44	0.74	0.29
Control Delay	27.3	88.0	22.3	66.1	39.7	6.5	57.1	52.9	6.7
Queue Delay	0.7	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.1	88.0	22.5	66.1	39.7	6.5	57.1	52.9	6.7
LOS	C	F	C	E	D	A	E	D	A
Approach Delay	28.1		36.1		31.9			42.1	
Approach LOS	C		D		C			D	
Queue Length 50th (m)	35.4	~95.5	105.4	32.1	43.4	0.0	18.1	67.4	0.0
Queue Length 95th (m)	45.7	#178.2	134.6	53.4	64.9	19.4	33.1	92.8	13.0
Internal Link Dist (m)	81.2		139.3		161.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1519	428	2597	226	512	603	226	505	510
Starvation Cap Reductn	325	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	189	0	0	0	0	0	4
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	1.06	0.72	0.63	0.43	0.43	0.36	0.61	0.25

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 34.5

Intersection LOS: C

Intersection Capacity Utilization 86.3%

ICU Level of Service E

Analysis Period (min) 15

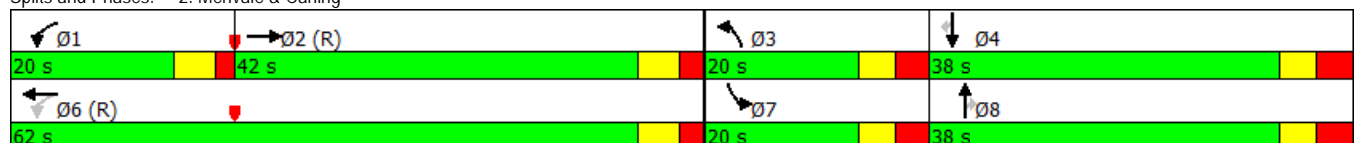
~ Volume exceeds capacity, queue is theoretically infinite.

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: 2: Merivale & Carling



Background 2024 PM
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	41	230	722	1	1679	10	3	127	4	138
Future Volume (vph)	41	230	722	1	1679	10	3	127	4	138
Lane Group Flow (vph)	0	285	768	1	1924	0	18	0	138	145
Turn Type	pm+pt	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	5	2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	5	5	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.6	10.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	24.0	24.0	83.0	59.0	59.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	20.0%	20.0%	69.2%	49.2%	49.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		89.7	89.7	65.3	65.3		22.3		22.3	22.3
Actuated g/C Ratio		0.75	0.75	0.54	0.54		0.19		0.19	0.19
v/c Ratio		0.82	0.21	0.00	0.74		0.07		0.60	0.37
Control Delay		59.9	2.9	7.0	10.3		30.8		54.1	8.6
Queue Delay		0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay		59.9	2.9	7.0	10.3		30.8		54.1	8.6
LOS		E	A	A	B		C		D	A
Approach Delay			18.3		10.3		30.8		30.8	
Approach LOS			B		B		C		C	
Queue Length 50th (m)		49.8	9.6	0.0	22.8		2.8		30.3	0.0
Queue Length 95th (m)		m#97.1	m16.1	m0.0	98.2		8.1		45.7	15.1
Internal Link Dist (m)			220.3		81.2		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		367	3631	328	2608		390		343	505
Starvation Cap Reductn		0	0	0	53		0		0	0
Spillback Cap Reductn		0	0	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.78	0.21	0.00	0.75		0.05		0.40	0.29

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 14.8

Intersection LOS: B

Intersection Capacity Utilization 103.2%

ICU Level of Service G






Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Carling & Westgate SC

									
83 s								37 s	
									
24 s			59 s					37 s	

Background 2024 PM
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	200	2320	227	545	481	410
Future Volume (vph)	200	2320	227	545	481	410
Lane Group Flow (vph)	211	2774	239	574	506	432
Turn Type	Perm	NA	pm+pt	NA	NA	Perm
Protected Phases		6	3	8	4	
Permitted Phases	6		8			4
Detector Phase	6	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	35.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	67.0	67.0	20.0	53.0	33.0	33.0
Total Split (%)	55.8%	55.8%	16.7%	44.2%	27.5%	27.5%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	C-Max	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	63.0	63.0	49.0	49.0	29.5	29.5
Actuated g/C Ratio	0.52	0.52	0.41	0.41	0.25	0.25
v/c Ratio	0.12	1.11	0.71	0.79	0.61	1.05
Control Delay	6.8	76.7	34.1	39.8	43.9	93.6
Queue Delay	0.0	0.0	0.0	5.2	0.0	0.0
Total Delay	6.8	76.7	34.1	45.0	43.9	93.6
LOS	A	E	C	D	D	F
Approach Delay		71.8		41.8	66.8	
Approach LOS		E		D	E	
Queue Length 50th (m)	5.1	~278.7	47.4	135.6	56.2	~96.0
Queue Length 95th (m)	m7.4	#306.6	65.6	177.8	74.2	#158.3
Internal Link Dist (m)		113.3		144.7	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1715	2493	345	728	834	412
Starvation Cap Reductn	0	0	0	102	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	1.11	0.69	0.92	0.61	1.05

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 6:WBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 65.6

Intersection LOS: E

Intersection Capacity Utilization 108.3%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

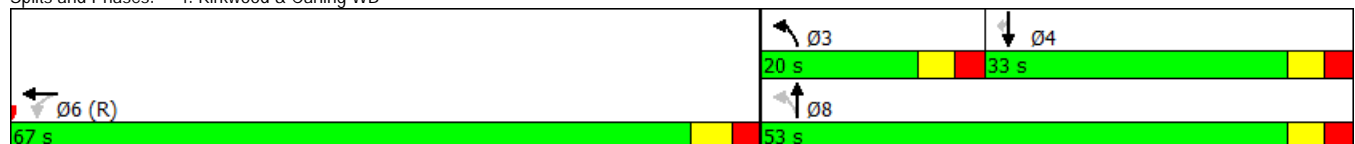
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

















Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Kirkwood & Carling WB



Background 2024 PM
5: Merivale & Thames

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	22	0	0	3	22	576	2	4	873	28
Future Volume (Veh/h)	8	0	22	0	0	3	22	576	2	4	873	28
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	8	0	23	0	0	3	23	606	2	4	919	29
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											186	
pX, platoon unblocked												
vC, conflicting volume	1294	1596	474	1144	1609	304	948			608		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1294	1596	474	1144	1609	304	948			608		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	96	100	100	100	97			100		
cM capacity (veh/h)	116	102	537	144	100	692	720			966		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	31	3	326	305	464	488						
Volume Left	8	0	23	0	4	0						
Volume Right	23	3	0	2	0	29						
cSH	278	692	720	1700	966	1700						
Volume to Capacity	0.11	0.00	0.03	0.18	0.00	0.29						
Queue Length 95th (m)	2.8	0.1	0.8	0.0	0.1	0.0						
Control Delay (s)	19.6	10.2	1.1	0.0	0.1	0.0						
Lane LOS	C	B	A		A							
Approach Delay (s)	19.6	10.2	0.6		0.1							
Approach LOS	C	B										
Intersection Summary												
Average Delay			0.6									
Intersection Capacity Utilization			49.1%		ICU Level of Service				A			
Analysis Period (min)			15									

Appendix G

Phase 1 and 2 Detailed Trip Generation

Trip Generation - Phase 1 and 2

4/7/2017 12:19 PM

ITE Vehicle Trip Generation Rates

Land Use	Data Source	Trip Rate	
		AM Peak	PM Peak
Specialty Retail	ITE 826	1.36	2.71
Residential Condominium	ITE 230	0.44	0.52

Modified Person Trip Generation Rates

Land Use	Data Source	Person Trip Rate	
		AM Peak	PM Peak
Specialty Retail	ITE 826	1.76	3.52
Residential Condominium	ITE 230	0.57	0.68
Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%			

ITE Fitted Curve Equations

Land Use	Data Source	Fitted Curve Equation			
		AM Peak		PM Peak	
Specialty Retail	ITE 826	T= 1.20(x) + 10.74		T= 2.40(x) + 21.48	
Residential Condominium	ITE 230	Ln(T)= 0.80Ln(x) + 0.26		Ln(T)= 0.82Ln(x) + 0.32	

Modified Person Trip Generation

Land Use	Data Source	Area	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
			In	Out	Total	In	Out	Total
		ft²	56%	44%		44%	56%	
Specialty Retail	ITE 826	26,232 ft²	30	25	55	48	62	110
		Units	17%	83%		67%	33%	
Residential Condominium	ITE 230	914 du	66	328	394	321	159	480
Total			96	353	449	369	221	590

Specialty Retail Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	50%	15	13	28	24	31	55
Auto Passenger	15%	5	4	9	8	10	18
Transit	15%	4	3	7	7	9	16
Non-motorized	20%	6	5	11	9	12	21
Total Person Trips	100%	30	25	55	48	62	110
Less Pass-by (25%)		-4	-4	-8	-7	-7	-14
Total 'New' Specialty Retail Auto Trips		11	9	20	17	24	41

Residential Condominium Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	50%	33	164	197	161	80	241
Auto Passenger	10%	7	33	40	32	16	48
Transit	25%	17	82	99	80	40	120
Non-motorized	15%	9	49	58	48	23	71
Total Person Trips	100%	66	328	394	321	159	480
Total 'New' Residential Condominium Auto Trips		33	164	197	161	80	241















Total Site Vehicle Trip Generation

Travel Mode	AM Peak (veh/hr)			PM Peak (veh/hr)		
	In	Out	Total	In	Out	Total
Specialty Retail Trip Generation	15	13	28	24	31	55
Residential Condominium Trip Generation	33	164	197	161	80	241
Specialty Retail Pass-by (25%)	-4	-4	-8	-7	-7	-14
Total 'New' Auto Trips	44	173	217	178	104	282

Appendix H

SYNCHRO Capacity Analysis – Projected 2019

Projected 2019 AM
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	187	1910	187	369	339	344	439
Future Volume (vph)	187	1910	187	369	339	344	439
Lane Group Flow (vph)	177	2031	197	388	357	362	462
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	58.0	58.0	58.0	38.0	38.0	24.0	62.0
Total Split (%)	48.3%	48.3%	48.3%	31.7%	31.7%	20.0%	51.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	55.7	55.7	55.7	32.3	32.3	56.3	56.3
Actuated g/C Ratio	0.46	0.46	0.46	0.27	0.27	0.47	0.47
v/c Ratio	0.26	0.95	0.26	0.43	0.88	0.76	0.55
Control Delay	21.5	42.4	6.6	37.5	64.6	32.5	24.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	21.5	42.4	6.6	37.5	64.6	32.5	25.4
LOS	C	D	A	D	E	C	C
Approach Delay		37.9		50.5			28.5
Approach LOS		D		D			C
Queue Length 50th (m)	29.6	178.5	6.2	38.9	78.9	73.5	96.5
Queue Length 95th (m)	48.2	#219.8	20.1	53.2	#127.0	101.9	129.3
Internal Link Dist (m)		161.6		158.6			152.2
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	676	2138	746	960	429	474	862
Starvation Cap Reductn	0	0	0	0	0	0	122
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.95	0.26	0.40	0.83	0.76	0.62

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 38.3

Intersection LOS: D

Intersection Capacity Utilization 84.5%

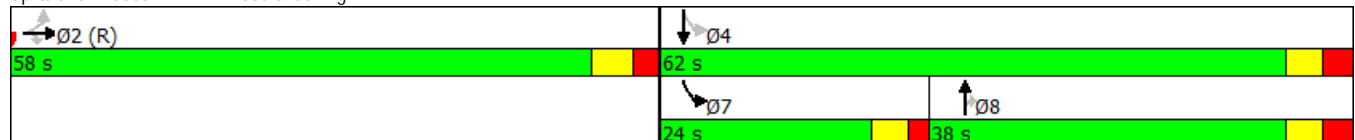
ICU Level of Service E

Analysis Period (min) 15




















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Projected 2019 AM
2: Merivale & Carling

										
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations										
Traffic Volume (vph)	957	185	584	163	239	352	29	270	238	
Future Volume (vph)	957	185	584	163	239	352	29	270	238	
Lane Group Flow (vph)	1110	195	652	172	252	371	31	284	251	
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	2	1	6	3	8		7	4		
Permitted Phases		6				8			4	
Detector Phase	2	1	6	3	8	8	7	4	4	
Switch Phase										
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7	
Total Split (s)	49.0	12.0	61.0	21.0	38.0	38.0	21.0	38.0	38.0	
Total Split (%)	40.8%	10.0%	50.8%	17.5%	31.7%	31.7%	17.5%	31.7%	31.7%	
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4	
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None	
Act Effct Green (s)	48.1	64.5	64.5	16.3	38.4	38.4	10.0	27.2	27.2	
Actuated g/C Ratio	0.40	0.54	0.54	0.14	0.32	0.32	0.08	0.23	0.23	
v/c Ratio	0.58	0.70	0.25	0.74	0.44	0.54	0.22	0.70	0.54	
Control Delay	24.1	33.1	15.8	69.8	35.5	9.3	54.3	51.8	15.3	
Queue Delay	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.5	33.1	15.8	69.8	35.5	9.3	54.3	51.8	15.3	
LOS	C	C	B	E	D	A	D	D	B	
Approach Delay	24.5		19.8		30.7			35.8		
Approach LOS	C		B		C			D		
Queue Length 50th (m)	53.2	23.7	29.1	39.2	48.9	9.5	7.0	61.4	12.8	
Queue Length 95th (m)	67.6	#63.4	41.3	#69.1	71.0	36.1	16.3	84.9	35.3	
Internal Link Dist (m)	89.4		139.3		159.9			100.7		
Turn Bay Length (m)		90.0		40.0			28.0		35.0	
Base Capacity (vph)	1923	280	2585	240	571	681	240	505	540	
Starvation Cap Reductn	350	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.71	0.70	0.25	0.72	0.44	0.54	0.13	0.56	0.46	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 26.7

Intersection LOS: C

Intersection Capacity Utilization 77.5%








ICU Level of Service D

Analysis Period (min) 15


















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Merivale & Carling

 Ø1	 Ø2 (R)	 Ø3	 Ø4
12 s	49 s	21 s	38 s
 Ø6 (R)		 Ø7	 Ø8
61 s		21 s	38 s

Projected 2019 AM
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	103	262	948	2	780	16	2	45	0	62
Future Volume (vph)	103	262	948	2	780	16	2	45	0	62
Lane Group Flow (vph)	0	384	1012	2	899	0	24	0	47	65
Turn Type	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases			2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	2	2	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	23.6	23.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	83.0	83.0	83.0	83.0	83.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	69.2%	69.2%	69.2%	69.2%	69.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		98.9	98.9	98.9	98.9		17.3		17.3	17.3
Actuated g/C Ratio		0.82	0.82	0.82	0.82		0.14		0.14	0.14
v/c Ratio		0.88	0.25	0.01	0.23		0.12		0.25	0.24
Control Delay		24.5	2.0	5.0	3.5		35.6		46.2	11.2
Queue Delay		0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay		24.5	2.0	5.0	3.6		35.6		46.2	11.2
LOS		C	A	A	A		D		D	B
Approach Delay			8.1		3.6		35.6		25.9	
Approach LOS			A		A		D		C	
Queue Length 50th (m)		32.4	6.6	0.1	16.4		4.1		10.4	0.0
Queue Length 95th (m)		m#121.8	m17.3	m0.4	30.9		10.0		18.1	10.5
Internal Link Dist (m)			168.6		89.4		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		436	4005	388	3940		380		357	453
Starvation Cap Reductn		0	0	0	1532		0		0	0
Spillback Cap Reductn		0	0	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.88	0.25	0.01	0.37		0.06		0.13	0.14

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 7.6

Intersection LOS: A

Intersection Capacity Utilization 81.1%

ICU Level of Service D





Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Carling & Westgate SC

					
					
83 s			37 s		
					
83 s			37 s		

Projected 2019 AM
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	344	1179	280	307	352	360
Future Volume (vph)	344	1179	280	307	352	360
Lane Group Flow (vph)	362	1505	295	323	371	379
Turn Type	Prot	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6	3	8	4	
Permitted Phases			8			4
Detector Phase	1	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	16.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	58.0	58.0	24.0	62.0	38.0	38.0
Total Split (%)	48.3%	48.3%	20.0%	51.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	57.6	57.6	54.4	54.4	31.3	31.3
Actuated g/C Ratio	0.48	0.48	0.45	0.45	0.26	0.26
v/c Ratio	0.23	0.66	0.64	0.40	0.42	0.85
Control Delay	19.5	25.4	20.2	15.3	37.9	50.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	25.4	20.2	15.3	37.9	50.7
LOS	B	C	C	B	D	D
Approach Delay		24.2		17.7	44.4	
Approach LOS		C		B	D	
Queue Length 50th (m)	26.5	99.3	49.1	53.9	37.0	64.8
Queue Length 95th (m)	36.7	116.7	m70.2	m75.9	51.0	#112.1
Internal Link Dist (m)		110.3		152.2	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1579	2267	468	862	960	475
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.66	0.63	0.37	0.39	0.80

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 27.7

Intersection LOS: C

Intersection Capacity Utilization 84.5%

ICU Level of Service E






Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

















Queue shown is maximum after two cycles.

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
















Splits and Phases: 4: Kirkwood & Carling WB

		
Ø1	Ø3	Ø4
58 s	24 s	38 s
		
Ø6 (R)	Ø8	
58 s	62 s	

Projected 2019 AM
5: Merivale & Thames

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	9	2	0	4	23	739	1	1	532	20
Future Volume (Veh/h)	11	0	9	2	0	4	23	739	1	1	532	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	0	9	2	0	4	24	778	1	1	560	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											184	
pX, platoon unblocked												
vC, conflicting volume	1014	1400	290	1118	1410	390	581			779		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1014	1400	290	1118	1410	390	581			779		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	99	99	100	99	98			100		
cM capacity (veh/h)	188	136	706	157	134	609	989			834		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	21	6	413	390	281	301						
Volume Left	12	2	24	0	1	0						
Volume Right	9	4	0	1	0	21						
cSH	274	310	989	1700	834	1700						
Volume to Capacity	0.08	0.02	0.02	0.23	0.00	0.18						
Queue Length 95th (m)	1.9	0.4	0.6	0.0	0.0	0.0						
Control Delay (s)	19.2	16.8	0.8	0.0	0.0	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	19.2	16.8	0.4		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.6									
Intersection Capacity Utilization			49.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Projected 2019 PM
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations		 					
Traffic Volume (vph)	419	1221	330	328	258	316	372
Future Volume (vph)	419	1221	330	328	258	316	372
Lane Group Flow (vph)	392	1334	347	345	272	333	392
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	61.0	61.0	61.0	29.0	29.0	30.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	24.2%	24.2%	25.0%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	58.9	58.9	58.9	24.4	24.4	53.1	53.1
Actuated g/C Ratio	0.49	0.49	0.49	0.20	0.20	0.44	0.44
v/c Ratio	0.55	0.59	0.41	0.50	0.88	0.68	0.50
Control Delay	25.6	23.7	5.9	45.1	75.2	16.0	11.5
Queue Delay	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	23.8	5.9	45.1	75.2	16.0	11.5
LOS	C	C	A	D	E	B	B
Approach Delay		21.2		58.4			13.6
Approach LOS		C		E			B
Queue Length 50th (m)	75.1	87.7	8.8	37.9	62.3	16.4	71.9
Queue Length 95th (m)	110.9	103.5	27.9	52.7	#108.3	67.7	99.6
Internal Link Dist (m)		161.6		158.6			144.7
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	714	2253	843	709	317	501	817
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	51	108	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.62	0.41	0.49	0.86	0.66	0.48

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 81 (68%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 26.3

Intersection LOS: C

Intersection Capacity Utilization 108.1%

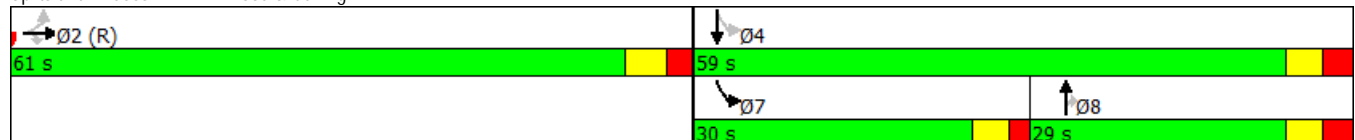
ICU Level of Service G

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Projected 2019 PM
2: Merivale & Carling

	→	↖	←	↙	↑	↗	↘	↓	↕
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↑	↗	↖	↑	↗
Traffic Volume (vph)	663	446	1537	129	201	245	67	289	122
Future Volume (vph)	663	446	1537	129	201	245	67	289	122
Lane Group Flow (vph)	891	469	1703	136	212	258	71	304	128
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	42.0	20.0	62.0	20.0	38.0	38.0	20.0	38.0	38.0
Total Split (%)	35.0%	16.7%	51.7%	16.7%	31.7%	31.7%	16.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	38.0	65.1	65.1	14.9	32.9	32.9	12.5	28.0	28.0
Actuated g/C Ratio	0.32	0.54	0.54	0.12	0.27	0.27	0.10	0.23	0.23
v/c Ratio	0.59	1.09	0.65	0.65	0.43	0.44	0.40	0.73	0.29
Control Delay	27.1	99.4	21.8	64.7	39.3	6.5	56.3	52.7	6.7
Queue Delay	0.8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	99.4	21.9	64.7	39.3	6.5	56.3	52.7	6.7
LOS	C	F	C	E	D	A	E	D	A
Approach Delay	27.8		38.6		31.0			41.5	
Approach LOS	C		D		C			D	
Queue Length 50th (m)	35.2	~103.9	102.0	30.6	41.9	0.0	15.8	66.3	0.0
Queue Length 95th (m)	45.6	#188.6	131.3	51.5	63.2	19.4	29.6	91.3	13.0
Internal Link Dist (m)	81.2		139.3		161.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1520	429	2618	226	510	602	226	505	510
Starvation Cap Reductn	320	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	105	0	0	0	0	0	2
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	1.09	0.68	0.60	0.42	0.43	0.31	0.60	0.25

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 35.6

Intersection LOS: D

Intersection Capacity Utilization 86.8%

ICU Level of Service E

Analysis Period (min) 15

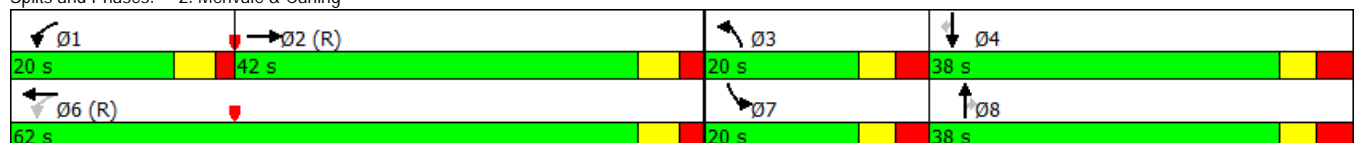
~ Volume exceeds capacity, queue is theoretically infinite.

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: 2: Merivale & Carling



Projected 2019 PM
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	58	179	753	1	1679	10	3	111	4	143
Future Volume (vph)	58	179	753	1	1679	10	3	111	4	143
Lane Group Flow (vph)	0	249	801	1	1904	0	18	0	121	151
Turn Type	pm+pt	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	5	2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	5	5	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.6	10.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	24.0	24.0	83.0	59.0	59.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	20.0%	20.0%	69.2%	49.2%	49.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		90.8	90.8	69.3	69.3		21.2		21.2	21.2
Actuated g/C Ratio		0.76	0.76	0.58	0.58		0.18		0.18	0.18
v/c Ratio		0.80	0.22	0.00	0.69		0.07		0.55	0.41
Control Delay		57.1	2.8	7.0	8.0		31.4		52.9	11.6
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay		57.1	2.8	7.0	8.0		31.4		52.9	11.6
LOS		E	A	A	A		C		D	B
Approach Delay			15.7		8.0		31.4		30.0	
Approach LOS			B		A		C		C	
Queue Length 50th (m)		39.2	10.0	0.0	21.6		2.8		26.6	3.2
Queue Length 95th (m)		m#75.5	m16.5	m0.0	96.9		8.1		40.2	18.6
Internal Link Dist (m)			162.3		81.2		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		351	3680	337	2771		391		344	498
Starvation Cap Reductn		0	0	0	44		0		0	0
Spillback Cap Reductn		0	0	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.71	0.22	0.00	0.70		0.05		0.35	0.30

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 12.5

Intersection LOS: B

Intersection Capacity Utilization 100.9%

ICU Level of Service G

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Carling & Westgate SC



Projected 2019 PM
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	205	2308	227	545	481	410
Future Volume (vph)	205	2308	227	545	481	410
Lane Group Flow (vph)	216	2761	239	574	506	432
Turn Type	Prot	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6	3	8	4	
Permitted Phases			8			4
Detector Phase	1	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	16.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	67.0	67.0	20.0	53.0	33.0	33.0
Total Split (%)	55.8%	55.8%	16.7%	44.2%	27.5%	27.5%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	63.0	63.0	49.0	49.0	29.5	29.5
Actuated g/C Ratio	0.52	0.52	0.41	0.41	0.25	0.25
v/c Ratio	0.13	1.11	0.71	0.79	0.61	1.05
Control Delay	14.7	83.1	34.1	39.8	43.9	93.6
Queue Delay	0.0	0.0	0.0	5.2	0.0	0.0
Total Delay	14.7	83.1	34.1	44.9	43.9	93.6
LOS	B	F	C	D	D	F
Approach Delay		78.2		41.7	66.8	
Approach LOS		E		D	E	
Queue Length 50th (m)	12.8	~271.2	47.4	135.6	56.2	~96.0
Queue Length 95th (m)	19.1	#298.6	65.6	177.8	74.2	#158.3
Internal Link Dist (m)		113.3		144.7	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1726	2493	345	728	834	412
Starvation Cap Reductn	0	0	0	102	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	1.11	0.69	0.92	0.61	1.05

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 69.6

Intersection LOS: E

Intersection Capacity Utilization 108.1%

ICU Level of Service G

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: Kirkwood & Carling WB

		
Ø1	Ø3	Ø4
67 s	20 s	33 s
		
Ø6 (R)	Ø8	
67 s	53 s	















Projected 2019 PM
5: Merivale & Thames

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	22	0	0	3	30	564	2	4	870	44
Future Volume (Veh/h)	8	0	22	0	0	3	30	564	2	4	870	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	8	0	23	0	0	3	32	594	2	4	916	46
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)											186	
pX, platoon unblocked												
vC, conflicting volume	1311	1607	481	1148	1629	298	962			596		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1311	1607	481	1148	1629	298	962			596		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	96	100	100	100	96			100		
cM capacity (veh/h)	112	99	531	142	96	698	711			976		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	31	3	329	299	462	504						
Volume Left	8	0	32	0	4	0						
Volume Right	23	3	0	2	0	46						
cSH	270	698	711	1700	976	1700						
Volume to Capacity	0.11	0.00	0.04	0.18	0.00	0.30						
Queue Length 95th (m)	2.9	0.1	1.1	0.0	0.1	0.0						
Control Delay (s)	20.1	10.2	1.5	0.0	0.1	0.0						
Lane LOS	C	B	A		A							
Approach Delay (s)	20.1	10.2	0.8		0.1							
Approach LOS	C	B										
Intersection Summary												
Average Delay			0.7									
Intersection Capacity Utilization			55.3%		ICU Level of Service				B			
Analysis Period (min)			15									

Appendix I

SYNCHRO Capacity Analysis – Modified Projected 2019

Projected 2019 AM - Modified
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	187	1910	187	369	339	344	439
Future Volume (vph)	187	1910	187	369	339	344	439
Lane Group Flow (vph)	177	2031	197	388	357	362	462
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	61.0	61.0	61.0	38.0	38.0	21.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	31.7%	31.7%	17.5%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	58.7	58.7	58.7	32.3	32.3	53.3	53.3
Actuated g/C Ratio	0.49	0.49	0.49	0.27	0.27	0.44	0.44
v/c Ratio	0.25	0.90	0.25	0.43	0.88	0.84	0.58
Control Delay	19.6	35.2	5.5	37.5	64.6	40.6	26.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	19.6	35.2	5.5	37.5	64.6	40.6	27.1
LOS	B	D	A	D	E	D	C
Approach Delay		31.6		50.5			33.1
Approach LOS		C		D			C
Queue Length 50th (m)	28.2	169.6	5.0	38.9	78.9	63.3	96.3
Queue Length 95th (m)	45.8	#196.6	17.8	53.2	#127.0	#104.1	121.8
Internal Link Dist (m)		161.6		158.6			152.2
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	712	2253	782	960	429	432	817
Starvation Cap Reductn	0	0	0	0	0	0	107
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.90	0.25	0.40	0.83	0.84	0.65

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 35.5

Intersection LOS: D

Intersection Capacity Utilization 84.5%

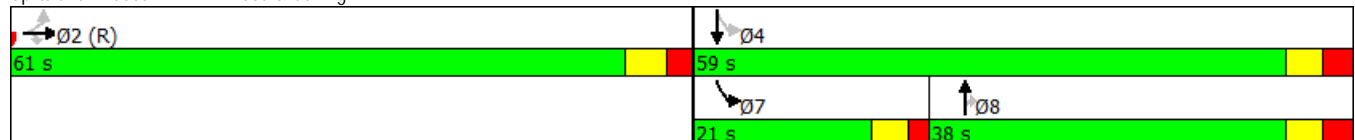
ICU Level of Service E

Analysis Period (min) 15










95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Projected 2019 AM - Modified
2: Merivale & Carling

									
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↗	↑↑↑	↗	↑	↗	↗	↑	↗
Traffic Volume (vph)	957	185	584	163	239	352	29	270	238
Future Volume (vph)	957	185	584	163	239	352	29	270	238
Lane Group Flow (vph)	1110	195	652	172	252	371	31	284	251
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	49.0	12.0	61.0	21.0	38.0	38.0	21.0	38.0	38.0
Total Split (%)	40.8%	10.0%	50.8%	17.5%	31.7%	31.7%	17.5%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	48.1	64.5	64.5	16.3	38.4	38.4	10.0	27.2	27.2
Actuated g/C Ratio	0.40	0.54	0.54	0.14	0.32	0.32	0.08	0.23	0.23
v/c Ratio	0.58	0.70	0.25	0.74	0.44	0.54	0.22	0.70	0.54
Control Delay	24.2	33.1	15.8	69.8	35.5	9.3	54.3	51.8	15.3
Queue Delay	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	33.1	15.8	69.8	35.5	9.3	54.3	51.8	15.3
LOS	C	C	B	E	D	A	D	D	B
Approach Delay	24.6		19.8		30.7			35.8	
Approach LOS	C		B		C			D	
Queue Length 50th (m)	53.1	23.7	29.1	39.2	48.9	9.5	7.0	61.4	12.8
Queue Length 95th (m)	71.9	#63.4	41.3	#69.1	71.0	36.1	16.3	84.9	35.3
Internal Link Dist (m)	89.4		139.3		159.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1923	280	2585	240	571	681	240	505	540
Starvation Cap Reductn	350	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.70	0.25	0.72	0.44	0.54	0.13	0.56	0.46

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 26.8

Intersection LOS: C

Intersection Capacity Utilization 77.5%








ICU Level of Service D

Analysis Period (min) 15


















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Merivale & Carling

			
12 s	49 s	21 s	38 s
			
61 s		21 s	38 s

Projected 2019 AM - Modified
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	103	262	948	2	780	16	2	45	0	62
Future Volume (vph)	103	262	948	2	780	16	2	45	0	62
Lane Group Flow (vph)	0	384	1012	2	899	0	24	0	47	65
Turn Type	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases			2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	2	2	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	23.6	23.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	83.0	83.0	83.0	83.0	83.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	69.2%	69.2%	69.2%	69.2%	69.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		98.9	98.9	98.9	98.9		17.3		17.3	17.3
Actuated g/C Ratio		0.82	0.82	0.82	0.82		0.14		0.14	0.14
v/c Ratio		0.87	0.25	0.01	0.23		0.12		0.25	0.24
Control Delay		23.1	2.4	5.0	3.5		35.5		46.1	11.1
Queue Delay		0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay		23.1	2.4	5.0	3.6		35.5		46.1	11.1
LOS		C	A	A	A		D		D	B
Approach Delay			8.1		3.6		35.5		25.8	
Approach LOS			A		A		D		C	
Queue Length 50th (m)		30.2	4.9	0.1	16.4		4.1		10.4	0.0
Queue Length 95th (m)		m#125.8	m#22.1	m#0.4	30.8		10.0		18.1	10.5
Internal Link Dist (m)			168.6		89.4		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		442	4007	390	3968		386		364	464
Starvation Cap Reductn		0	0	0	1556		0		0	0
Spillback Cap Reductn		0	13	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.87	0.25	0.01	0.37		0.06		0.13	0.14

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 7.5

Intersection LOS: A

Intersection Capacity Utilization 69.0%

ICU Level of Service C



Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Carling & Westgate SC

		Ø2 (R)				Ø4
83 s				37 s		
		Ø6 (R)				Ø8
83 s				37 s		

Projected 2019 AM - Modified
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	344	1179	280	307	352	360
Future Volume (vph)	344	1179	280	307	352	360
Lane Group Flow (vph)	326	1541	295	323	371	379
Turn Type	Perm	NA	pm+pt	NA	NA	Perm
Protected Phases		6	3	8	4	
Permitted Phases	6		8			4
Detector Phase	6	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	35.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	58.0	58.0	24.0	62.0	38.0	38.0
Total Split (%)	48.3%	48.3%	20.0%	51.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	C-Max	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	58.1	58.1	53.9	53.9	30.7	30.7
Actuated g/C Ratio	0.48	0.48	0.45	0.45	0.26	0.26
v/c Ratio	0.46	0.70	0.64	0.40	0.43	0.83
Control Delay	24.4	26.4	20.9	15.9	38.4	47.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	26.4	20.9	15.9	38.4	47.2
LOS	C	C	C	B	D	D
Approach Delay		26.0		18.3	42.9	
Approach LOS		C		B	D	
Queue Length 50th (m)	60.5	109.6	50.0	55.0	37.6	63.6
Queue Length 95th (m)	92.7	131.4	m71.6	m77.2	51.0	#100.9
Internal Link Dist (m)		110.3		152.2	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	706	2192	466	862	960	497
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.70	0.63	0.37	0.39	0.76

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 28.5

Intersection LOS: C

Intersection Capacity Utilization 84.5%

ICU Level of Service E















Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.















Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Kirkwood & Carling WB

						
						
Ø6 (R)	Ø3	Ø4	Ø8			
58 s	24 s	38 s	62 s			

Projected 2019 PM - Modified
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	419	1221	330	328	258	316	372
Future Volume (vph)	419	1221	330	328	258	316	372
Lane Group Flow (vph)	392	1334	347	345	272	333	392
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	61.0	61.0	61.0	29.0	29.0	30.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	24.2%	24.2%	25.0%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	58.9	58.9	58.9	24.4	24.4	53.1	53.1
Actuated g/C Ratio	0.49	0.49	0.49	0.20	0.20	0.44	0.44
v/c Ratio	0.55	0.59	0.41	0.50	0.88	0.68	0.50
Control Delay	25.6	23.7	5.1	45.1	75.2	17.1	12.9
Queue Delay	0.4	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	23.8	5.1	45.1	75.2	17.1	12.9
LOS	C	C	A	D	E	B	B
Approach Delay		21.1		58.4			14.9
Approach LOS		C		E			B
Queue Length 50th (m)	75.1	87.7	6.3	37.9	62.3	10.3	71.4
Queue Length 95th (m)	110.9	103.5	24.1	52.7	#108.3	93.7	109.6
Internal Link Dist (m)		161.6		158.6			144.7
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	714	2253	855	709	317	501	817
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	68	144	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.63	0.41	0.49	0.86	0.66	0.48

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 81 (68%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 26.5

Intersection LOS: C

Intersection Capacity Utilization 104.5%

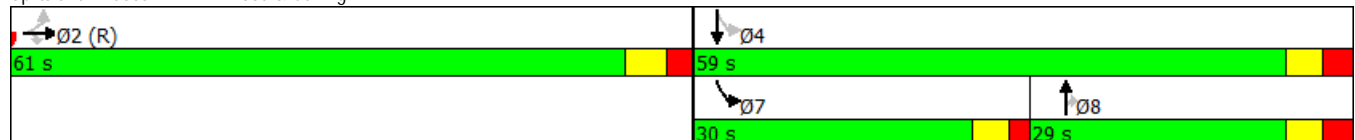
ICU Level of Service G

Analysis Period (min) 15










95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Projected 2019 PM - Modified
2: Merivale & Carling

									
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↱	↑↑↑	↱	↑	↗	↱	↑	↗
Traffic Volume (vph)	663	446	1537	129	201	245	67	289	122
Future Volume (vph)	663	446	1537	129	201	245	67	289	122
Lane Group Flow (vph)	891	469	1703	136	212	258	71	304	128
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	30.3	36.0	66.3	16.0	38.9	38.9	14.8	37.7	37.7
Total Split (%)	25.3%	30.0%	55.3%	13.3%	32.4%	32.4%	12.3%	31.4%	31.4%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	32.4	68.1	68.1	12.0	32.1	32.1	10.4	27.9	27.9
Actuated g/C Ratio	0.27	0.57	0.57	0.10	0.27	0.27	0.09	0.23	0.23
v/c Ratio	0.69	0.91	0.62	0.80	0.44	0.45	0.49	0.73	0.29
Control Delay	30.6	52.1	19.2	85.7	40.0	6.5	63.8	52.9	6.8
Queue Delay	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	52.1	19.8	85.7	40.0	6.5	63.8	52.9	6.8
LOS	C	D	B	F	D	A	E	D	A
Approach Delay	30.9		26.7		36.0			42.7	
Approach LOS	C		C		D			D	
Queue Length 50th (m)	42.5	84.3	93.8	31.9	42.9	0.0	16.1	66.3	0.0
Queue Length 95th (m)	54.6	#153.6	121.2	#64.8	62.5	19.1	31.2	91.7	13.0
Internal Link Dist (m)	81.2		139.3		161.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1297	538	2736	169	522	610	152	501	507
Starvation Cap Reductn	72	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	541	0	0	0	0	0	14
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.87	0.78	0.80	0.41	0.42	0.47	0.61	0.26

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 30.9

Intersection LOS: C

Intersection Capacity Utilization 86.8%

ICU Level of Service E

Analysis Period (min) 15


















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Merivale & Carling

			
36 s	30.3 s	16 s	37.7 s
			
66.3 s		14.8 s	38.9 s

Projected 2019 PM - Modified
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	58	179	753	1	1679	10	3	111	4	143
Future Volume (vph)	58	179	753	1	1679	10	3	111	4	143
Lane Group Flow (vph)	0	249	801	1	1904	0	18	0	121	151
Turn Type	pm+pt	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	5	2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	5	5	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.6	10.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	24.0	24.0	83.0	59.0	59.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	20.0%	20.0%	69.2%	49.2%	49.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		91.0	91.0	69.5	69.5		21.0		21.0	21.0
Actuated g/C Ratio		0.76	0.76	0.58	0.58		0.18		0.18	0.18
v/c Ratio		0.80	0.22	0.00	0.68		0.07		0.54	0.39
Control Delay		57.2	2.9	7.0	11.9		31.5		52.4	8.6
Queue Delay		0.0	0.0	0.0	0.3		0.0		0.0	0.0
Total Delay		57.2	2.9	7.0	12.3		31.5		52.4	8.6
LOS		E	A	A	B		C		D	A
Approach Delay			15.7		12.2		31.5		28.1	
Approach LOS			B		B		C		C	
Queue Length 50th (m)		39.5	10.0	0.0	123.0		2.8		26.6	0.0
Queue Length 95th (m)		m#75.6	m17.2	m0.1	179.0		8.1		40.0	15.4
Internal Link Dist (m)			162.3		81.2		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		351	3691	348	2797		399		353	526
Starvation Cap Reductn		0	0	0	335		0		0	0
Spillback Cap Reductn		0	0	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.71	0.22	0.00	0.77		0.05		0.34	0.29

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 14.8

Intersection LOS: B

Intersection Capacity Utilization 82.2%

ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Carling & Westgate SC



Projected 2019 PM - Modified
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	205	2308	227	545	481	410
Future Volume (vph)	205	2308	227	545	481	410
Lane Group Flow (vph)	216	2761	239	574	506	432
Turn Type	Prot	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6	3	8	4	
Permitted Phases			8			4
Detector Phase	1	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	16.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	73.0	73.0	14.0	47.0	33.0	33.0
Total Split (%)	60.8%	60.8%	11.7%	39.2%	27.5%	27.5%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	69.0	69.0	43.0	43.0	29.0	29.0
Actuated g/C Ratio	0.58	0.58	0.36	0.36	0.24	0.24
v/c Ratio	0.11	1.00	0.92	0.90	0.62	1.00
Control Delay	5.9	36.3	68.1	54.2	44.4	81.0
Queue Delay	0.0	0.0	0.0	15.8	0.0	0.0
Total Delay	5.9	36.3	68.1	70.0	44.4	81.0
LOS	A	D	E	E	D	F
Approach Delay		34.1		69.4	61.2	
Approach LOS		C		E	E	
Queue Length 50th (m)	6.5	248.4	52.0	140.7	56.2	~85.9
Queue Length 95th (m)	m6.7	#276.6	#99.2	#199.0	74.2	#152.0
Internal Link Dist (m)		113.3		144.7	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1890	2765	260	639	819	431
Starvation Cap Reductn	0	0	0	69	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	1.00	0.92	1.01	0.62	1.00

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 45.5

Intersection LOS: D

Intersection Capacity Utilization 104.5%

ICU Level of Service G

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.

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















Splits and Phases: 4: Kirkwood & Carling WB

		
Ø1	Ø3	Ø4
73 s	14 s	33 s
		
Ø6 (R)	Ø8	
73 s	47 s	

Appendix J

SYNCHRO Capacity Analysis – Projected 2024

Projected 2024 AM
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	187	1959	187	369	339	351	439
Future Volume (vph)	187	1959	187	369	339	351	439
Lane Group Flow (vph)	177	2082	197	388	357	369	462
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	58.0	58.0	58.0	38.0	38.0	24.0	62.0
Total Split (%)	48.3%	48.3%	48.3%	31.7%	31.7%	20.0%	51.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	55.7	55.7	55.7	32.3	32.3	56.3	56.3
Actuated g/C Ratio	0.46	0.46	0.46	0.27	0.27	0.47	0.47
v/c Ratio	0.26	0.97	0.26	0.43	0.88	0.78	0.55
Control Delay	21.5	46.3	7.0	37.5	64.6	32.9	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	21.5	46.3	7.0	37.5	64.6	32.9	24.7
LOS	C	D	A	D	E	C	C
Approach Delay		41.4		50.5			28.4
Approach LOS		D		D			C
Queue Length 50th (m)	29.6	~188.4	6.7	38.9	78.9	72.2	92.4
Queue Length 95th (m)	48.2	#229.4	20.7	53.2	#127.0	#100.5	122.8
Internal Link Dist (m)		161.6		158.6			152.2
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	676	2138	744	960	429	474	862
Starvation Cap Reductn	0	0	0	0	0	0	120
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.97	0.26	0.40	0.83	0.78	0.62

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 40.4

Intersection LOS: D

Intersection Capacity Utilization 85.7%

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: 1: Kirkwood & Carling EB

									
58 s							62 s		
							24 s		38 s

Projected 2024 AM
2: Merivale & Carling

	→	↗	←	↖	↑	↘	↙	↓	↕
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↗	↑↑↑	↖	↑	↘	↙	↑	↘
Traffic Volume (vph)	1007	188	591	167	243	352	43	278	238
Future Volume (vph)	1007	188	591	167	243	352	43	278	238
Lane Group Flow (vph)	1183	198	666	176	256	371	45	293	251
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	49.0	12.0	61.0	21.0	38.0	38.0	21.0	38.0	38.0
Total Split (%)	40.8%	10.0%	50.8%	17.5%	31.7%	31.7%	17.5%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	46.5	64.0	64.0	16.4	35.5	35.5	10.9	27.6	27.6
Actuated g/C Ratio	0.39	0.53	0.53	0.14	0.30	0.30	0.09	0.23	0.23
v/c Ratio	0.64	0.71	0.26	0.76	0.49	0.58	0.29	0.71	0.53
Control Delay	26.6	36.1	16.0	71.1	38.5	12.2	55.0	52.1	15.7
Queue Delay	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	36.1	16.0	71.1	38.5	12.2	55.0	52.1	15.7
LOS	C	D	B	E	D	B	D	D	B
Approach Delay	27.2		20.6		33.5			36.8	
Approach LOS	C		C		C			D	
Queue Length 50th (m)	63.8	24.3	30.0	40.2	50.2	14.2	10.1	63.4	13.5
Queue Length 95th (m)	78.9	#74.6	42.1	#71.5	73.5	43.5	21.2	87.7	36.2
Internal Link Dist (m)	89.4		139.3		159.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1859	277	2563	240	533	640	240	505	537
Starvation Cap Reductn	322	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.71	0.26	0.73	0.48	0.58	0.19	0.58	0.47

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 28.7

Intersection LOS: C

Intersection Capacity Utilization 79.5%

ICU Level of Service D

Analysis Period (min) 15


















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Merivale & Carling

↖ Ø1	→ Ø2 (R)	↖ Ø3	↓ Ø4
12 s	49 s	21 s	38 s
↖ Ø6 (R)		↖ Ø7	↑ Ø8
61 s		21 s	38 s

Projected 2024 AM
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	128	273	995	2	780	16	2	67	0	76
Future Volume (vph)	128	273	995	2	780	16	2	67	0	76
Lane Group Flow (vph)	0	422	1061	2	910	0	24	0	71	80
Turn Type	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases			2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	2	2	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	23.6	23.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	83.0	83.0	83.0	83.0	83.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	69.2%	69.2%	69.2%	69.2%	69.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		93.8	93.8	93.8	93.8		18.2		18.2	18.2
Actuated g/C Ratio		0.78	0.78	0.78	0.78		0.15		0.15	0.15
v/c Ratio		1.04	0.28	0.01	0.24		0.11		0.36	0.27
Control Delay		60.3	2.6	5.5	4.2		34.6		48.6	10.4
Queue Delay		0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay		60.3	2.6	5.5	4.3		34.6		48.6	10.4
LOS		E	A	A	A		C		D	B
Approach Delay			19.0		4.3		34.6		28.4	
Approach LOS			B		A		C		C	
Queue Length 50th (m)		-51.9	11.1	0.1	17.2		4.0		15.7	0.0
Queue Length 95th (m)		m#144.1	m19.8	m0.4	31.4		10.0		25.1	11.6
Internal Link Dist (m)			168.6		89.4		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		405	3798	346	3728		382		357	464
Starvation Cap Reductn		0	0	0	1470		0		0	0
Spillback Cap Reductn		0	59	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		1.04	0.28	0.01	0.40		0.06		0.20	0.17

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 14.5

Intersection LOS: B

Intersection Capacity Utilization 83.5%

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.

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

Splits and Phases: 3: Carling & Westgate SC

			
			
83 s			37 s
			
83 s			37 s

Projected 2024 AM
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	351	1280	280	307	352	360
Future Volume (vph)	351	1280	280	307	352	360
Lane Group Flow (vph)	369	1611	295	323	371	379
Turn Type	Prot	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6	3	8	4	
Permitted Phases			8			4
Detector Phase	1	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	16.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	58.0	58.0	24.0	62.0	38.0	38.0
Total Split (%)	48.3%	48.3%	20.0%	51.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	57.6	57.6	54.4	54.4	31.3	31.3
Actuated g/C Ratio	0.48	0.48	0.45	0.45	0.26	0.26
v/c Ratio	0.23	0.71	0.64	0.40	0.42	0.86
Control Delay	16.8	23.0	20.2	15.3	37.9	51.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	23.0	20.2	15.3	37.9	51.6
LOS	B	C	C	B	D	D
Approach Delay		21.8		17.7	44.8	
Approach LOS		C		B	D	
Queue Length 50th (m)	25.0	92.5	49.1	53.9	37.0	65.7
Queue Length 95th (m)	m25.6	m105.6	m70.2	m75.9	51.0	#113.6
Internal Link Dist (m)		110.3		152.2	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1577	2266	468	862	960	472
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.71	0.63	0.37	0.39	0.80

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 26.2

Intersection LOS: C

Intersection Capacity Utilization 85.7%

ICU Level of Service E






Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

















Queue shown is maximum after two cycles.

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















Splits and Phases: 4: Kirkwood & Carling WB

		
Ø1	Ø3	Ø4
58 s	24 s	38 s
		
Ø6 (R)	Ø8	
58 s	62 s	

Projected 2024 AM
5: Merivale & Thames

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	9	2	0	4	24	747	1	1	559	23
Future Volume (Veh/h)	11	0	9	2	0	4	24	747	1	1	559	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	0	9	2	0	4	25	786	1	1	588	24
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											184	
pX, platoon unblocked												
vC, conflicting volume	1049	1439	306	1142	1450	394	612			787		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1049	1439	306	1142	1450	394	612			787		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	99	99	100	99	97			100		
cM capacity (veh/h)	177	128	690	150	126	606	963			828		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	21	6	418	394	295	318						
Volume Left	12	2	25	0	1	0						
Volume Right	9	4	0	1	0	24						
cSH	260	301	963	1700	828	1700						
Volume to Capacity	0.08	0.02	0.03	0.23	0.00	0.19						
Queue Length 95th (m)	2.0	0.5	0.6	0.0	0.0	0.0						
Control Delay (s)	20.1	17.2	0.8	0.0	0.0	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	20.1	17.2	0.4		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.6									
Intersection Capacity Utilization			50.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Projected 2024 PM
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	419	1344	330	328	258	320	372
Future Volume (vph)	419	1344	330	328	258	320	372
Lane Group Flow (vph)	392	1464	347	345	272	337	392
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	61.0	61.0	61.0	29.0	29.0	30.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	24.2%	24.2%	25.0%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	58.8	58.8	58.8	24.4	24.4	53.2	53.2
Actuated g/C Ratio	0.49	0.49	0.49	0.20	0.20	0.44	0.44
v/c Ratio	0.55	0.65	0.41	0.50	0.88	0.69	0.50
Control Delay	25.6	25.0	5.9	45.1	75.6	17.9	13.5
Queue Delay	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	25.1	5.9	45.1	75.6	17.9	13.5
LOS	C	C	A	D	E	B	B
Approach Delay		22.2		58.6			15.5
Approach LOS		C		E			B
Queue Length 50th (m)	75.1	100.2	8.8	37.9	62.3	49.1	74.8
Queue Length 95th (m)	110.9	117.5	27.9	52.7	#108.3	92.1	106.3
Internal Link Dist (m)		161.6		158.6			144.7
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	713	2252	843	707	316	501	817
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	51	107	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.68	0.41	0.49	0.86	0.67	0.48

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 81 (68%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 27.2

Intersection LOS: C

Intersection Capacity Utilization 110.1%

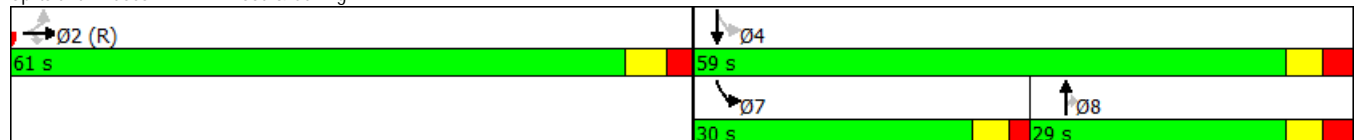
ICU Level of Service H

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Projected 2024 PM
2: Merivale & Carling

	→	↖	←	↙	↑	↗	↘	↓	↕
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↑	↗	↖	↑	↗
Traffic Volume (vph)	696	462	1550	135	207	245	77	294	122
Future Volume (vph)	696	462	1550	135	207	245	77	294	122
Lane Group Flow (vph)	938	486	1731	142	218	258	81	309	128
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	42.0	20.0	62.0	20.0	38.0	38.0	20.0	38.0	38.0
Total Split (%)	35.0%	16.7%	51.7%	16.7%	31.7%	31.7%	16.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	38.0	64.8	64.8	15.0	32.8	32.8	13.0	28.2	28.2
Actuated g/C Ratio	0.32	0.54	0.54	0.12	0.27	0.27	0.11	0.24	0.24
v/c Ratio	0.62	1.18	0.67	0.67	0.45	0.44	0.44	0.74	0.29
Control Delay	27.3	130.7	22.3	66.1	39.7	6.5	57.1	52.9	6.7
Queue Delay	0.9	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	130.7	22.8	66.1	39.7	6.5	57.1	52.9	6.7
LOS	C	F	C	E	D	A	E	D	A
Approach Delay	28.2		46.4		31.9			42.1	
Approach LOS	C		D		C			D	
Queue Length 50th (m)	38.2	~119.2	105.4	32.1	43.4	0.0	18.1	67.4	0.0
Queue Length 95th (m)	48.6	#203.4	134.6	53.4	64.9	19.4	33.1	92.8	13.0
Internal Link Dist (m)	81.2		139.3		161.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1519	413	2597	226	512	603	226	505	510
Starvation Cap Reductn	301	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	366	0	0	0	0	0	9
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	1.18	0.78	0.63	0.43	0.43	0.36	0.61	0.26

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.18

Intersection Signal Delay: 39.8

Intersection LOS: D

Intersection Capacity Utilization 88.3%

ICU Level of Service E

Analysis Period (min) 15

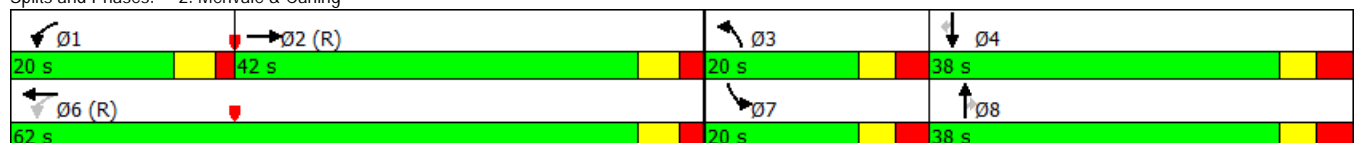
~ Volume exceeds capacity, queue is theoretically infinite.

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: 2: Merivale & Carling



Projected 2024 PM
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	74	230	783	1	1679	10	3	127	4	138
Future Volume (vph)	74	230	783	1	1679	10	3	127	4	138
Lane Group Flow (vph)	0	320	832	1	1924	0	18	0	138	145
Turn Type	pm+pt	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	5	2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	5	5	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.6	10.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	24.0	24.0	83.0	59.0	59.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	20.0%	20.0%	69.2%	49.2%	49.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Lost Time (s)		5.6	5.6	5.6	5.6		7.0		7.0	7.0
Lead/Lag	Lead	Lead		Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		88.1	88.1	58.5	58.5		19.3		19.3	19.3
Actuated g/C Ratio		0.73	0.73	0.49	0.49		0.16		0.16	0.16
v/c Ratio		0.80	0.23	0.00	0.82		0.08		0.69	0.62
Control Delay		57.7	3.1	8.0	16.1		33.0		63.7	57.2
Queue Delay		0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay		57.7	3.1	8.0	16.2		33.0		63.7	57.2
LOS		E	A	A	B		C		E	E
Approach Delay			18.3		16.2		33.0		60.4	
Approach LOS			B		B		C		E	
Queue Length 50th (m)		59.4	11.0	0.0	146.9		2.9		31.3	32.4
Queue Length 95th (m)		m#120.0	m17.9	m0.0	122.6		8.5		47.4	48.0
Internal Link Dist (m)			162.3		81.2		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		398	3570	276	2337		343		312	364
Starvation Cap Reductn		0	0	0	45		0		0	0
Spillback Cap Reductn		0	0	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.80	0.23	0.00	0.84		0.05		0.44	0.40

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 20.7

Intersection LOS: C

Intersection Capacity Utilization 112.8%

ICU Level of Service H

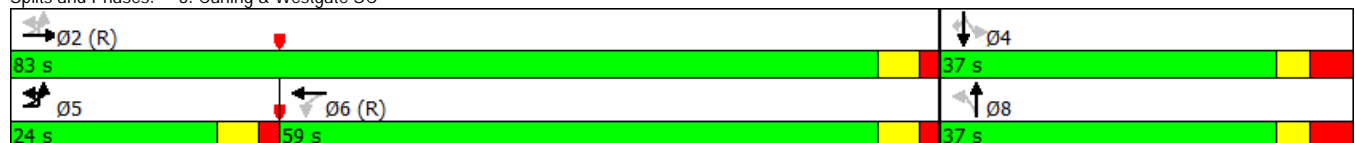
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Carling & Westgate SC



Projected 2024 PM
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	209	2408	227	545	481	410
Future Volume (vph)	209	2408	227	545	481	410
Lane Group Flow (vph)	220	2867	239	574	506	432
Turn Type	Prot	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6	3	8	4	
Permitted Phases			8			4
Detector Phase	1	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	16.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	67.0	67.0	20.0	53.0	33.0	33.0
Total Split (%)	55.8%	55.8%	16.7%	44.2%	27.5%	27.5%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	63.0	63.0	49.0	49.0	29.5	29.5
Actuated g/C Ratio	0.52	0.52	0.41	0.41	0.25	0.25
v/c Ratio	0.13	1.15	0.71	0.79	0.61	1.05
Control Delay	8.3	92.6	33.9	39.6	43.9	93.6
Queue Delay	0.0	0.0	0.0	5.3	0.0	0.0
Total Delay	8.3	92.6	33.9	44.9	43.9	93.6
LOS	A	F	C	D	D	F
Approach Delay		86.6		41.7	66.8	
Approach LOS		F		D	E	
Queue Length 50th (m)	6.7	~296.0	47.1	135.6	56.2	~96.0
Queue Length 95th (m)	m8.8	#323.0	65.3	177.8	74.2	#158.3
Internal Link Dist (m)		113.3		144.7	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1726	2496	345	728	834	412
Starvation Cap Reductn	0	0	0	103	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	1.15	0.69	0.92	0.61	1.05

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.15

Intersection Signal Delay: 75.2

Intersection LOS: E

Intersection Capacity Utilization 110.1%

ICU Level of Service H

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.

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

Splits and Phases: 4: Kirkwood & Carling WB

		
Ø1	Ø3	Ø4
67 s	20 s	33 s
		
Ø6 (R)	Ø8	
67 s	53 s	















Projected 2024 PM
5: Merivale & Thames

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	22	0	0	3	37	576	2	4	887	60
Future Volume (Veh/h)	8	0	22	0	0	3	37	576	2	4	887	60
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	8	0	23	0	0	3	39	606	2	4	934	63
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											186	
pX, platoon unblocked												
vC, conflicting volume	1358	1660	498	1183	1690	304	997			608		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1358	1660	498	1183	1690	304	997			608		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	96	100	100	100	94			100		
cM capacity (veh/h)	102	91	517	132	87	692	690			966		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	31	3	342	305	471	530						
Volume Left	8	0	39	0	4	0						
Volume Right	23	3	0	2	0	63						
cSH	253	692	690	1700	966	1700						
Volume to Capacity	0.12	0.00	0.06	0.18	0.00	0.31						
Queue Length 95th (m)	3.1	0.1	1.4	0.0	0.1	0.0						
Control Delay (s)	21.2	10.2	1.8	0.0	0.1	0.0						
Lane LOS	C	B	A		A							
Approach Delay (s)	21.2	10.2	1.0		0.1							
Approach LOS	C	B										
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			61.5%		ICU Level of Service				B			
Analysis Period (min)			15									

Appendix K

SYNCHRO Capacity Analysis – Modified Projected 2024

Projected 2024 AM - Modified
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	187	1959	187	369	339	351	439
Future Volume (vph)	187	1959	187	369	339	351	439
Lane Group Flow (vph)	177	2082	197	388	357	369	462
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	63.0	63.0	63.0	37.0	37.0	20.0	57.0
Total Split (%)	52.5%	52.5%	52.5%	30.8%	30.8%	16.7%	47.5%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	60.2	60.2	60.2	31.8	31.8	51.8	51.8
Actuated g/C Ratio	0.50	0.50	0.50	0.26	0.26	0.43	0.43
v/c Ratio	0.24	0.90	0.25	0.43	0.89	0.89	0.60
Control Delay	18.5	34.1	5.1	38.1	67.1	52.0	30.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	18.5	34.1	5.1	38.1	67.1	52.0	30.7
LOS	B	C	A	D	E	D	C
Approach Delay		30.7		52.0			40.2
Approach LOS		C		D			D
Queue Length 50th (m)	27.2	171.1	4.7	39.4	79.9	76.7	98.0
Queue Length 95th (m)	44.1	197.2	17.0	53.9	#130.1	#132.0	138.9
Internal Link Dist (m)		161.6		158.6			152.2
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	730	2310	798	932	417	413	787
Starvation Cap Reductn	0	0	0	0	0	0	87
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.90	0.25	0.42	0.86	0.89	0.66

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 36.6

Intersection LOS: D

Intersection Capacity Utilization 85.7%

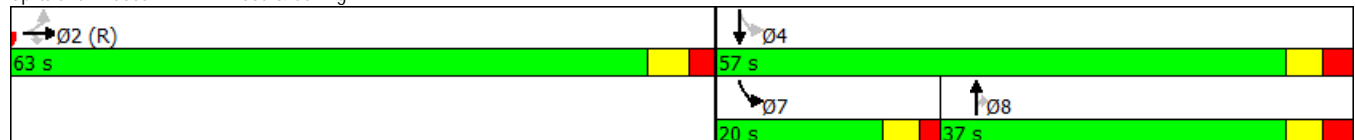
ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Projected 2024 AM - Modified
2: Merivale & Carling

	→	↖	←	↗	↑	↘	↓	↙	
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↑	↗	↖	↑	↗
Traffic Volume (vph)	1007	188	591	167	243	352	43	278	238
Future Volume (vph)	1007	188	591	167	243	352	43	278	238
Lane Group Flow (vph)	1183	198	666	176	256	371	45	293	251
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	49.0	12.0	61.0	21.0	38.0	38.0	21.0	38.0	38.0
Total Split (%)	40.8%	10.0%	50.8%	17.5%	31.7%	31.7%	17.5%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	46.5	64.0	64.0	16.4	35.5	35.5	10.9	27.6	27.6
Actuated g/C Ratio	0.39	0.53	0.53	0.14	0.30	0.30	0.09	0.23	0.23
v/c Ratio	0.64	0.71	0.26	0.76	0.49	0.58	0.29	0.71	0.53
Control Delay	33.9	36.1	16.0	71.1	38.5	12.2	55.0	52.1	15.7
Queue Delay	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	36.1	16.0	71.1	38.5	12.2	55.0	52.1	15.7
LOS	D	D	B	E	D	B	D	D	B
Approach Delay	37.3		20.6		33.5			36.8	
Approach LOS	D		C		C			D	
Queue Length 50th (m)	54.2	24.3	30.0	40.2	50.2	14.2	10.1	63.4	13.5
Queue Length 95th (m)	121.5	#74.6	42.1	#71.5	73.5	43.5	21.2	87.7	36.2
Internal Link Dist (m)	89.4		139.3		159.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1859	277	2563	240	533	640	240	505	537
Starvation Cap Reductn	562	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.71	0.26	0.73	0.48	0.58	0.19	0.58	0.47

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 32.1

Intersection LOS: C

Intersection Capacity Utilization 79.5%

ICU Level of Service D

Analysis Period (min) 15


















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Merivale & Carling

↖ Ø1	→ Ø2 (R)	↖ Ø3	↓ Ø4
12 s	49 s	21 s	38 s
↖ Ø6 (R)		↖ Ø7	↑ Ø8
61 s		21 s	38 s

Projected 2024 AM - Modified
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	128	273	995	2	780	16	2	67	0	76
Future Volume (vph)	128	273	995	2	780	16	2	67	0	76
Lane Group Flow (vph)	0	422	1061	2	910	0	24	0	71	80
Turn Type	pm+pt	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	5	2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	5	5	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.9	10.9	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	24.0	24.0	83.0	59.0	59.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	20.0%	20.0%	69.2%	49.2%	49.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.2	2.2	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.9	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		93.8	93.8	71.1	71.1		18.2		18.2	18.2
Actuated g/C Ratio		0.78	0.78	0.59	0.59		0.15		0.15	0.15
v/c Ratio		0.77	0.28	0.01	0.32		0.11		0.36	0.27
Control Delay		17.1	8.0	21.5	15.0		34.6		48.6	10.4
Queue Delay		0.0	0.0	0.0	0.4		0.0		0.1	0.0
Total Delay		17.1	8.1	21.5	15.3		34.6		48.7	10.4
LOS		B	A	C	B		C		D	B
Approach Delay			10.6		15.4		34.6		28.4	
Approach LOS			B		B		C		C	
Queue Length 50th (m)		39.7	33.1	0.1	24.6		4.0		15.7	0.0
Queue Length 95th (m)		m86.4	m72.4	m0.9	68.7		10.0		25.1	11.6
Internal Link Dist (m)			168.6		89.4		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		571	3798	270	2828		382		357	464
Starvation Cap Reductn		0	0	0	1244		0		0	0
Spillback Cap Reductn		0	600	0	0		0		42	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.74	0.33	0.01	0.57		0.06		0.23	0.17

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 13.6

Intersection LOS: B

Intersection Capacity Utilization 83.5%

ICU Level of Service E













Analysis Period (min) 15

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

Splits and Phases: 3: Carling & Westgate SC



Projected 2024 AM - Modified
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	351	1280	280	307	352	360
Future Volume (vph)	351	1280	280	307	352	360
Lane Group Flow (vph)	369	1611	295	323	371	379
Turn Type	Prot	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6	3	8	4	
Permitted Phases			8			4
Detector Phase	1	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	16.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	56.0	56.0	26.0	64.0	38.0	38.0
Total Split (%)	46.7%	46.7%	21.7%	53.3%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	56.9	56.9	55.1	55.1	31.1	31.1
Actuated g/C Ratio	0.47	0.47	0.46	0.46	0.26	0.26
v/c Ratio	0.24	0.72	0.63	0.39	0.42	0.85
Control Delay	21.0	29.4	18.7	14.3	38.1	48.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	29.4	18.7	14.3	38.1	48.9
LOS	C	C	B	B	D	D
Approach Delay		27.9		16.4	43.6	
Approach LOS		C		B	D	
Queue Length 50th (m)	29.1	124.2	49.6	54.6	37.1	62.9
Queue Length 95th (m)	44.4	146.9	m70.8	m76.4	51.0	#109.2
Internal Link Dist (m)		110.3		152.2	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1558	2239	489	892	960	480
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.72	0.60	0.36	0.39	0.79

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 29.3

Intersection LOS: C

Intersection Capacity Utilization 85.7%

ICU Level of Service E






Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.















Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Kirkwood & Carling WB

		
56 s	26 s	38 s
		
56 s	64 s	

Projected 2024 PM - Modified
1: Kirkwood & Carling EB

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	419	1344	330	328	258	320	372
Future Volume (vph)	419	1344	330	328	258	320	372
Lane Group Flow (vph)	392	1464	347	345	272	337	392
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		2		8		7	4
Permitted Phases	2		2		8	4	
Detector Phase	2	2	2	8	8	7	4
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	29.2	29.2	29.2	26.1	26.1	10.1	26.1
Total Split (s)	61.0	61.0	61.0	29.0	29.0	30.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	24.2%	24.2%	25.0%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.8	2.8	1.8	2.8
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.1	-2.1	-1.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Min
Act Effct Green (s)	58.8	58.8	58.8	24.4	24.4	53.2	53.2
Actuated g/C Ratio	0.49	0.49	0.49	0.20	0.20	0.44	0.44
v/c Ratio	0.55	0.65	0.41	0.50	0.88	0.69	0.50
Control Delay	25.6	25.0	5.9	45.1	75.6	16.8	12.1
Queue Delay	0.4	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	25.2	5.9	45.1	75.6	16.8	12.1
LOS	C	C	A	D	E	B	B
Approach Delay		22.3		58.6			14.3
Approach LOS		C		E			B
Queue Length 50th (m)	75.1	100.2	8.8	37.9	62.3	40.8	73.9
Queue Length 95th (m)	110.9	117.5	27.9	52.7	#108.3	88.5	102.2
Internal Link Dist (m)		161.6		158.6			144.7
Turn Bay Length (m)	40.0				90.0		
Base Capacity (vph)	713	2252	843	707	316	501	817
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	68	144	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.69	0.41	0.49	0.86	0.67	0.48

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 81 (68%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 27.0

Intersection LOS: C

Intersection Capacity Utilization 110.1%

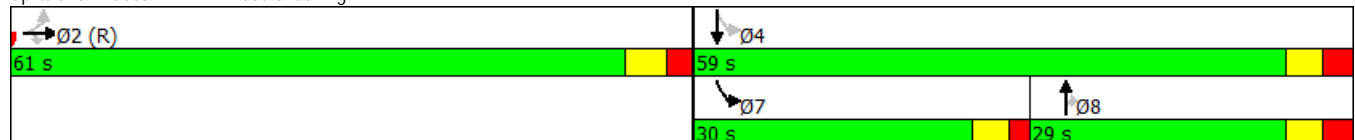
ICU Level of Service H

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Kirkwood & Carling EB



Projected 2024 PM - Modified
2: Merivale & Carling

	→	↖	←	↙	↑	↗	↘	↓	↕
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↑	↗	↖	↑	↗
Traffic Volume (vph)	696	462	1550	135	207	245	77	294	122
Future Volume (vph)	696	462	1550	135	207	245	77	294	122
Lane Group Flow (vph)	938	486	1731	142	218	258	81	309	128
Turn Type	NA	pm+pt	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	2	1	6	3	8		7	4	
Permitted Phases		6				8			4
Detector Phase	2	1	6	3	8	8	7	4	4
Switch Phase									
Minimum Initial (s)	10.0	5.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.0	10.4	29.0	11.3	37.7	37.7	11.3	37.7	37.7
Total Split (s)	30.0	36.0	66.0	16.0	40.0	40.0	14.0	38.0	38.0
Total Split (%)	25.0%	30.0%	55.0%	13.3%	33.3%	33.3%	11.7%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	1.7	2.3	3.0	3.4	3.4	3.0	3.4	3.4
Lost Time Adjust (s)	-2.0	-1.4	-2.0	-2.3	-2.7	-2.7	-2.3	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	30.7	67.8	67.8	12.0	33.0	33.0	9.8	28.2	28.2
Actuated g/C Ratio	0.26	0.56	0.56	0.10	0.28	0.28	0.08	0.24	0.24
v/c Ratio	0.76	0.92	0.64	0.84	0.44	0.44	0.59	0.74	0.29
Control Delay	34.7	55.1	19.7	90.7	39.2	6.3	70.7	52.9	6.7
Queue Delay	0.4	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	55.1	22.0	90.7	39.2	6.3	70.7	52.9	6.7
LOS	D	E	C	F	D	A	E	D	A
Approach Delay	35.1		29.3		37.3			44.2	
Approach LOS	D		C		D			D	
Queue Length 50th (m)	46.5	91.1	97.0	33.4	43.7	0.0	18.7	67.4	0.0
Queue Length 95th (m)	#70.7	#165.5	125.0	#68.2	63.2	18.8	#36.9	92.8	13.0
Internal Link Dist (m)	81.2		139.3		161.9			100.7	
Turn Bay Length (m)		90.0		40.0			28.0		35.0
Base Capacity (vph)	1233	541	2717	169	536	619	141	505	510
Starvation Cap Reductn	60	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	812	0	0	0	0	0	22
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.90	0.91	0.84	0.41	0.42	0.57	0.61	0.26

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 33.5

Intersection LOS: C

Intersection Capacity Utilization 88.3%

ICU Level of Service E

Analysis Period (min) 15


















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Merivale & Carling

↖ Ø1	→ Ø2 (R)	↖ Ø3	↓ Ø4
36 s	30 s	16 s	38 s
↖ Ø6 (R)		↖ Ø7	↑ Ø8
66 s		14 s	40 s

Projected 2024 PM - Modified
3: Carling & Westgate SC

										
Lane Group	EBU	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	74	230	783	1	1679	10	3	127	4	138
Future Volume (vph)	74	230	783	1	1679	10	3	127	4	138
Lane Group Flow (vph)	0	320	832	1	1924	0	18	0	138	145
Turn Type	pm+pt	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	5	2		6		8		4	
Permitted Phases	2	2		6		8		4		4
Detector Phase	5	5	2	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.6	10.6	23.6	23.6	23.6	37.0	37.0	37.0	37.0	37.0
Total Split (s)	24.0	24.0	83.0	59.0	59.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	20.0%	20.0%	69.2%	49.2%	49.2%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)		-1.6	-1.6	-1.6	-1.6		-3.0		-3.0	-3.0
Total Lost Time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)		89.7	89.7	62.0	62.0		22.3		22.3	22.3
Actuated g/C Ratio		0.75	0.75	0.52	0.52		0.19		0.19	0.19
v/c Ratio		0.81	0.23	0.00	0.78		0.07		0.60	0.39
Control Delay		58.5	3.0	9.0	18.4		30.8		54.1	12.7
Queue Delay		0.0	0.0	0.0	1.3		0.0		0.0	0.0
Total Delay		58.5	3.0	9.0	19.7		30.8		54.1	12.7
LOS		E	A	A	B		C		D	B
Approach Delay			18.4		19.7		30.8		32.9	
Approach LOS			B		B		C		C	
Queue Length 50th (m)		59.2	10.4	0.1	148.0		2.8		30.3	4.6
Queue Length 95th (m)		m#115.8	m17.0	m0.1	182.6		8.1		45.7	19.7
Internal Link Dist (m)			162.3		81.2		10.8		75.6	
Turn Bay Length (m)		70.0		36.0						
Base Capacity (vph)		398	3634	292	2477		390		343	488
Starvation Cap Reductn		0	0	0	332		0		0	0
Spillback Cap Reductn		0	4	0	0		0		0	0
Storage Cap Reductn		0	0	0	0		0		0	0
Reduced v/c Ratio		0.80	0.23	0.00	0.90		0.05		0.40	0.30

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 20.4

Intersection LOS: C

Intersection Capacity Utilization 105.1%

ICU Level of Service G






Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Carling & Westgate SC

											
83 s						37 s					
											
24 s						59 s					

Projected 2024 PM - Modified
4: Kirkwood & Carling WB

						
Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	209	2408	227	545	481	410
Future Volume (vph)	209	2408	227	545	481	410
Lane Group Flow (vph)	220	2867	239	574	506	432
Turn Type	Prot	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6	3	8	4	
Permitted Phases			8			4
Detector Phase	1	6	3	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	16.3	35.3	11.0	29.0	29.0	29.0
Total Split (s)	74.0	74.0	13.0	46.0	33.0	33.0
Total Split (%)	61.7%	61.7%	10.8%	38.3%	27.5%	27.5%
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	-2.3	-2.3	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	C-Max	None	Ped	Ped	Ped
Act Effct Green (s)	70.0	70.0	42.0	42.0	29.0	29.0
Actuated g/C Ratio	0.58	0.58	0.35	0.35	0.24	0.24
v/c Ratio	0.11	1.03	0.98	0.92	0.62	1.06
Control Delay	11.4	51.9	83.6	57.9	44.4	98.2
Queue Delay	0.0	0.0	0.0	14.7	0.0	0.0
Total Delay	11.4	51.9	83.6	72.6	44.4	98.2
LOS	B	D	F	E	D	F
Approach Delay		49.0		75.9	69.2	
Approach LOS		D		E	E	
Queue Length 50th (m)	11.2	~264.7	52.2	141.6	56.2	~96.0
Queue Length 95th (m)	16.9	#291.6	#104.3	#202.8	74.2	#158.3
Internal Link Dist (m)		113.3		144.7	73.8	
Turn Bay Length (m)	40.0					22.0
Base Capacity (vph)	1918	2772	244	624	819	406
Starvation Cap Reductn	0	0	0	55	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	1.03	0.98	1.01	0.62	1.06

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 57.4

Intersection LOS: E

Intersection Capacity Utilization 110.1%

ICU Level of Service H

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: Kirkwood & Carling WB

		
Ø1	Ø3	Ø4
74 s	13 s	33 s
		
Ø6 (R)	Ø8	
74 s	46 s	