

Transportation Impact Study

Riverside South Phase 15 Lands



Prepared for Riverside South Development Corporation
by IBI Group

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EXECUTIVE SUMMARY

IBI Group (IBI) was retained by the Riverside South Development Corporation to complete a Transportation Impact Study in support of the proposed Riverside South Phase 15 residential subdivision off River Road. The proposed site is located in the South Gloucester-South Nepean Ward, near the Earl Armstrong Road and River Road intersection.

The purpose of this study was to:

- Determine the impact of the proposed Riverside South Phase 15 development generated traffic volumes on the adjacent road network at the full build-out horizon; and,
- Recommend appropriate measures/strategies/improvements to ensure the adjacent road network can accommodate the proposed Riverside South Phase 15 development generated traffic volumes at the full build-out plus 5 year horizon.

The proposed Riverside South Phase 15 Lands - part of 4650 Spratt Road and 750 River Road, consists of two non-contiguous parcels with frontage on Spratt Road, River Road and Borbridge Road. These properties are approximately 102 hectares in total area. The northerly limit of the largest parcel abuts the Riverside South Phase 9 subdivisions, currently under construction. The study area boundaries are defined by River Road, Earl Armstrong Road, Spratt Road and Borbridge Road.

The proposed development will contain a mix of low and medium density residential land uses located within two non-contiguous parcels. For the purposes of this study, full occupancy of the proposed development was assumed by the 2018 horizon year. It is important to note that the assumed buildout horizon year is highly dependent on market forces. It is possible full occupancy won't be achieved by 2018.

The intersection capacity analysis and geometric analysis completed in the Riverside South Phase 15 Transportation Impact Study was used to determine appropriate modifications to the adjacent road network to accommodate the proposed development. The key findings of this report are as follows:

- All study area intersections were indicated to operate within City standards in the 2018 horizon year with estimated background growth and full buildout of the proposed development.
- The Earl Armstrong Road and River Road intersection did not operate within City standards in the 2023 horizon year with estimated background growth and full buildout of the proposed development.
 - The primary trigger of this result was the southbound right-turn movement.
 - The proposed development is not expected to add new traffic to this movement.
 - Sensitivity analysis revealed a 10% reduction in the estimated future southbound right-turn peak hour traffic resulted in an acceptable intersection level-of-service. This 10% margin between adequate and below-adequate operation was not considered reason enough to warrant additional modifications to a recently constructed intersection. More time and data is necessary to properly assess how traffic patterns in the area will evolve with the new bridge in place. Traffic levels are also expected to fluctuate in the coming years before settling to equilibrium as new infrastructure projects come on-stream. For example, the planned City widening of Prince of Wales from 2 to 4-lanes is expected to draw traffic away from River Road.
 - No modifications were recommended.

- All remaining study area intersections were indicated to operate within City standards in the 2023 horizon year with estimated background growth and full buildout of the proposed development.
- Geometric evaluations revealed no sight distance or corner clearance issues. Proper care should be taken to ensure no obstructions be placed in the line-of-sight in the vicinity of the proposed access points.
- Auxiliary left-turn lanes were recommended at the following locations:
 - River Road and Borbridge Avenue – 30m storage on the southbound left-turn lane
 - River Road and Street 16 – 30m storage on the southbound left-turn lane
- The outbound approaches at proposed access intersections should provide auxiliary turn lanes with the following configurations:
 - River Road intersections – Westbound left-turn lanes (minimum storage length required)
 - Spratt Road intersections – Eastbound right-turn lanes (minimum storage length required)

The auxiliary turn lanes were provided on the non-commuter movement, to ensure maximum capacity is provided to the critical movement.

- All geometric recommendations should be reviewed and confirmed during detailed design.

The overall conclusion of this study is that the Riverside South Phase 15 Development can be accommodated by the adjacent road network. The Owner shall be responsible for constructing all proposed access intersections and internal transportation facilities as dictated by the latest draft plan.

1 Introduction

IBI Group (IBI) was retained by the Riverside South Development Corporation to complete a Transportation Impact Study in support of the proposed Riverside South Phase 15 residential subdivision off River Road. The proposed site is located in the South Gloucester-South Nepean Ward, near the Earl Armstrong Road and River Road intersection.

This report presents the methodology, findings and conclusions of a TIS related to the proposed development.

1.1 Study Objectives

The purpose of this study was to:

- Determine the impact of the proposed Riverside South Phase 15 development generated traffic volumes on the adjacent road network at the full build-out horizon; and,
- Recommend appropriate measures/strategies/improvements to ensure the adjacent road network can accommodate the proposed Riverside South Phase 15 development generated traffic volumes at the full build-out plus 5 year horizon.

1.2 Study Methodology

The methodology used in this study was based on the City of Ottawa Transportation Impact Assessment Guidelines (October 2006). The following study parameters and assumptions have been confirmed by City staff:

- Background Traffic Counts
- Traffic Growth Rate Assumptions
- Road Network Assumptions
- Trip Generation Rates and Trip Distribution Assumptions
- Intersection Capacity Analysis Methodology

The following traffic studies were referenced for methodologies and assumptions used in this study:

- The Summerhill Village Phase 1 TIS completed by IBI in 2011

Existing peak hour turning movement counts were provided by the City of Ottawa or were manually collected by IBI. Future traffic volumes were estimated by applying a growth factor to existing traffic counts agreed to by City staff.

The Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, 2012 (ITE Manual) was referenced for the required trip generation rates. The intersection capacity analysis was completed using Synchro v7.0 analysis software. The criteria for evaluating intersection capacity are based on the City of Ottawa Traffic Impact Assessment Guidelines.

All relevant traffic data and details of the analysis have been provided in the Appendix at the end of this report.

2 Proposed Development

2.1 Site Location

The proposed Riverside South Phase 15 Lands - part of 4650 Spratt Road and 750 River Road, is shown in Exhibit 1. The lands consist of two non-contiguous parcels with frontage on Spratt Road, River Road and Borbridge Road. These properties are approximately 102 hectares in total area. The northerly limit of the largest parcel abuts the Riverside South Phase 9 subdivisions, currently under construction. The study area boundaries are defined by River Road, Earl Armstrong Road, Spratt Road and Borbridge Road.

2.2 Land Use

The current concept plan for the subject site is shown in Exhibit 2. The proposed development will contain a mix of low and medium density residential land uses. The development will contain two non-contiguous parcels. For the purposes of this study, full occupancy of the proposed development was assumed by the 2018 horizon year. However, the assumed buildout horizon year is highly dependent on market forces. It is possible full occupancy won't be achieved by 2018.

The following table summarizes the proposed land uses and densities.

TABLE 1 – Land Use Statistics

LAND USE	SIZE (# OF UNITS)
Single Family Residential	452
Townhome/ Semi-Detached Residential	740

It was assumed for the analysis that the both developments would be built out in a single phase. Approximately 25% of the total number of units is located in the south parcel, 75% in the north parcel.

2.3 Site Layout

The two development parcels are separated by approximately 250m of vacant land owned by others. The subject site proposes the following five (5) new access intersections; two intersections located off River Road and three intersections located off Spratt Road (as shown on Exhibit 2):

- River Road and Street 16
- River Road and Street 8 * *not analyzed*
- Spratt Road and Street 22
- Spratt Road and Street 1 * *not analyzed*
- Spratt Road and Street 8

Street 16 and Street 22 are intended to be the main access points to the north parcel off River Road and Spratt Road respectively. They are connected to each other via Street 21.

Street 8 also provides access to the north parcel via River Road. However, it ends approximately 100m into the proposed development by the limits of the property. With only five units fronting this roadway, the River Road and

Street 8 intersection was not considered in the road network analysis. As a worst case scenario, it was assumed that all development traffic that travels on River Road would access either Street 16 or Borbridge Avenue.

Further into the proposed development, Street 8 becomes the main access for the south parcel. Street 1 is potentially a secondary access, but similar to Street 8 for the north parcel, it does not extend far into the development. It is cut off due to the property limits. Therefore, it was assumed that all traffic from the south parcel would use the Street 8 and Spratt Road intersection for access/ egress.

Borbridge Avenue is an east-west roadway that fronts the northern limits of the proposed development. It also provides access to the development from both River Road and Spratt Road, but is not a part of the development application limits.

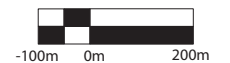
Brian Good Avenue is a future north-south collector road that bisects the development. Based on the proposed concept plan, Brian Good Avenue will be disconnected between the two parcels. In the future, it will run through both development parcels and continue further south.

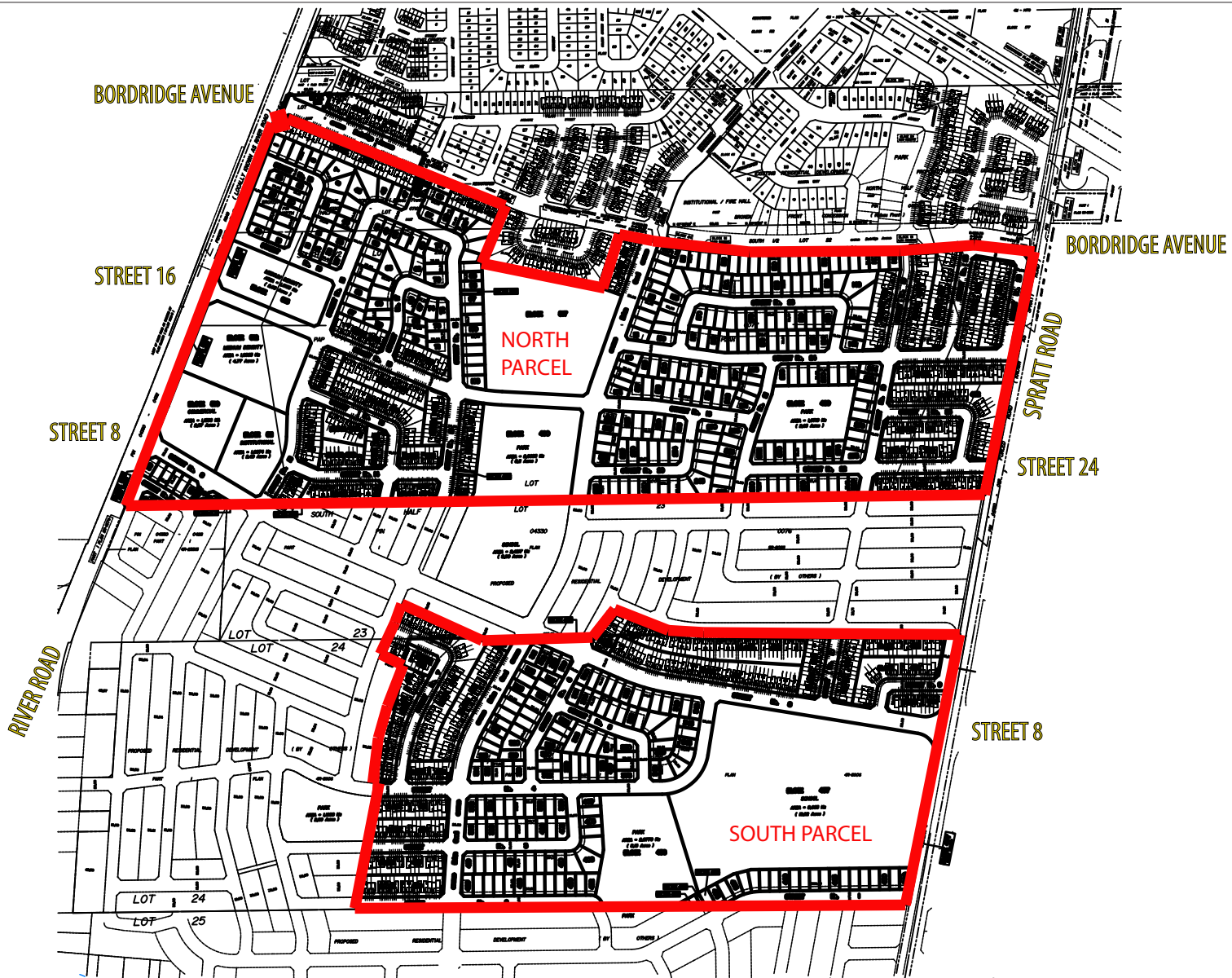


Riverside South Phase 15
Transportation Impact Study

Exhibit 1
Site Location

PROJECT No. 37097
DATE: FEBRUARY 2015
SCALE:

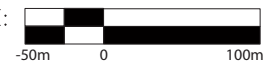




Riverside South Phase 15
Transportation Impact Study

Exhibit 2
Proposed Development

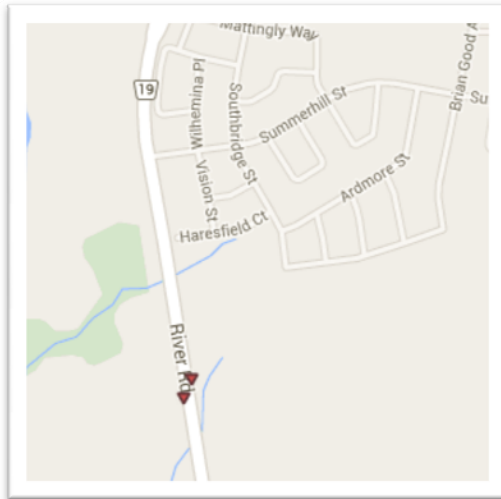
PROJECT No. 37097
DATE: FEBRUARY 2015
SCALE:



2.4 Transit, Pedestrian and Cycling Facilities

The Riverview Transit Station and Park and Ride facility is located approximately 500m north of the north parcel, approximately 800m from the south parcel. The nearest transit service is provided by the #99 transit route along River Road. The nearest bus stop is located on River Road, in the vicinity of the proposed Street 16 and River Road intersection.

EXHIBIT 3 – Nearest Bus Stop Location



Transit service is expected to be provided along Brian Good Avenue in the future to ensure the 400m peak service coverage is provided to residents within the proposed development.

In the interim, while the lands between the two parcels remain undeveloped, transit may be run along Spratt Road to facilitate service to the south parcel.

Sidewalks are expected to be provided along every street, which helps facilitate access to the adjacent network. No dedicated bicycle lanes or facilities are planned within the proposed development at this time. Further review of active transportation facilities may be reviewed at the site plan stage.

2.5 Transportation Demand Management (TDM)

The following section discusses briefly the potential impact of TDM, outlined in the 2013 TMP. The opportunity exists to consider the implementation of TDM measures to encourage sustainable community development and sustainable transportation, including:

- Ride share programs
- Modern bicycle facilities/ promotions at schools
- Priority pickup/ drop-offs parking or car-share parking at schools
- Transit oriented development benefits
- Parking Restrictions

Each of these measures is designed to increase the quality of service of alternative modes of travel that supports the existing measures being provided by the City.

2.6 Community Transportation Issues

The proposed development is located within an established residential area with two major roadways providing access. Community impacts from the development are expected to be minimal.

3 Transportation Network

3.1 Existing Road Network

3.1.1 Roadways

Earl Armstrong Road is designated as an arterial road in the City of Ottawa Official Plan. Earl Armstrong Road extends east-west from River Road in the west to High Road in the east. Further west, across the recently completed Vimy memorial Bridge, Earl Armstrong Road transitions into Strandherd Drive. Earl Armstrong Road has a four lane urban cross-section from River Road to just east of Limebank Road. The posted speed limit on Earl Armstrong Road, through the study area, is 60 km/h.

River Road is a two-lane rural arterial roadway that runs along the Rideau River from Riverside Drive/ Limebank Road south beyond the City limits. River Road has a 4-lane urban cross section at the intersection with Earl Armstrong Road. The posted speed limit on River Road within the study area is 80km/h.

3.1.2 Study Area Intersections

The following intersections will be examined in this report. The intersection control and lane configurations of each are indicated in Exhibit 4:

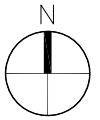
- Earl Armstrong Road and River Road (Existing)
- Earl Armstrong Road and Spratt Road (Existing)
- River Road and Borbridge Avenue
- River Road and Street 16
- Spratt Road and Street 8
- Spratt Road and Street 22

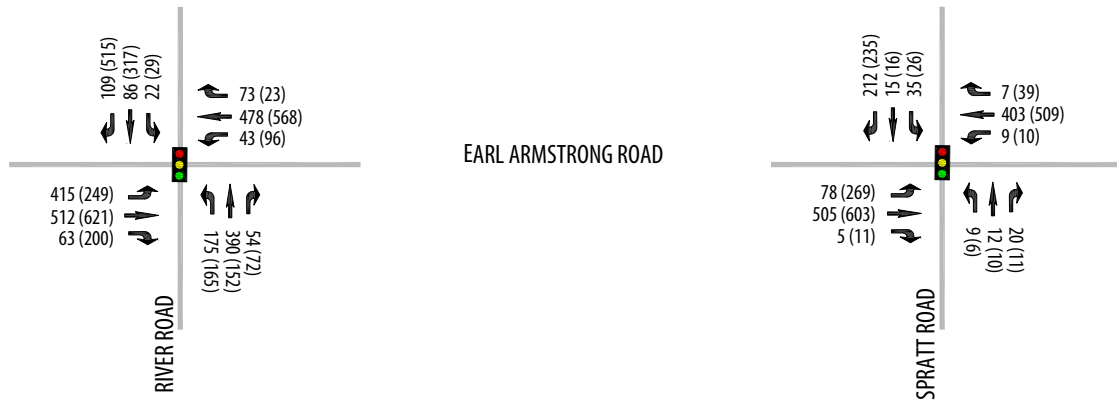
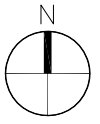
3.2 Existing Traffic Volumes

Weekday morning and afternoon peak hour turning movement counts were obtained from the City of Ottawa at the following study area intersections. Where City data was not available, IBI Group completed the necessary traffic count.

- Earl Armstrong Road and River Road (City of Ottawa, August 2014)
- Earl Armstrong Road and Spratt Road (IBI Group, December 2014)

Raw traffic count sheets and existing signal timing plans have been provided **Appendix A**. The existing (2014) peak hour traffic volumes are shown in Exhibit 5.





LEGEND

XX (XX) - AM (PM) PEAK HOUR TRAFFIC VOLUMES



3.3 Existing Bicycle and Pedestrian Facilities

Dedicated cycling lanes are provided on River Road north of Earl Armstrong Road and on Earl Armstrong Road. Paved and gravel shoulders on River Road south of Earl Armstrong Road are able to accommodate cyclists.

Formal urban sidewalks have been provided on both sides of Earl Armstrong Road. A sidewalk is provided on the east side of River Road north of Earl Armstrong Road. There are no sidewalks located on River Road south of Earl Armstrong Road.

There is an existing multi-use pathway (part of the City's multi-use pathway system) that runs along the Rideau River, west of the proposed development, which accommodates both pedestrians and cyclists.

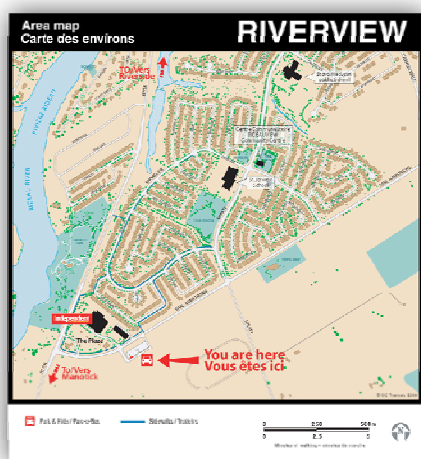
3.4 Existing Transit Facilities and Service

Earl Armstrong Road provides exclusive transit lanes from the Riverview Park and Ride Station west across the Vimy Memorial Bridge. There are currently three (3) OC Transpo service routes that run through the study area.

- Route #94 is a regular/ all-day 30-minute headway service route that operates between Millennium Station and the Riverview Park and Ride. Buses enter/ exit the study area via River Road.
- Route #99 is a regular/ all-day 15-minute headway service route that operates between South Keys station and the Riverview Park and Ride. Buses enter/ exit the study area via Spratt Road.
- Route #189 is a peak period weekday service route that operates between South Keys station and the Riverview Park and Ride. Buses enter/ exit the study area via River Road.

The Riverview Park and Ride was completed in August 2010 and is located approximately 500m north of the proposed development. This facility contains approximately 400 parking spaces. Transit service maps for the above routes have been provided in **Appendix B**.

EXHIBIT 6 – Riverview Transit Station



3.5 Collision Analysis

A review of historical collision data has been provided. The City requires a safety review if 33 or more total collisions were reported at a particular location or at least six collisions for any one movement or of a discernible pattern, over a three year period. Table 2 summarizes all reported collisions between January 1, 2011 and January 1, 2014.

TABLE 2 – Reported Collisions Within Study Area

LOCATION	# OF REPORTED COLLISIONS
Earl Armstrong Road and River Road	6
Earl Armstrong Road and Spratt Road	8

Based on Table 2, the total number of collisions at each location does not exceed 33 over the three year period. There were no other discernible patterns to the reports that would signify a particular geometric or design deficiency. The collision analysis did not take into consideration the modified Earl Armstrong Road and River Road intersection.

A copy of the City collision records is available in **Appendix C**.

3.6 Future Road Network

The City recently completed the following capital roadway projects in the vicinity of the proposed development:

- Construction of the Vimy Memorial Bridge;
- Earl Armstrong Road 4-lane widening; and,
- Upgrade of the Earl Armstrong Road and River Road intersection.

The 2013 TMP outlines future road network modifications required in the 2031 'Affordable Road Network.' The following project was noted that may have an impact on study area traffic:

- Earl Armstrong Road widening – Widen from 2 to 4-lanes between Limebank Road and Bowesville Road and a new 2-lane road between Bowesville Road and Bank Street (Phase 3: 2026-2031)

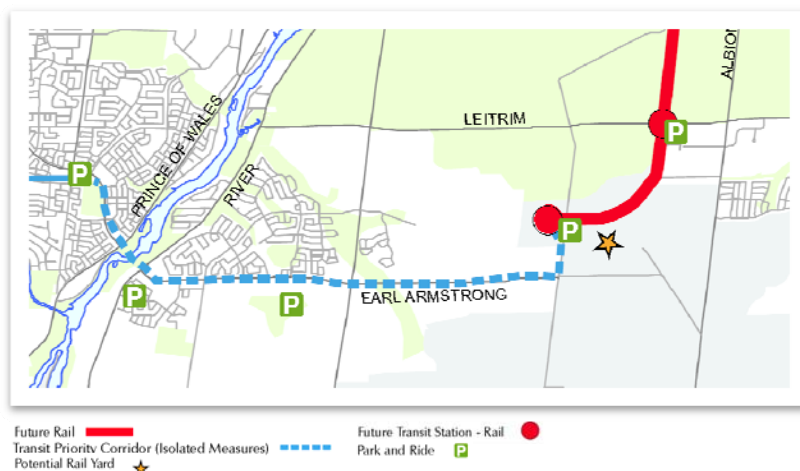
Local intersection modifications may also be required in the surrounding area to support future adjacent developments.

3.7 Future Transit Facilities and Services

The 2013 TMP outlines future rapid transit and transit priority (RTTP) network. The following projects were noted that may have an impact on study area traffic:

- O-Train – Extension of the O-Train from Greenboro Station to Bowesville, including new stations at Gladstone, Walkley, South Keys and Leirim (2014-2031); and,
- The Chapman Mills/ Strandherd Drive/ Earl Armstrong Road - The corridor is expected to be upgraded with transit signal priority and queue jump lanes between the Barrhaven Town Centre Station and Bowesville Station. It also includes some road reconstruction to accommodate buses – partial implementation was expected by this year.

EXHIBIT 7 – Future Transit Infrastructure Projects



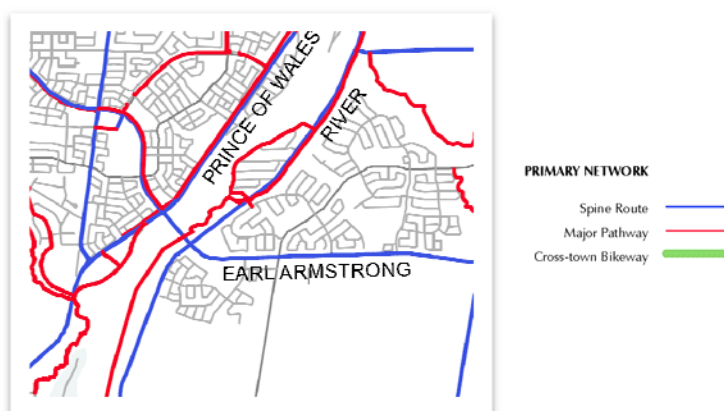
3.8 Future Cycling and Pedestrian Facilities

The TMP designates River Road and Earl Armstrong Road as “Spine” or “City-wide Cycling Routes,” which form part of a system linking the commercial, employment, institutional, residential and educational nodes throughout the City of Ottawa. Multi-use pathways (major pathways) are provided along the Rideau River, which tie into the existing urban pedestrian network.

The Ottawa Cycling Plan (2013), a long term strategic plan to strengthen and support cycling in the City, does not note any future modifications to the area cycling network based on the ‘Affordable Cycling Network Plan’ recommendations.

The Ottawa Pedestrian Plan (2013) does not propose any future modifications to the pedestrian network within the study area.

EXHIBIT 8 – Future Cycling Network



4 Traffic Generation

4.1 Future Background Traffic Growth

Two future horizons were analyzed in the report, as required by City staff.

1. Year 2018 – Opening Day; Full occupancy of the proposed development;
2. Year 2023 – Opening Day plus 5 years.

The proposed opening day horizon year is highly dependent on market forces. As noted in Section 2.2, the opening day horizon year is highly dependent on market forces. Therefore, it is possible full occupancy won't be achieved by 2018.

A 2% background growth rate, as agreed to by City staff, was used in this study that accounts for regional growth along the adjacent road network.

4.2 Future Adjacent Development Traffic Volumes

The City of Ottawa Transportation Impact Assessment Guidelines specifies all significant developments within the study area which are likely to occur within the horizon year must be identified and recognized in all TIS reports. Since the traffic generated by these developments was not captured in the background traffic growth calculation, they must be added separately.

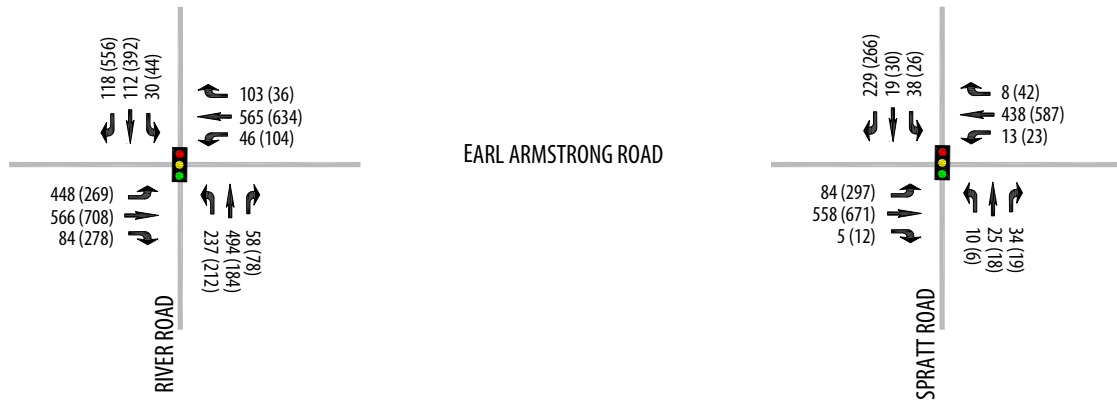
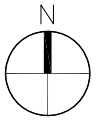
The adjacent residential developments located directly north of the proposed development were manually counted and the number of occupied dwelling units was confirmed. Therefore, trips generated by an occupied dwelling unit would be accounted for in the existing counts and were removed from the adjacent development trip generation. The remaining undeveloped or unoccupied units had their peak hour trips estimated using the same trip generation, distribution and assignment procedures used for the subject site (discussed in Section 4.4: Trip Generation and Section 4.5: Trip Distribution and Assignment).

4.3 Future Background Traffic Volumes

The estimated background and adjacent development weekday peak hour traffic volumes were combined to create the future background peak hour traffic volumes for the 2018 and 2023 horizon years, as shown in **Exhibits 9 and 10** respectively.

4.4 Trip Generation

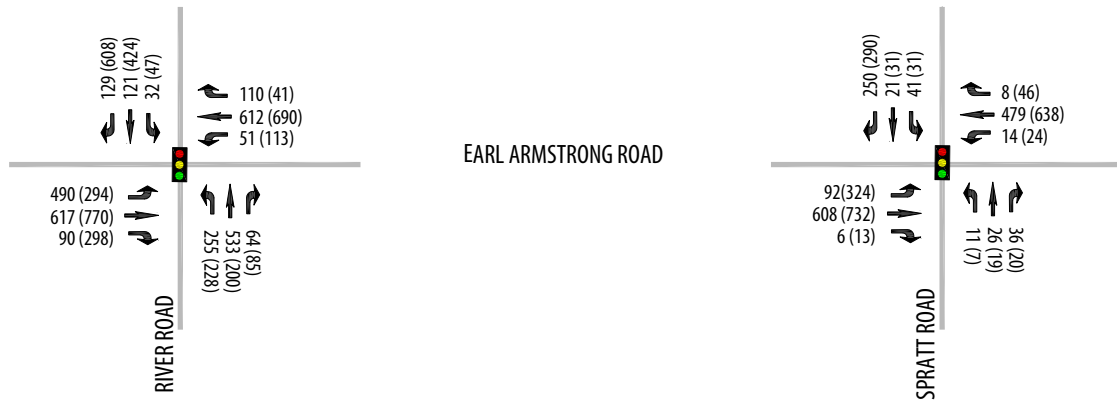
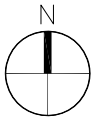
The peak hour traffic volumes from the proposed development were determined using standard peak hour trip generation rates from the ITE Manual, "Trip Generation", 9th Edition, 2012, published by the Institute of Transportation Engineers (ITE), Washington. The resulting trip generation for the subject site is summarized in Table 3. The relevant extracts from the ITE Manual have been provided in **Appendix D**.



LEGEND

XX (XX) - AM (PM) PEAK HOUR TRAFFIC VOLUMES





LEGEND

XX (XX) - AM (PM) PEAK HOUR TRAFFIC VOLUMES



TABLE 3 – Riverside South Phase 15 Development Trip Generation

LAND USE	SIZE	SOURCE	RATE	PERIOD	SPLIT		GENERATED TRAFFIC (vph)		
					IN	OUT	IN	OUT	TOTAL
Single Family	452	ITE 210	Formula †	AM	25%	75%	82	245	326
				PM	63%	37%	257	151	408
Townhomes	740	ITE 230	Average ‡	AM	17%	83%	44	213	256
				PM	67%	33%	208	102	310
Transit Modal Split Reduction (10%)				AM			-13	-45	-58
				PM			-47	-25	-72
TOTAL VEHICLE TRIPS				AM			113	411	524
				PM					419

Notes:

sf. = square feet, vph = vehicles per hour.

† Formula Rate for Single Family Detached Land Use:

AM T = $0.70(X) + 9.74$

PM T = $e^{(0.90\ln(X) + 0.51)}$

‡ Average Rate for Condo/ Townhouse Land Use:

AM T = $e^{(0.80\ln(X) + 0.26)}$

PM T = $e^{(0.82\ln(X) + 0.32)}$

The proposed development is expected to generate approximately 500 morning peak hour trips and 650 afternoon peak hour trips.

The ITE Trip Generation rates are based on data collected from traffic surveys conducted across North America, but mostly in suburban areas of the United States where the level of transit use is traditionally very low (estimates show the ITE rates average approximately 96% auto mode split). In order to obtain an estimate of trip generation that is more reflective of the conditions in Ottawa, a transit modal split (TMS) factor was applied to the trip generation results.

Active transportation modes of travel, such as walk and cycling, were not factored into the trip generation analysis. Given the suburban location of the proposed development, a more conservative approach was taken. However, it is important to note that there are facilities available within the study area to accommodate these modes. Therefore, the trip generation results should be considered the worst case scenario.

4.4.1 Internalization

There are two schools proposed within the development, one in each parcel. It is expected that these schools would be entirely serviced within the community, with little to no exclusive school trips accessing the adjacent network. It was assumed the majority of trips would be captured by auto-passenger, walk and/ or cycling trips. Therefore, the traffic impact of these land uses was expected to be minimal during the peak periods.

4.4.2 Transit Modal Split (TMS)

Trip generation data in the ITE Manual was derived from surveys in North America, where the locations often possess limited transit use. As agreed by City staff, the trip generation results were subsequently reduced to reflect transit usage. The Riverview Park and Ride facility provides direct access for local residents to the regional transit network. The station is also within 800m walking distance to a significant portion of the proposed development.

With multiple peak period services operating at the Riverview Station, a 10% transit modal split was considered reasonable and relatively conservative to apply in all horizon years.

4.5 Trip Distribution and Assignment

The trip distribution, shown below, was applied to development traffic (both background and site generated) within the study area. The distribution was based on previous studies and completed road infrastructure projects. The intersection directional splits were based on existing traffic volume patterns.

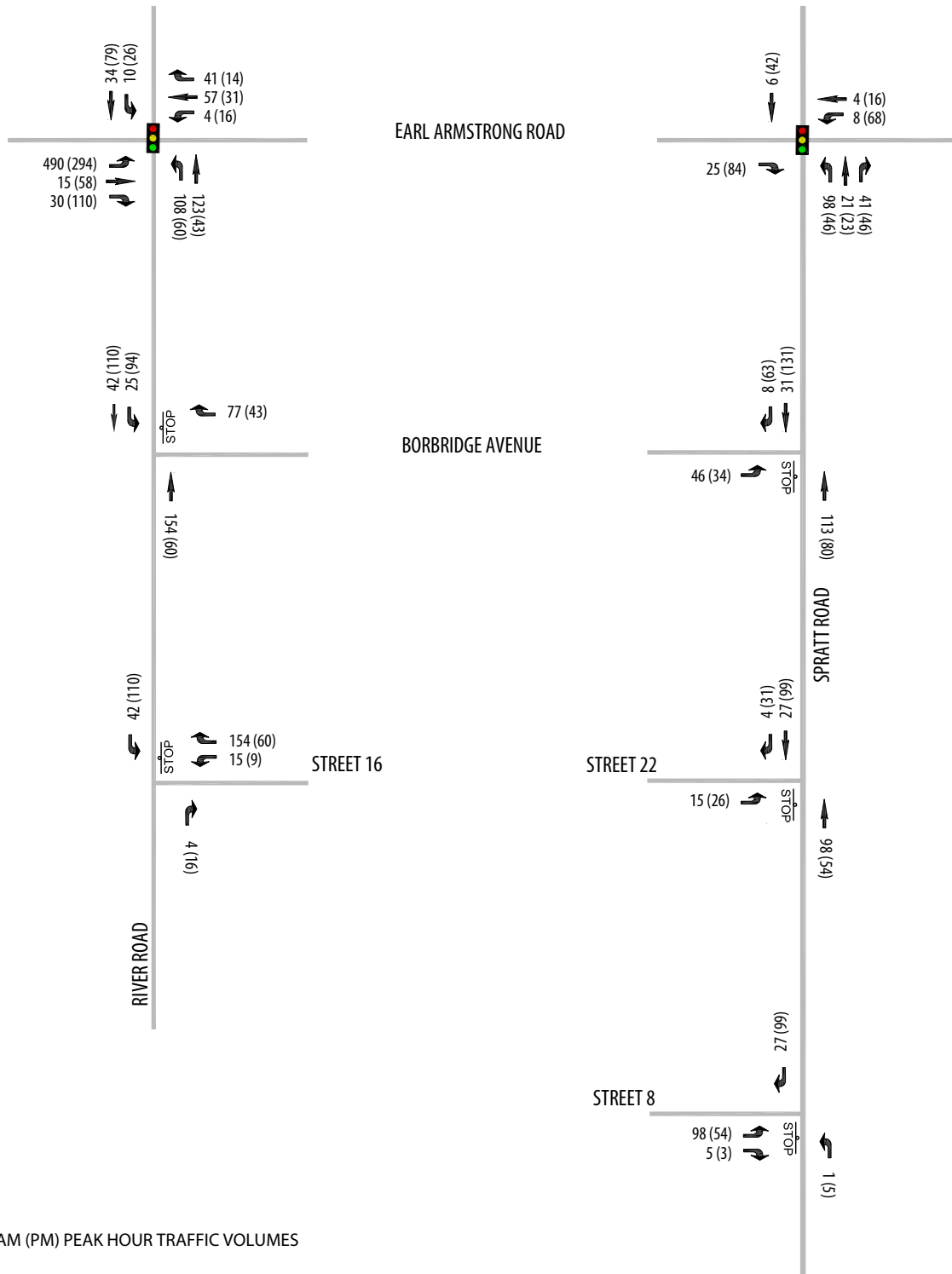
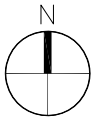
TABLE 4 – Trip Distribution

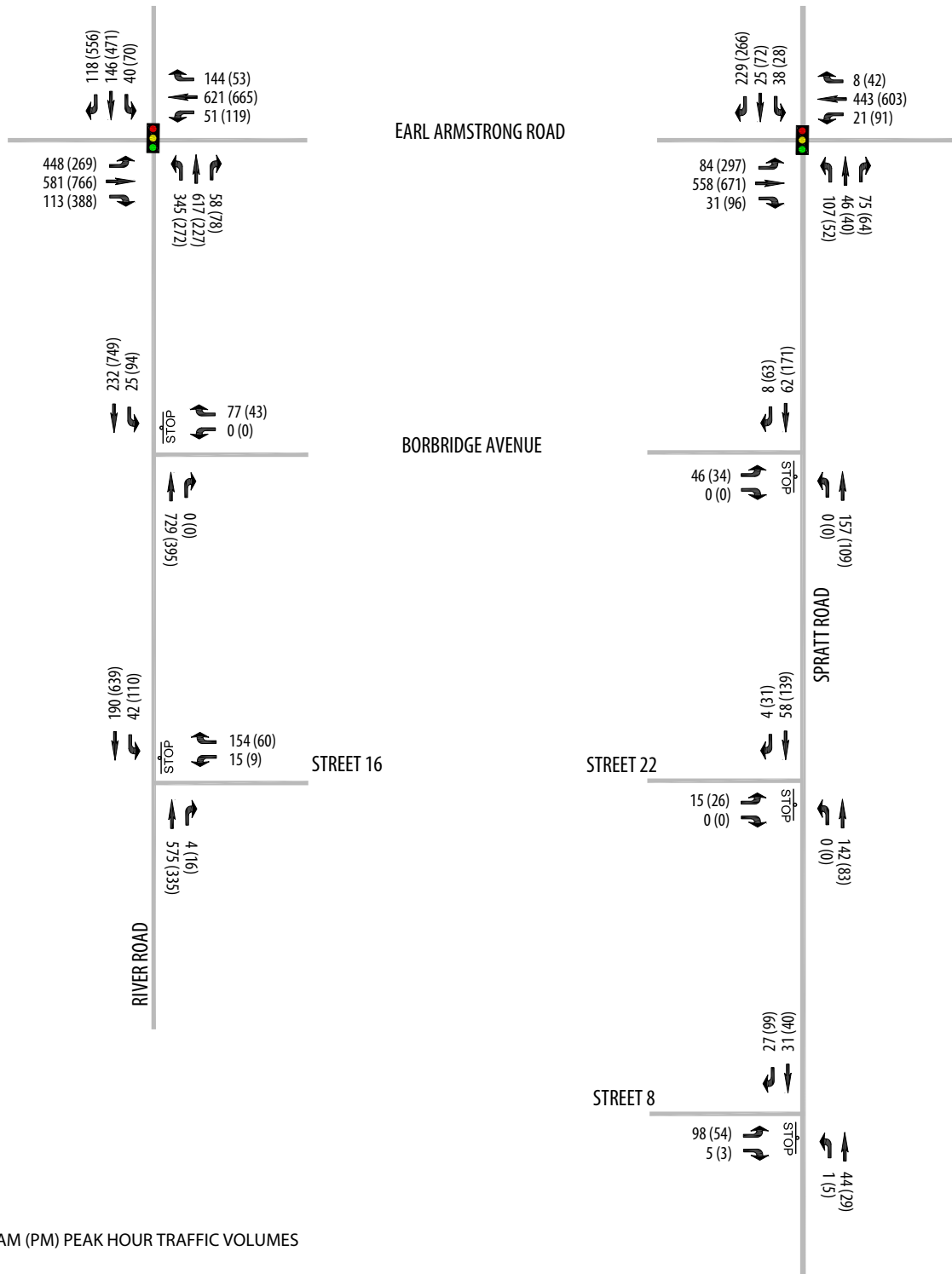
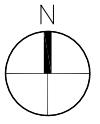
DIRECTION	DISTRIBUTION	
	AM	PM
North Parcel – 85% Traffic onto River Road; 15% onto Spratt Road		
South Parcel – 100% Traffic onto Spratt Road		
West on Earl Armstrong Road	40%	40%
North on River Road	40%	25%
North on Spratt Road	5%	10%
East on Earl Armstrong Road	10%	20%
South on River Road	5%	5%

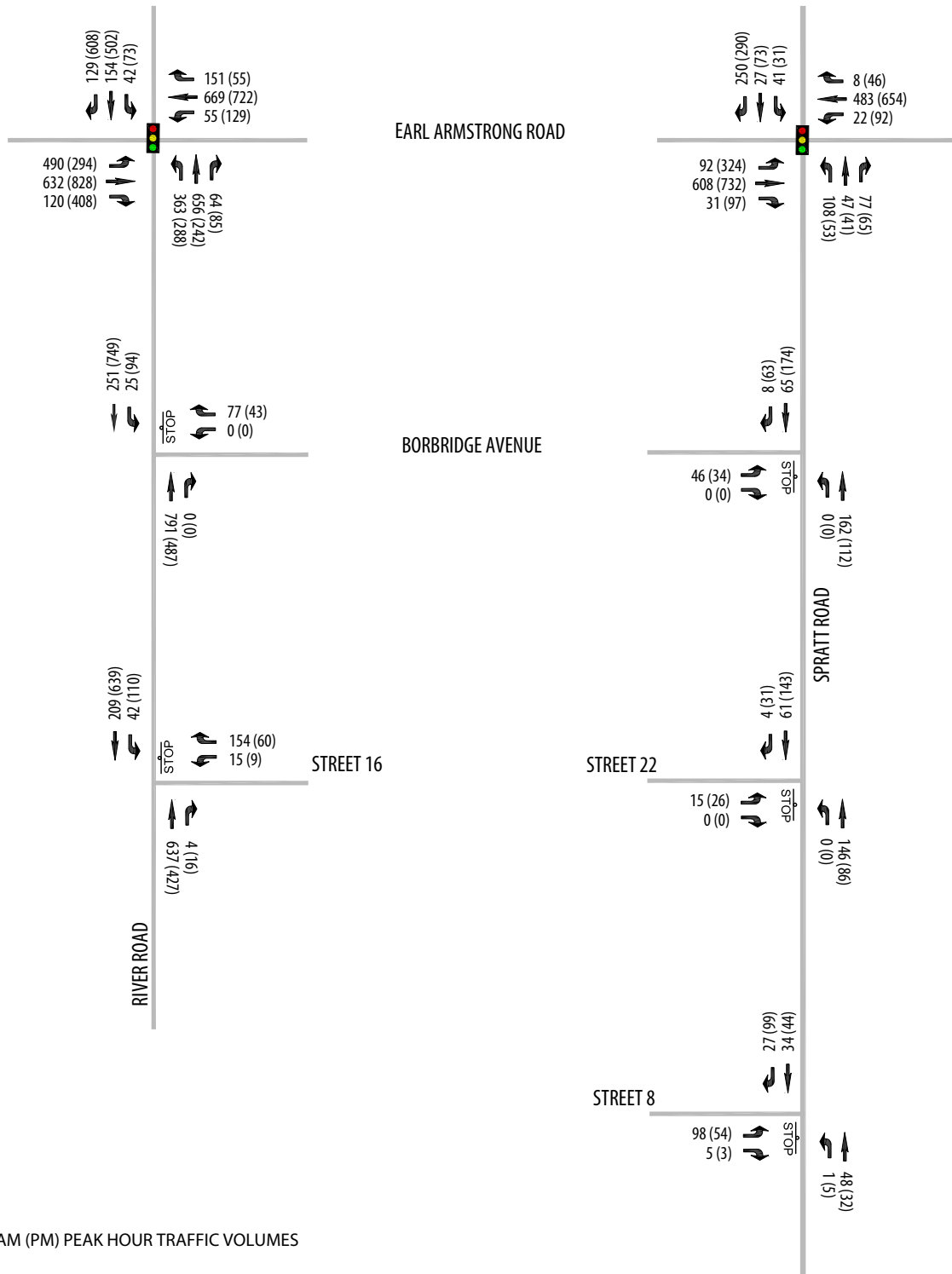
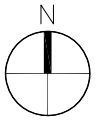
Two separate distributions were created; one for each parcel. The differences in the morning and afternoon peak hour distributions were based on differences in traffic patterns observed in the existing traffic counts. In the future, traffic may opt to use Brian Good Avenue to exit the site to the north, but for this analysis it was assumed all onsite traffic used the proposed development access intersections. This assumption represents the worst case scenario for adjacent road network requirements.

The trip distribution proportions indicated in Table 4 were applied to the adjusted traffic generation volumes in Table 3 to determine the morning and afternoon site generated peak hour traffic volumes in the 2018 and 2023 horizon years. The results are shown in **Exhibit 11**.

The morning and afternoon site generated peak hour traffic volumes were added to the Future (2017) and (2022) Background traffic volumes to create the Future (2018) and (2023) Background plus Site Generated peak hour traffic volumes shown in **Exhibits 12** and **13** respectively.







5 Intersection Capacity Review

5.1 Intersection Capacity Analysis Criteria

The intersection capacity of a signalized intersection is commonly expressed by the manner in which an intersection functions in terms of the "Level of Service" (LOS) it provides.

In qualitative terms, the LOS defines operational conditions within a traffic stream and their perception by motorists. A LOS definition generally describes these conditions in terms of such factors as delay, speed and travel time, freedom to manoeuvre, traffic interruptions, safety, comfort and convenience. LOS can also be related to the ratio of the volume to capacity (v/c) which is simply the relationship of the traffic volume (either measured or forecast) to the capability of the intersection or road section to accommodate a given traffic volume. This capability varies depending on the factors described above. LOS are given letter designations from A to F. LOS "A" represents the best operating conditions and LOS "E" represents the level at which the intersection or an approach to the intersection is carrying the maximum traffic volume that can, practicably, be accommodated. LOS F indicates that the intersection is operating beyond its theoretical capacity.

The City of Ottawa has developed criteria as part of the Transportation Impact Assessment Guidelines, which directly relate the volume to capacity (v/c) ratio of a signalized intersection to a LOS designation. These criteria are as follows:

TABLE 5 – LOS Criteria for Signalized Intersections

LOS	v/c RATIO
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	> 1.00

The intersection capacity analysis technique provides an indication of the LOS for each movement at the intersection under consideration and for the intersection as a whole. The overall v/c ratio for an intersection is defined as the sum of equivalent volumes for all critical movements at the intersection divided by the sum of capacities for all critical movements.

The capacity of an unsignalized intersection can also be expressed in terms of the LOS it provides. For an unsignalized intersection, the Level of Service is defined in terms of the average movement delays at the intersection. This is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position. The average delay for any particular minor movement at the un-signalized intersection is a function of the capacity of the approach and the degree of saturation.

The Highway Capacity Manual 2000 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for un-signalized intersections, related to average movement delays at the intersection.

TABLE 6 – LOS Criteria for Unsignalized Intersections

LOS	DELAY
A	<10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

The unsignalized intersection capacity analysis technique included in the HCM and used in the current study provides an indication of the LOS for each movement of the intersection under consideration. By this technique, the performance of the un-signalized intersection can be compared under varying traffic conditions, using the LOS concept in a qualitative sense. One un-signalized intersection can be compared with another un-signalized intersection using this concept. LOS E represents the capacity of the movement under consideration and generally, in large urban areas, LOS D is considered to represent an acceptable operating condition (LOS E is considered an acceptable operating condition for planning purposes for intersections located in Ottawa's Urban Core – the downtown and its vicinity). LOS F indicates that the movement is operating beyond its design capacity.

Traffic control signal warrant analyses were completed for all unsignalized intersections that operated below acceptable City standards. The warrants are based on the established procedures outlined in the "Ontario Traffic Manual, Book 12", published by the Ontario Ministry of Transportation (MTO).

5.2 Intersection Capacity Analysis Methodology

Based on the established intersection capacity analysis criteria described above, the existing and future conditions were analyzed using the weekday peak hour traffic volumes derived in the previous sections of this report. Existing traffic conditions were analyzed using existing (2014) weekday peak hour traffic counts. Future traffic conditions were analyzed in two stages:

1. Background – Estimated weekday peak hour traffic volumes in 2018 and 2023 from regional growth and anticipated developments
2. Background plus Site Generated – Background weekday peak hour traffic volumes plus the proposed development generated traffic volumes.

For each horizon year, the existing (2014) road network was assumed to provide a starting point for the intersection capacity analysis. Any known infrastructure improvements planned by the City of Ottawa or adjacent developers were accounted for separately.

5.2.1 Base Road Network

Prior to the Synchro analysis, a base road network was established for each condition outlined above. The existing (2014) road network is shown in Exhibit 4. There were no modifications to the road network in future horizons, as noted in Section 3.6: Future Road Network.

All proposed access intersections off River Road and Spratt Road were assumed to have either inbound left-turn or right-turn lanes where appropriate. Outbound approaches were assumed to have shared turning movements. A full geometric review of all intersections is provided in Section 6: Geometric Review.

5.2.2 Traffic Signal Warrant

Traffic control signal warrants were checked for any failing unsignalized intersection using the established methodology outlined in the Ontario Traffic Manual, Book 12, Ministry of Transportation Ontario (MTO), 2007. If the MTO traffic signal warrant procedure for any unsignalized intersection was triggered, the Synchro analysis would assume a traffic control signal.

With only morning and afternoon peak hour data for the future horizons, the remaining six hours of traffic data were estimated using the following equation:

$$\text{Future Non-Peak Hour Volume} = \frac{(\text{AM Peak Hour Volume} + \text{PM Peak Hour Volume})}{2}$$

This formula is applied to each movement in each off-peak hour. With estimated 8-hour data, it was determined that none of the unsignalized study area intersections triggered the traffic signal warrant in the ultimate condition.

Details of the MTO TCS warrant analysis are provided in **Appendix E**.

5.3 Intersection Capacity Analysis Results

The following section discusses the results of the intersection capacity analysis. All tables summarize study area intersection LOS results during the morning and afternoon peak hour periods. The worst/ critical observed LOS movement at each study area intersection was recorded; if the LOS was E or lower (a v/c ratio greater than 0.90) it was compared to the intersection LOS. If the intersection LOS was also indicated to be below City standards, potential roadway modifications or measures were considered and the intersection was re-evaluated.

Synchro analysis output files have been provided in **Appendix F**.

5.3.1 Existing (2014) and Future Background (2018) & (2023) Traffic

TABLE 7 - Intersection Capacity Analysis: Existing (2014) Traffic

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	V/C RATIO		LEVEL OF SERVICE	
			CRITICAL MOVEMENT	INTERSECTION	CRITICAL MOVEMENT	INTERSECTION
Earl Armstrong Road and River Road	Traffic Signal	AM	0.60	-	A	-
		PM	0.93	0.66	E	B
Earl Armstrong Road and Spratt Road	Traffic Signal	AM	0.68	-	B	-
		PM	0.68	-	B	-

TABLE 8 - Intersection Capacity Analysis: Future (2018) Background Traffic

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	V/C RATIO		LEVEL OF SERVICE	
			CRITICAL MOVEMENT	INTERSECTION	CRITICAL MOVEMENT	INTERSECTION
Earl Armstrong Road and River Road	Traffic Signal	AM	0.69	-	B	-
		PM	1.00	0.78	E	C
Earl Armstrong Road and Spratt Road	Traffic Signal	AM	0.70	-	B	-
		PM	0.68	-	B	-

TABLE 9 - Intersection Capacity Analysis: Future (2023) Background Traffic

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	V/C RATIO		LEVEL OF SERVICE	
			CRITICAL MOVEMENT	INTERSECTION	CRITICAL MOVEMENT	INTERSECTION
Earl Armstrong Road and River Road	Traffic Signal	AM	0.73	-	C	-
		PM	1.10	0.89	F	D
Earl Armstrong Road and Spratt Road	Traffic Signal	AM	0.71	-	C	-
		PM	0.72	-	C	-

5.3.2 Future Background Plus Site Generated (2018) & (2023) Traffic

TABLE 10 - Intersection Capacity Analysis: Future (2018) Background plus Site Generated Traffic

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	V/C RATIO		LEVEL OF SERVICE	
			CRITICAL MOVEMENT	INTERSECTION	CRITICAL MOVEMENT	INTERSECTION
Earl Armstrong Road and River Road	Traffic Signal	AM	0.93	0.72	E	C
		PM	1.01	0.86	F	D
Earl Armstrong Road and Spratt Road	Traffic Signal	AM	0.65	-	B	-
		PM	0.69	-	B	-
River Road and Borbridge Avenue	Traffic Signal	AM	0.45	-	C	-
		PM	0.46	-	D	-
River Road and Street 16	Traffic Signal	AM	0.36	-	C	-
		PM	0.40	-	D	-
Spratt Road and Borbridge Avenue	Traffic Signal	AM	0.10	-	B	-
		PM	0.11	-	B	-
Spratt Road and Street 22	Traffic Signal	AM	0.09	-	A	-
		PM	0.09	-	A	-
Spratt Road and Street 8	Traffic Signal	AM	0.11	-	A	-
		PM	0.06	-	A	-

TABLE 11 - Intersection Capacity Analysis: Future (2023) Background plus Site Generated Traffic

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	V/C RATIO		LEVEL OF SERVICE	
			CRITICAL MOVEMENT	INTERSECTION	CRITICAL MOVEMENT	INTERSECTION
Earl Armstrong Road and River Road	Traffic Signal	AM	0.98	0.76	E	C
		PM	1.11	0.94	F	E
Earl Armstrong Road and Spratt Road	Traffic Signal	AM	0.65	-	B	-
		PM	0.71	-	C	-
River Road and Borbridge Avenue	Traffic Signal	AM	0.49	-	C	-
		PM	0.46	-	D	-
River Road and Street 16	Traffic Signal	AM	0.39	-	C	-
		PM	0.40	-	D	-
Spratt Road and Borbridge Avenue	Traffic Signal	AM	0.10	-	B	-
		PM	0.11	-	B	-

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	V/C RATIO		LEVEL OF SERVICE	
			CRITICAL MOVEMENT	INTERSECTION	CRITICAL MOVEMENT	INTERSECTION
Spratt Road and Street 22	Traffic Signal	AM	0.09	-	A	-
		PM	0.09	-	A	-
Spratt Road and Street 8	Traffic Signal	AM	0.11	-	A	-
		PM	0.06	-	A	-

5.3.3 Summary of Intersection Capacity Analysis

All study area intersections were shown to operate within City standards in the **Future (2018) Background plus Site Generated Condition** and the **Future (2023) Background Condition**. No modifications were required.

In the **Future (2023) Background plus Site Generated Condition**, the Earl Armstrong Road and River Road intersection was shown to operate below City standards. All other study area intersections met City requirements and no modifications were required.

A brief discussion of the Earl Armstrong Road and River Road intersection is discussed below.

Earl Armstrong Road and River Road Intersection

This intersection was indicated to operate below City standards during the afternoon peak hour in the Future (2023) Background Condition. The overall intersection level of service was estimated to be 0.94, which is slightly above the City standard (0.90).

Upon further examination of intersection turning movement volumes, the southbound right-turn was the critical movement. This result was not unexpected since the recent opening of the Vimy Memorial Bridge provided a new location for commuter traffic to cross the Rideau River. The overall impact of southbound right turn traffic was assessed in a sensitivity analysis. The results of the sensitivity analysis have been summarized in Table 12.

TABLE 12 – Future (2023) Background plus Site Generated PM Sensitivity Analysis: Earl Armstrong Road and River Road

HORIZON YEAR	OPTION	V/C RATIO		LEVEL OF SERVICE	
		CRITICAL MOVEMENT	INTERSECTION	CRITICAL MOVEMENT	INTERSECTION
2023	Existing (2014) Timing Plan and Future (2023) SB Right-Turn Volume (608 vph)	1.11	0.98	F	E
	Optimized Timing Plan and Reduced SB Right-Turn Volume by 10% (548 vph)	0.97	0.88	E	D

Notes:

Reductions only applied to southbound right-turn volumes.

From Table 12, the intersection was shown to operate within City standards with a 10% reduction in southbound right-turn traffic volumes in the afternoon peak hour. A 10% margin between adequate and below-adequate operation using the assumed background growth rate was not considered reason enough to warrant additional modifications to a recently constructed intersection. More time and data is necessary to properly assess how traffic patterns in the area will evolve with the new bridge in place. Traffic levels are also expected to fluctuate in the coming years before settling to equilibrium as new infrastructure projects come on-stream. For example, the planned City widening of Prince of Wales from 2 to 4-lanes is expected to draw traffic away from River Road.

6 Geometric Review

The following section reviews all geometric requirements for the study area intersections. All relevant excerpts from referenced technical standards have been provided in **Appendix G**.

6.1 Site Access Assessment

6.1.1 Sight Distance

Horizontal or vertical curves in a road may obstruct the line of sight of a vehicles turning from a side street, which increases the risk of a collision. As a result, the proposed site access was assessed for appropriate sight distances. No significant horizontal or vertical curves exist on River Road or Spratt Road that would obstruct the view of a driver exiting the site. Proper care should be taken to ensure no obstructions be placed in the line-of-sight in the vicinity of the proposed access points. No modifications were required.

6.1.2 Corner Clearances

The proposed development includes minor accesses to and from arterial roadways in relative close proximity of major intersections. Corner clearances up and downstream of these major intersections need to be protected. According to TAC, the minimum corner clearance along a major road is 70m. All accesses off River Road and Spratt Road meet this standard.

6.2 Auxiliary Lane Analyses

Auxiliary lane analyses were completed at all relevant study area intersections under **Future (2023) Background plus Site Generated** traffic conditions. The highest left-turn traffic volume in either the morning or afternoon peak hour period was evaluated as the critical design condition.

6.2.1 Auxiliary Left-Turn Lane

The auxiliary left-turn lane analysis was completed using the worst peak hour traffic volumes for the approach; in this case, the higher left-turn volume occurred during the afternoon peak hour. Only the unsignalized study area intersections required evaluation based on existing lane configurations.

The MTO Geometric Design Standards for Ontario Highways left-turn lane warrant was verified at the proposed River Road unsignalized access intersections. The proposed access intersections along Spratt Road were not evaluated since the estimated peak hour volumes were too low to trigger left-turn lanes. The results from the warrant check are summarized in Table 13 below.

TABLE 13 – Critical Peak Auxiliary Left-Turn Lane Analysis Results at Unsignalized Intersections

Intersection	Movement	Design Speed (km/h)	Left-Turn Volume (vph)	Approach Volume (vph)	Opposing Volume (vph)	Left-Turn Storage (m)
River Road and Borbridge Avenue	SBL	70	94	843	487	30
River Road and Street 16	SBL	70	110	749	443	30

Note: Left-turn storage does not include taper.

The results from Table 13 indicate that auxiliary left-turn lanes with 25m of storage are required at both River Road intersections. These results should be reviewed and confirmed during detailed design.

6.2.2 Access Intersection Auxiliary Turn Lanes

The outbound approaches at proposed access intersections should provide auxiliary turn lanes with the following configurations:

- River Road intersections – Westbound left-turn lanes (minimum storage length required)
- Spratt Road intersections – Eastbound right-turn lanes (minimum storage length required)

The auxiliary turn lanes were provided on the non-commuter movement, to ensure maximum capacity is provided to the critical movement.

7 Conclusions and Recommendations

The intersection capacity analysis completed in the Riverside South Phase 15 Transportation Impact Study has been used to determine appropriate modifications to the adjacent road network to accommodate the proposed development.

The key findings of this report are as follows:

- All study area intersections were indicated to operate within City standards in the 2018 horizon year with estimated background growth and full buildout of the proposed development.
- The Earl Armstrong Road and River Road intersection did not operate within City standards in the 2023 horizon year with estimated background growth and full buildout of the proposed development.
 - The primary trigger of this result was the southbound right-turn movement.
 - The proposed development is not expected to add new traffic to this movement.
 - Sensitivity analysis revealed a 10% reduction in the estimated future southbound right-turn peak hour traffic resulted in an acceptable intersection level-of-service. This 10% margin between adequate and below-adequate operation was not considered reason enough to warrant additional modifications to a recently constructed intersection. More time and data is necessary to properly assess how traffic patterns in the area will evolve with the new bridge in place. Traffic levels are also expected to fluctuate in the coming years before settling to equilibrium as new infrastructure projects come on-stream. For example, the planned City widening of Prince of Wales from 2 to 4-lanes is expected to draw traffic away from River Road.
 - No modifications were recommended.
- All remaining study area intersections were indicated to operate within City standards in the 2023 horizon year with estimated background growth and full buildout of the proposed development.
- Geometric evaluations revealed no sight distance or corner clearance issues. Proper care should be taken to ensure no obstructions be placed in the line-of-sight in the vicinity of the proposed access points.
- Auxiliary left-turn lanes were recommended at the following locations:
 - River Road and Borbridge Avenue – 30m storage on the southbound left-turn lane
 - River Road and Street 16 – 30m storage on the southbound left-turn lane
- The outbound approaches at proposed access intersections should provide auxiliary turn lanes with the following configurations:
 - River Road intersections – Westbound left-turn lanes (minimum storage length required)
 - Spratt Road intersections – Eastbound right-turn lanes (minimum storage length required)

The auxiliary turn lanes were provided on the non-commuter movement, to ensure maximum capacity is provided to the critical movement.

- All geometric recommendations should be reviewed and confirmed during detailed design.

The overall conclusion of this study is that the Riverside South Phase 15 Development can be accommodated by the adjacent road network. The Owner shall be responsible for constructing all proposed access intersections and internal transportation facilities as dictated by the latest draft plan.

8 Professional Authorization

Prepared By:



Austin Shih, M.A.Sc., P.Eng.
Project Engineer

APPENDIX A

TRAFFIC DATA



Turning Movement Count - 15 Minute Summary Report

EARL ARMSTRONG RD @ RIVER RD

Survey Date: Thursday, August 28, 2014

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 6 Westbound: 3

RIVER RD										EARL ARMSTRONG RD										Grand Total
Northbound					Southbound					Eastbound					Westbound					
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT		
07:00 07:15	48	87	9	144	3	15	29	47	191	97	106	21	224	3	71	11	85	309	500	
07:15 07:30	43	107	10	160	4	10	32	46	206	112	155	16	283	8	123	14	145	428	634	
07:30 07:45	50	100	15	165	6	23	32	61	226	106	121	18	245	14	124	21	159	404	630	
07:45 08:00	44	88	11	143	6	30	22	58	201	98	114	15	227	15	123	21	159	386	587	
08:00 08:15	38	95	18	151	6	23	23	52	203	99	122	14	235	6	108	17	131	366	569	
08:15 08:30	35	81	24	140	3	22	23	48	188	110	122	24	256	17	112	13	142	398	586	
08:30 08:45	43	65	17	125	7	15	28	50	175	98	96	24	218	18	82	11	111	329	504	
08:45 09:00	40	55	16	111	8	10	29	47	158	65	93	17	175	17	105	9	132	307	465	
09:00 09:15	32	54	15	101	3	24	16	43	144	43	63	25	131	12	86	13	111	242	386	
09:15 09:30	23	45	12	80	5	24	35	64	144	63	73	13	149	20	77	11	108	257	401	
09:30 09:45	27	55	15	97	3	23	29	55	152	47	63	29	139	20	82	8	110	249	401	
09:45 10:00	34	36	12	82	6	26	25	57	139	49	56	18	123	22	59	12	93	216	355	
11:30 11:45	32	48	9	89	3	23	30	56	145	40	90	20	151	20	64	6	90	241	386	
11:45 12:00	21	38	17	76	2	40	35	77	153	36	66	25	127	17	64	4	85	212	365	
12:00 12:15	28	46	14	88	8	39	44	91	179	34	68	18	121	27	67	4	98	219	398	
12:15 12:30	22	37	11	70	4	46	39	89	159	46	73	28	147	24	74	5	103	250	409	
12:30 12:45	18	37	18	73	5	32	29	66	139	39	71	24	134	22	92	4	118	252	391	
12:45 13:00	25	38	9	72	3	26	34	63	135	39	63	24	126	17	79	10	106	232	367	
13:00 13:15	22	27	11	60	6	28	37	71	131	36	58	18	112	19	56	7	82	194	325	
13:15 13:30	32	28	9	69	7	31	37	75	144	38	69	26	133	23	72	6	101	234	378	
15:00 15:15	31	30	29	90	12	60	63	135	225	45	85	25	155	24	88	6	118	273	498	
15:15 15:30	24	26	24	74	6	69	101	176	250	32	110	39	181	13	103	5	121	302	552	
15:30 15:45	23	32	11	66	10	58	72	140	206	60	137	31	228	21	110	9	140	368	574	
15:45 16:00	32	37	16	85	6	72	93	171	256	47	129	34	210	26	121	7	156	366	622	
16:00 16:15	39	33	13	85	4	76	109	189	274	61	140	39	242	27	120	11	158	400	674	
16:15 16:30	57	42	13	112	9	82	110	201	313	53	164	68	285	21	107	3	131	416	729	
16:30 16:45	34	43	19	96	5	51	131	187	283	54	154	44	253	31	152	10	193	446	729	
16:45 17:00	44	38	19	101	11	100	145	256	357	68	149	38	255	21	137	5	163	418	775	
17:00 17:15	30	29	21	80	4	84	129	217	297	74	154	50	278	23	172	5	200	478	775	
17:15 17:30	36	30	16	82	8	61	142	211	293	62	151	53	267	25	119	11	155	422	715	
17:30 17:45	20	48	17	85	13	70	131	214	299	76	158	44	278	36	134	12	182	460	759	
17:45 18:00	25	31	14	70	11	75	118	204	274	48	122	56	226	22	142	9	173	399	673	
Total	1052	1586	484	3122	197	1368	1952	3517	6639	1975	3395	938	6314	631	3225	300	4159	10473	17112	

Note: U-Turns are included in Totals.

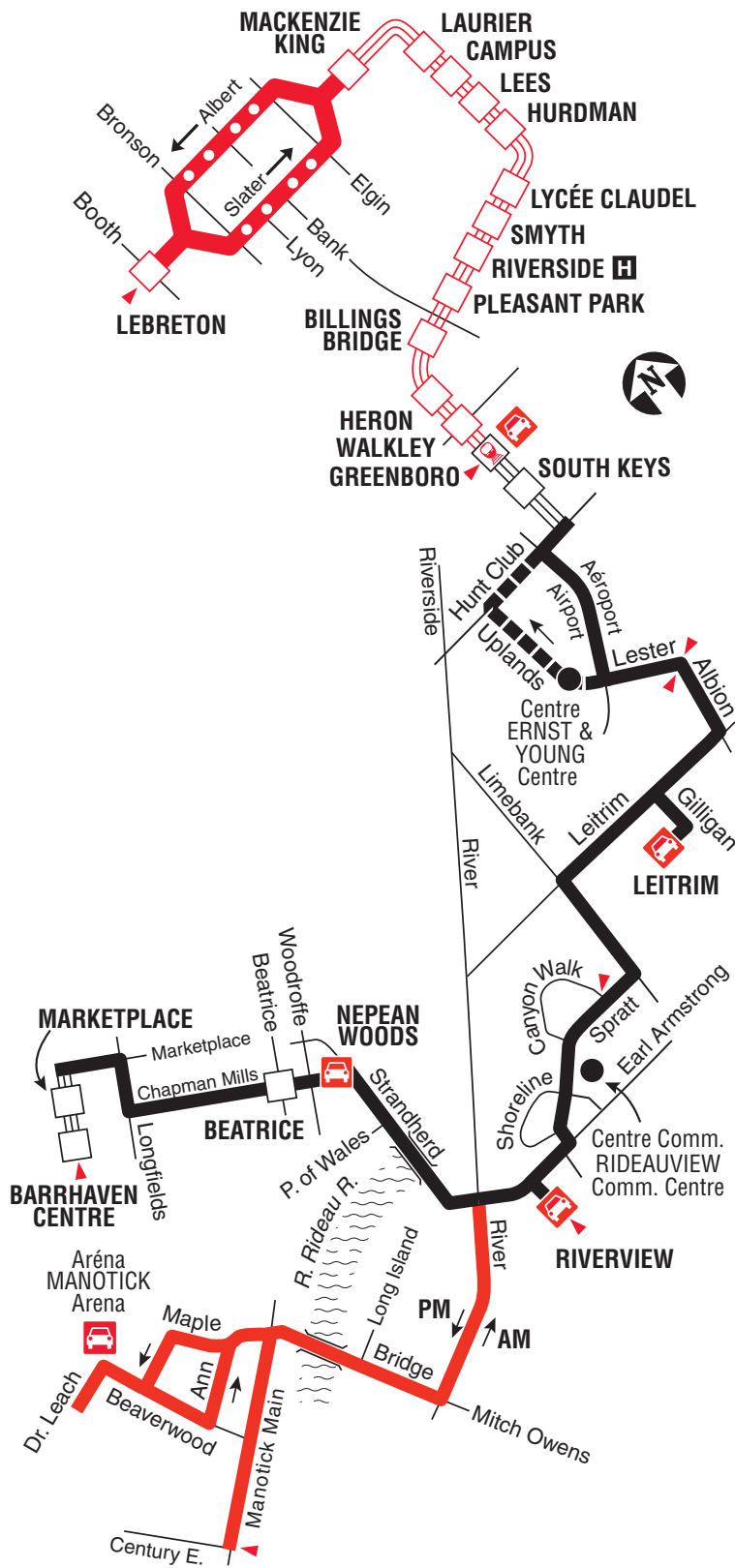
Validation Note:

Results generated Sep 26, 2014. All records still in violation were set to Edited.

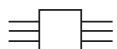
APPENDIX B

OC TRANSPOR MAPS

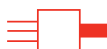




Legend • Légende



Transitway & Station



Peak periods only /
Périodes de pointe seulement



Northbound (Sat. & Sun. only) /
Direction nord (Sam. et dim. seul.)



Park & Ride / Parc-o-Bus

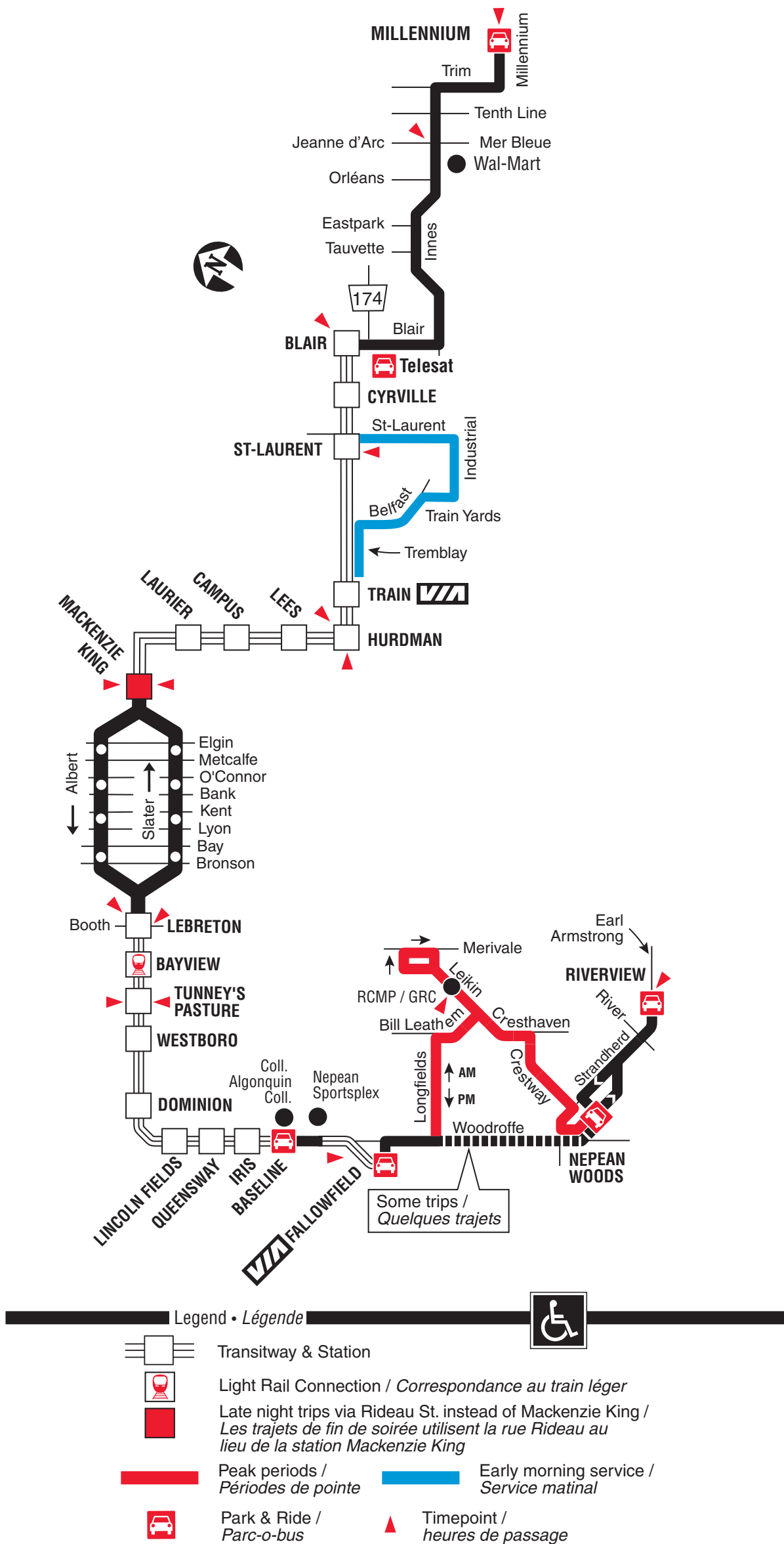


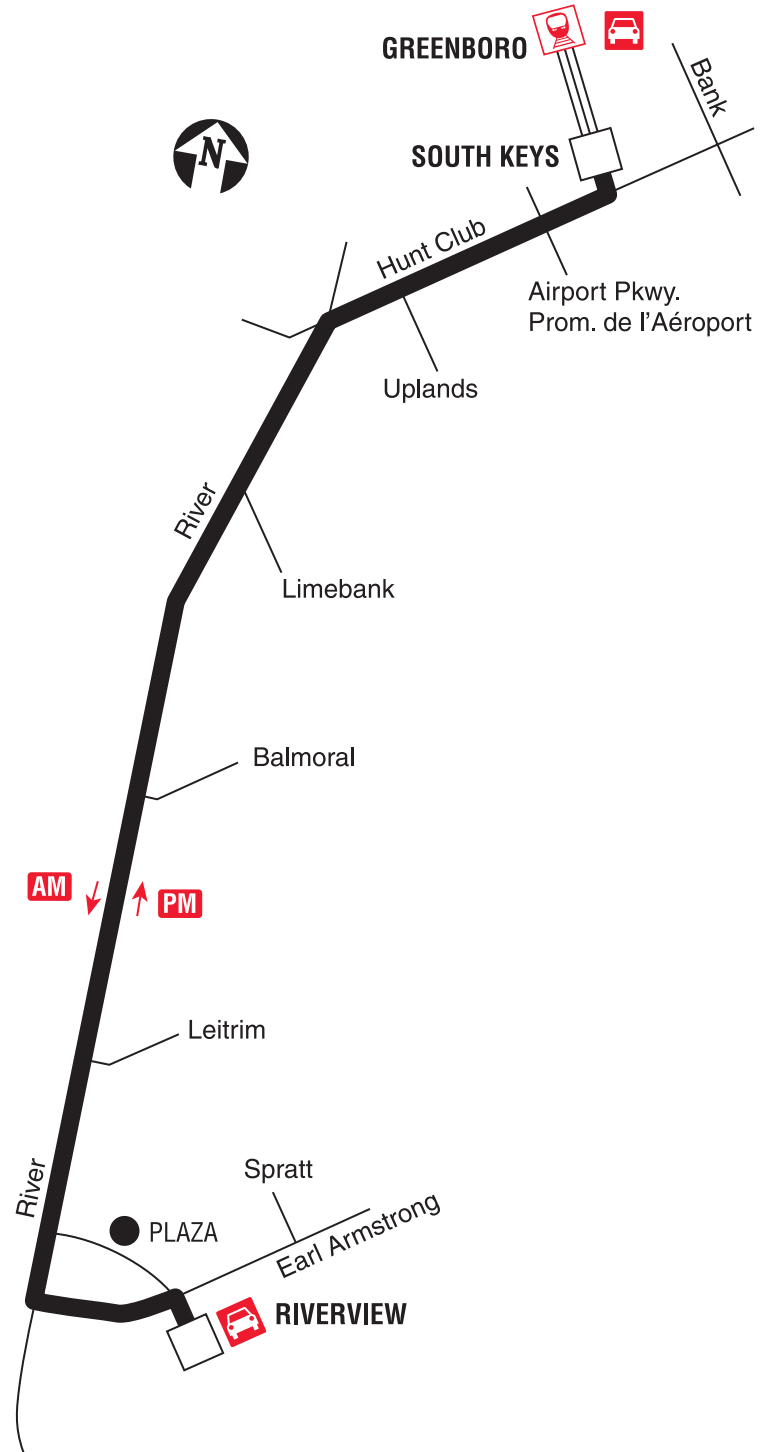
Timepoint / Heures de passage



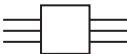


Light Rail Connection /
Correspondance au train léger







Legend • Légende

-  Transitway & Station
-  Light Rail Connection / *Correspondance au train léger*
-  Park & Ride / *Parc-o-bus*

APPENDIX C

COLLISION DATA



Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2011-01-01 TO: 2014-01-01

EARL ARMSTRONG RD & RIVER RD

Former Municipality: Gloucester

Traffic Control: Traffic signal

Number of Collisions: 6

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2011-03-14	Mo	08:51	Clear	Daylight	Rear end	P.D. only	V1 N V2 N	Dry Dry	Slowing or Stopped	Passenger van Delivery van	Other motor vehicle Other motor vehicle	0
2	2011-06-28	Tue	09:51	Clear	Daylight	Turning	Non-fatal	V1 S V2 N	Dry Dry	Turning left Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
3	2011-11-29	Tue	08:00	Rain	Daylight	Rear end	P.D. only	V1 N V2 N	Wet Wet	Going ahead Stopped	Pick-up truck Automobile, station	Other motor vehicle Other motor vehicle	0
4	2013-02-17	Sun	14:08	Clear	Daylight	Rear end	Non-fatal	V1 W V2 W	Dry Dry	Going ahead Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
5	2013-03-06	We	14:44	Clear	Daylight	Single vehicle	Non-fatal	V1 N	Wet	Turning right	Truck - dump	Roll over	0
6	2013-06-27	Thu	10:31	Clear	Daylight	Rear end	P.D. only	V1 S V2 S	Dry Dry	Going ahead Stopped	Delivery van Automobile, station	Other motor vehicle Other motor vehicle	0

EARL ARMSTRONG RD, PARK AND RIDE to SPRATT RD

Former Municipality: Gloucester

Traffic Control: No control

Number of Collisions: 2

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
7	2011-12-09	Fri	11:35	Snow	Daylight	Single vehicle	Non-fatal	V1 W	Wet	Going ahead	Passenger van	Curb	0

EARL ARMSTRONG RD, RIVER RD to PARK AND RIDE

Former Municipality: Gloucester

Traffic Control: No control

Number of Collisions: 2

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
8	2012-02-21	Tue	08:45	Clear	Daylight	Rear end	P.D. only	V1 W V2 W	Dry Dry	Going ahead Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0

EARL ARMSTRONG RD & SPRATT RD

Former Municipality: Gloucester

Traffic Control: Traffic signal

Number of Collisions: 8

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
9	2011-05-03	Tue	15:43	Rain	Daylight	Turning	P.D. only	V1 W V2 E	Wet Wet	Going ahead Turning left	Pick-up truck Passenger van	Other motor vehicle Other motor vehicle	0
10	2011-12-14	We	19:20	Clear	Dark	Turning	P.D. only	V1 W V2 E	Dry Dry	Going ahead Turning left	Unknown Automobile, station	Other motor vehicle Other motor vehicle	0

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

Tuesday, September 02, 2014

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2011-01-01 TO: 2014-01-01

11	2012-05-16	We	07:25	Clear	Daylight	Turning	Non-fatal	V1 E	Dry	Turning left	Automobile, station	Other motor vehicle	0
								V2 W	Dry	Going ahead	Passenger van	Other motor vehicle	
12	2012-11-25	Sun	17:00	Clear	Dusk	Rear end	P.D. only	V1 N	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 N	Dry	Turning right	Automobile, station	Other motor vehicle	
13	2013-02-28	Thu	08:02	Snow	Daylight	Angle	Non-fatal	V1 W	Packed snow	Going ahead	Automobile, station	Other motor vehicle	0
								V2 N	Packed snow	Turning left	Pick-up truck	Other motor vehicle	
14	2013-11-01	Fri	01:30	Clear	Dark	Single vehicle	P.D. only	V1 E	Wet	Turning left	Automobile, station	Curb	0
15	2013-11-14	Thu	18:03	Clear	Dark	Turning	P.D. only	V1 N	Dry	Turning left	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Going ahead	Automobile, station	Other motor vehicle	
16	2013-11-17	Sun	13:27	Clear	Daylight	Turning	P.D. only	V1 E	Dry	Turning left	Automobile, station	Other motor vehicle	0
								V2 W	Dry	Going ahead	Automobile, station	Other motor vehicle	

EARL ARMSTRONG RD & PARK AND RIDE

Former Municipality: Gloucester

Traffic Control: Traffic signal

Number of Collisions: 1

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
17	2011-01-24	Mo	08:45	Clear	Daylight	Sideswipe	P.D. only	V1 E	Dry	Changing lanes	Automobile, station	Other motor vehicle	0
								V2 E	Dry	Going ahead	Automobile, station	Other motor vehicle	

NICOLLS ISLAND RD & RIVER RD

Former Municipality: Gloucester

Traffic Control: Stop sign

Number of Collisions: 2

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
18	2011-02-14	Mo	16:34	Clear	Daylight	Single vehicle	P.D. only	V1 N	Dry	Going ahead	Automobile, station	Ditch	0
19	2012-03-02	Fri	14:45	Clear	Daylight	Rear end	P.D. only	V1 N	Wet	Going ahead	Automobile, station	Other motor vehicle	0
								V2 N	Wet	Stopped	Pick-up truck	Other motor vehicle	

PRINCE OF WALES DR & STRANDHERD DR

Former Municipality: Nepean

Traffic Control: Traffic signal

Number of Collisions: 6

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
20	2011-08-18	Thu	22:45	Clear	Dark	Turning	P.D. only	V1 S	Dry	Going ahead	Automobile, station	Other motor vehicle	0
								V2 N	Dry	Turning left	Police vehicle	Other motor vehicle	
21	2011-12-29	Thu	10:28	Clear	Daylight	Rear end	P.D. only	V1 S	Ice	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Ice	Turning right	Automobile, station	Other motor vehicle	
22	2012-10-19	Fri	06:35	Clear	Dark	Rear end	P.D. only	V1 N	Wet	Slowing or	Automobile, station	Other motor vehicle	0
								V2 N	Wet	Stopped	Automobile, station	Other motor vehicle	

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

Tuesday, September 02, 2014

Page 2 of 5

APPENDIX D

TRIP GENERATION DATA



Single-Family Detached Housing (210)

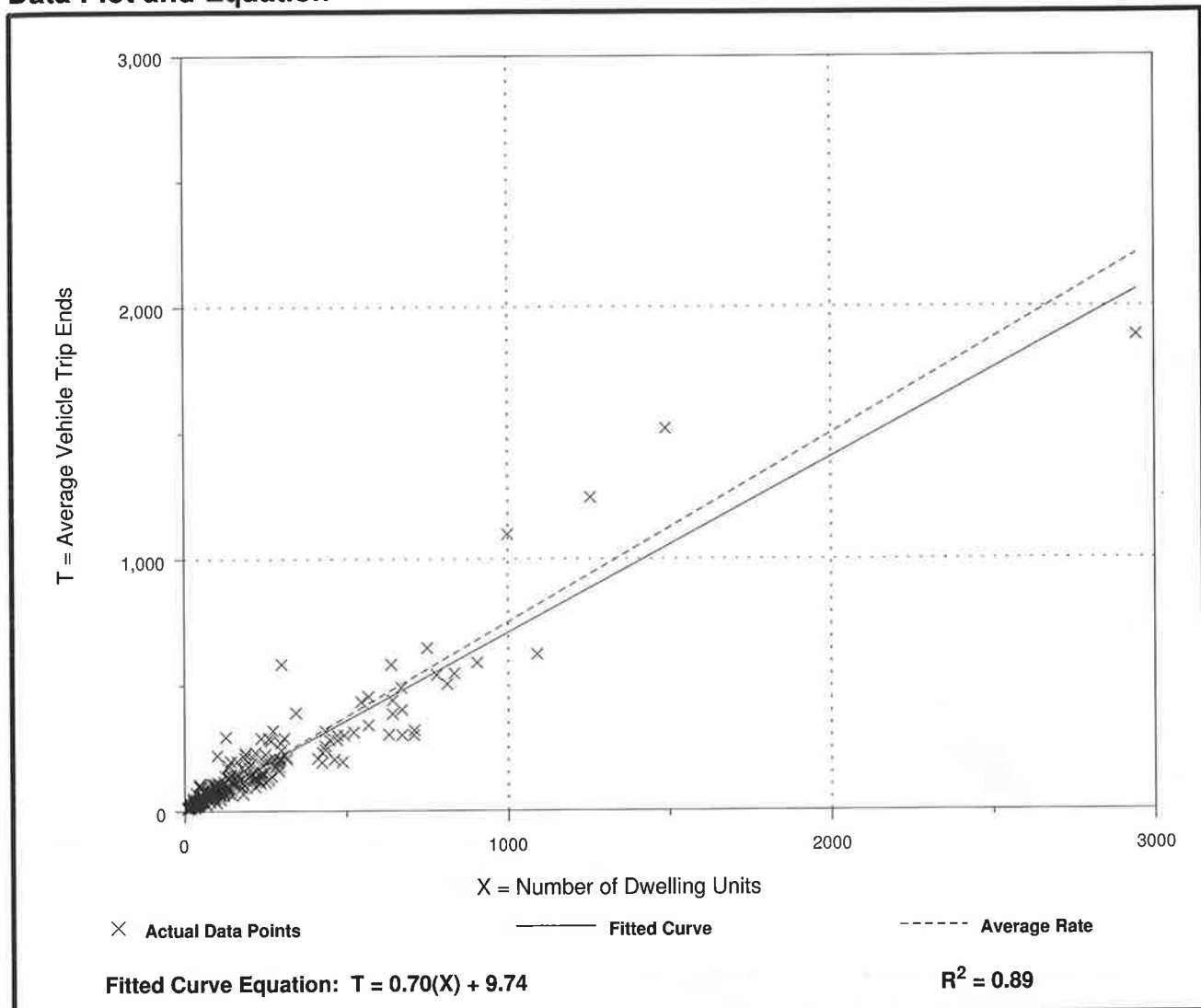
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 292
 Avg. Number of Dwelling Units: 194
 Directional Distribution: 25% entering, 75% exiting

Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.75	0.33 - 2.27	0.90

Data Plot and Equation



Single-Family Detached Housing (210)

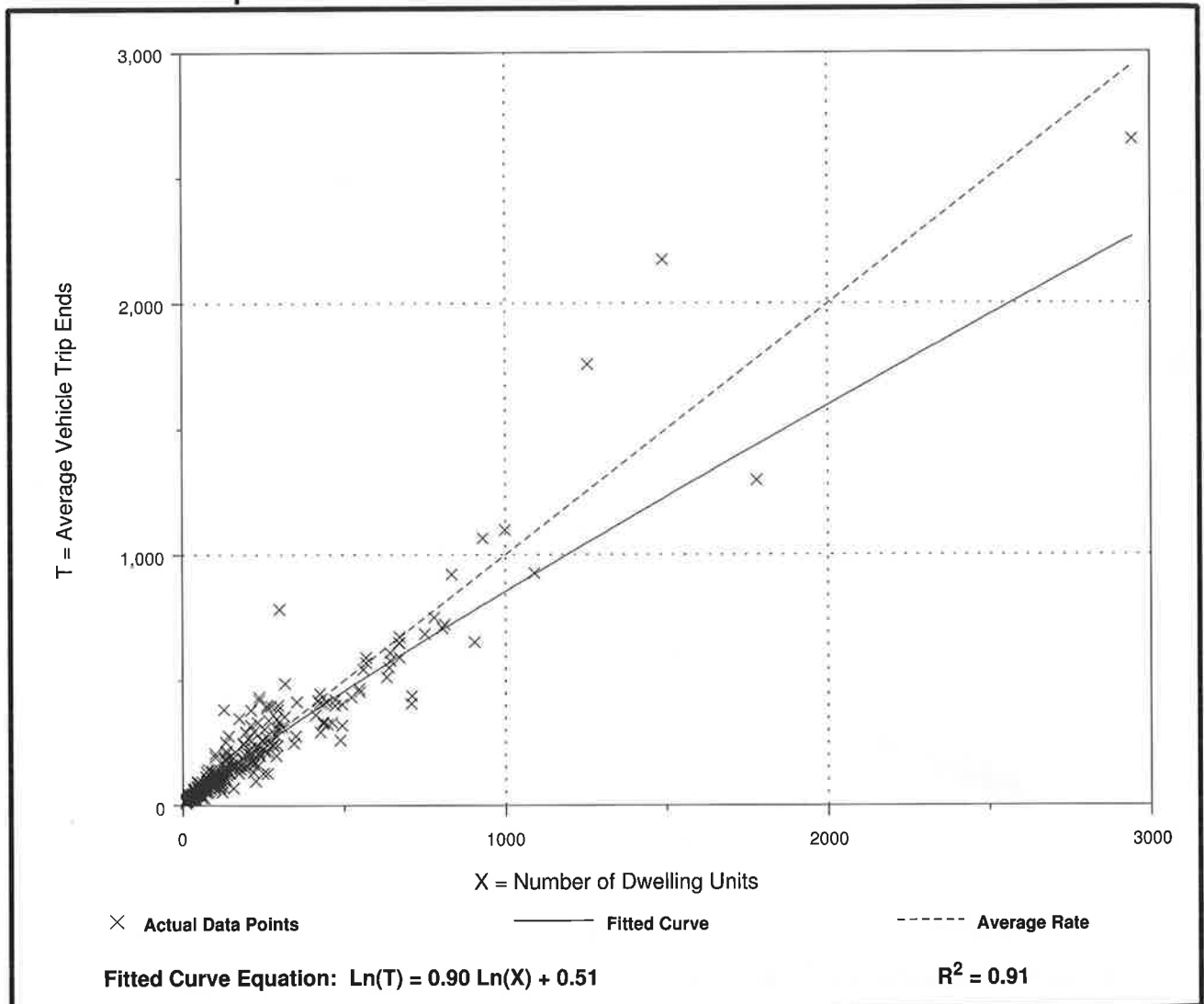
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 321
 Avg. Number of Dwelling Units: 207
 Directional Distribution: 63% entering, 37% exiting

Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
1.00	0.42 - 2.98	1.05

Data Plot and Equation



Residential Condominium/Townhouse (230)

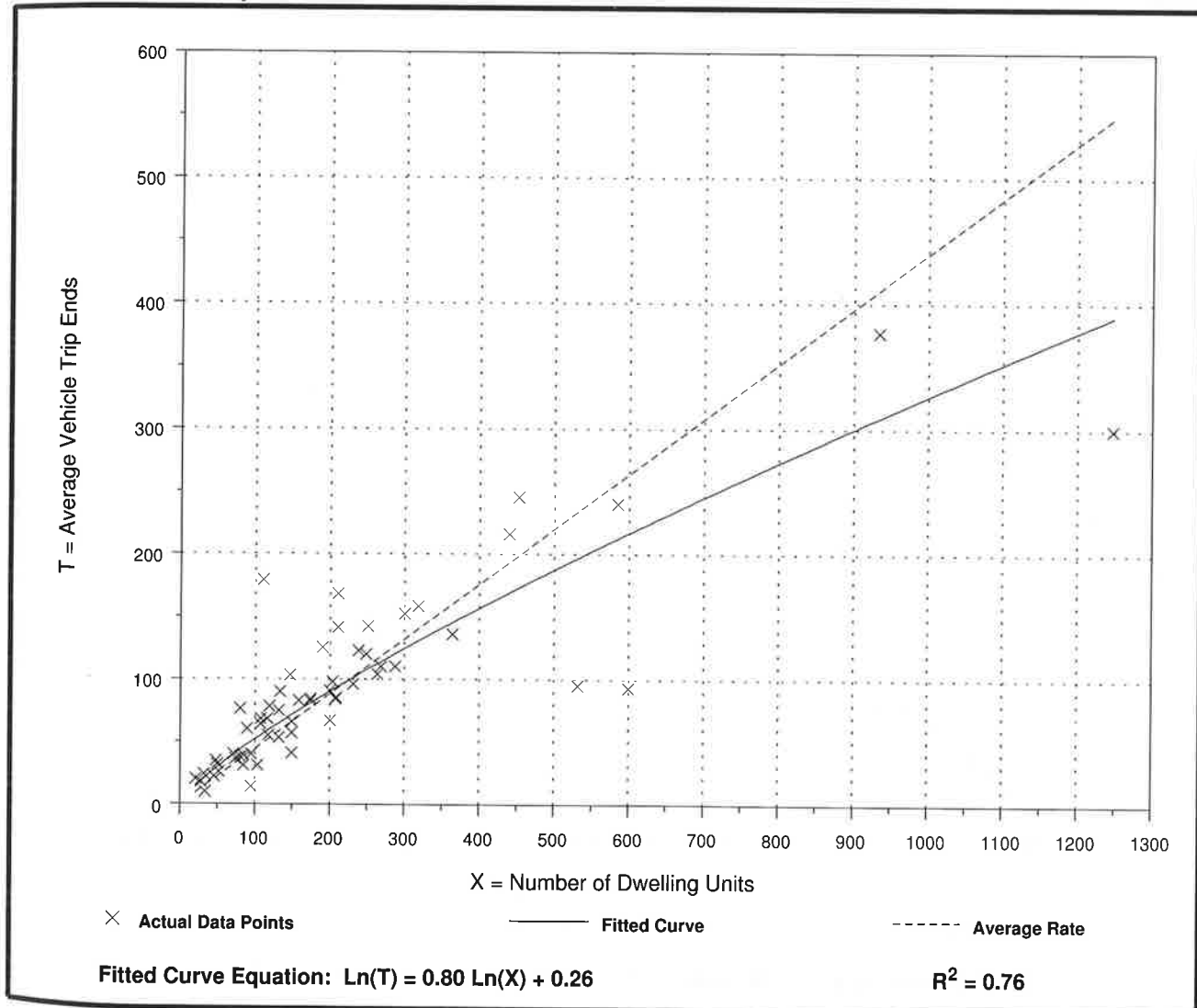
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 59
 Avg. Number of Dwelling Units: 213
 Directional Distribution: 17% entering, 83% exiting

Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.15 - 1.61	0.69

Data Plot and Equation



Residential Condominium/Townhouse (230)

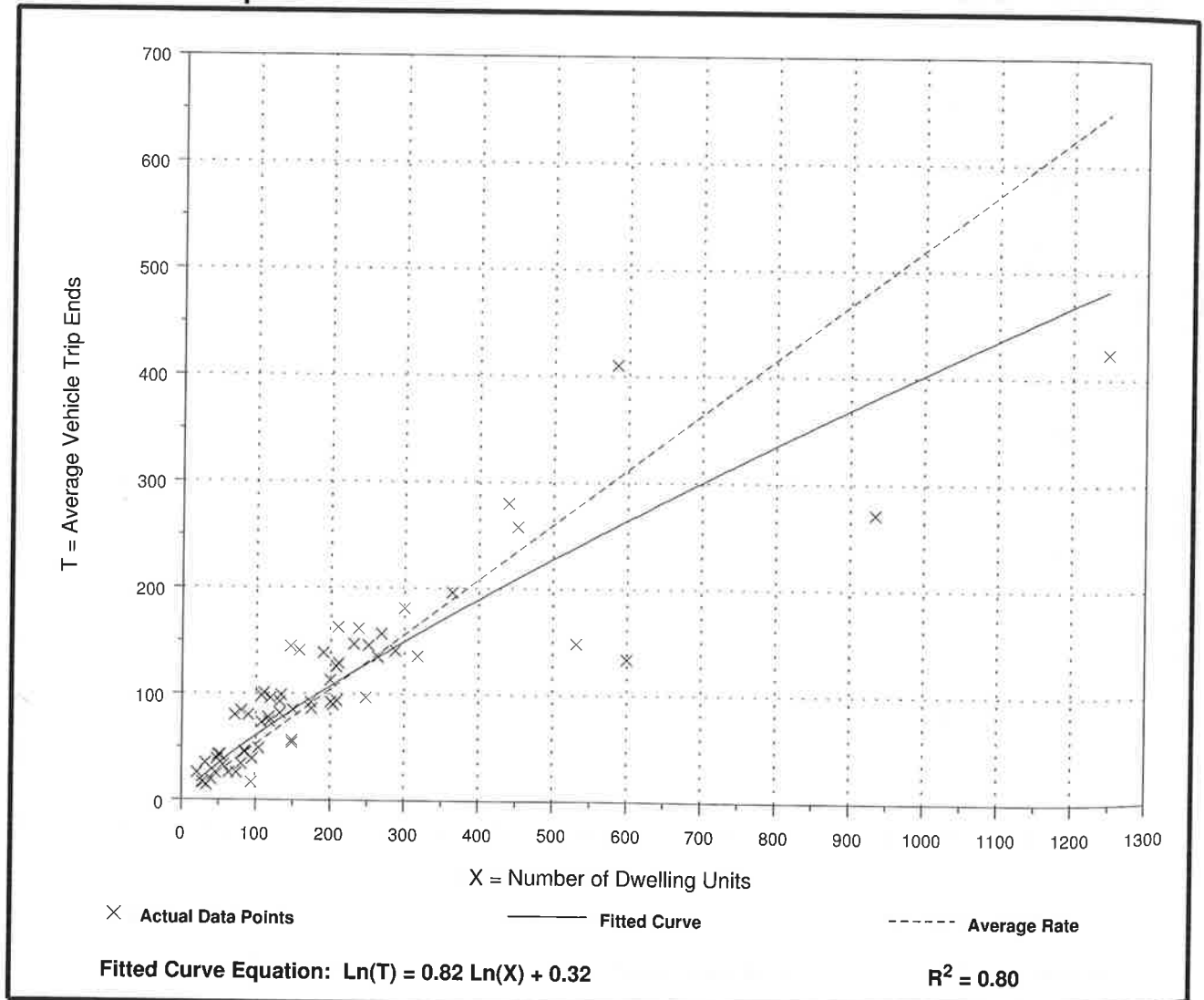
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 62
 Avg. Number of Dwelling Units: 205
 Directional Distribution: 67% entering, 33% exiting

Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.52	0.18 - 1.24	0.75

Data Plot and Equation



APPENDIX E

MTO TCS WARRANT



Input Data Sheet

[Analysis Sheet](#)
[Results Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

What are the intersecting roadways?

River Road and Bortridge Avenue

What is the direction of the Main Road street?

North-South

When was the data collected?

Future (2023) SG

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

1

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

3

d.- What is the operating environment?

Urban

Population >= 10,000

AND

Speed < 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00		639	1				60	500		1		60	5
8:00		791	1				25	251		1		77	5
9:00		639	1				60	500		1		60	5
10:00		639	1				60	500		1		60	5
15:00		639	1				60	500		1		60	5
16:00		639	1				60	500		1		60	5
17:00		487	1				94	749		1		43	5
18:00		639	1				60	500		1		60	5
Total	0	5,112	8	0	0	0	476	4,000	0	8	0	480	40

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	2
13-24	2
25-36	2

* Include only collisions that are susceptible to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Factored 8 hour pedestrian volume	120		15		7		0		
% Assigned to crossing rate	100%		50%		0%		0%		
Net 8 Hour Pedestrian Volume at Crossing									128
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	10	10	1	6	2	4	0	0	
Factored volume of total pedestrians	120		15		7		0		
Factored volume of delayed pedestrians	30		8		8		0		
% Assigned to Crossing Rate	100%		50%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									128
Net 8 Hour Volume of Delayed Pedestrians									34

Results Sheet

[Input Sheet](#)
[Analysis Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

Intersection: River Road and Bortridge Avenue

Count Date: Future (2023) SG

Summary Results

Justification		Compliance		Signal Justified?	
				YES	NO
1. Minimum Vehicular Volume	A Total Volume	100	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	24	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	8	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	24	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	8	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		71	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	40	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Input Data Sheet

[Analysis Sheet](#)
[Results Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

What are the intersecting roadways?

River Road and Street 16

What is the direction of the Main Road street?

North-South

When was the data collected?

Future (2023) SG

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

1

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

3

d.- What is the operating environment?

Urban

Population >= 10,000

AND

Speed < 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00		532	9				76	424		12		107	5
8:00		637	1				42	209		15		154	5
9:00		532	9				76	424		12		107	5
10:00		532	9				76	424		12		107	5
15:00		532	9				76	424		12		107	5
16:00		532	9				76	424		12		107	5
17:00		427	16				110	639		9		60	5
18:00		532	9				76	424		12		107	5
Total	0	4,256	68	0	0	0	608	3,392	0	96	0	856	40

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	2
13-24	2
25-36	2

* Include only collisions that are susceptible to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Factored 8 hour pedestrian volume	120		15		7		0		
% Assigned to crossing rate	100%		50%		0%		0%		
Net 8 Hour Pedestrian Volume at Crossing									128
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	10	10	1	6	2	4	0	0	
Factored volume of total pedestrians	120		15		7		0		
Factored volume of delayed pedestrians	30		8		8		0		
% Assigned to Crossing Rate	100%		50%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									128
Net 8 Hour Volume of Delayed Pedestrians									34

Results Sheet

[Input Sheet](#)[Analysis Sheet](#)[Proposed Collision](#)[GO TO Justification:](#)

Intersection: River Road and Street 16

Count Date: Future (2023) SG

Summary Results

Justification		Compliance		Signal Justified?	
				YES	NO
1. Minimum Vehicular Volume	A Total Volume	100	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	47	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	23	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	47	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	23	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		97	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	40	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

APPENDIX F

SYNCHRO ANALYSES OUTPUT



























Existing (2014) Traffic















Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Existing (2014)
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	415	521	63	43	478	73	175	390	54	22	86	109
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			66			77			57			115
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	437	548	66	45	503	77	184	411	57	23	91	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	437	548	66	45	503	77	184	411	57	23	91	115
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	37.0	37.0	11.7	37.0	37.0	11.8	36.0	36.0	11.8	36.0	36.0
Total Split (s)	19.0	37.0	37.0	19.0	37.0	37.0	21.0	52.0	52.0	12.0	43.0	43.0
Total Split (%)	15.8%	30.8%	30.8%	15.8%	30.8%	30.8%	17.5%	43.3%	43.3%	10.0%	35.8%	35.8%
Maximum Green (s)	12.3	30.4	30.4	12.3	30.4	30.4	14.2	46.0	46.0	5.2	37.0	37.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.0	4.0	4.2	4.0	4.0
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.0	2.0	2.6	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.0	6.0	6.8	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		23.4	23.4		23.4	23.4		21.0	21.0		21.0	21.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	27.9	63.1	63.1	8.6	41.3	41.3	11.8	24.2	24.2	5.2	12.9	12.9
Actuated g/C Ratio	0.23	0.53	0.53	0.07	0.34	0.34	0.10	0.20	0.20	0.04	0.11	0.11
v/c Ratio	0.57	0.31	0.08	0.37	0.43	0.13	0.57	0.60	0.16	0.16	0.25	0.43
Control Delay	45.0	18.6	5.0	60.8	32.0	7.0	58.6	47.8	11.2	58.0	49.9	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	18.6	5.0	60.8	32.0	7.0	58.6	47.8	11.2	58.0	49.9	13.7
LOS	D	B	A	E	C	A	E	D	B	E	D	B

Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Existing (2014)
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		28.7			31.0			47.7			32.6	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	44.6	36.1	0.0	9.5	42.8	0.0	19.9	45.0	0.0	2.5	9.6	0.0
Queue Length 95th (m)	60.2	55.4	7.6	20.0	61.6	9.9	30.0	57.1	9.9	6.5	16.5	15.1
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	765	1783	829	174	1168	573	389	1300	617	142	1045	547
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.31	0.08	0.26	0.43	0.13	0.47	0.32	0.09	0.16	0.09	0.21

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 34.5









Intersection LOS: C

Intersection Capacity Utilization 54.5%

ICU Level of Service A

























Analysis Period (min) 15

Splits and Phases: 1: Earl Armstrong Road & River Road

 ø1	 ø2	 ø3	 ø4
19 s	37 s	21 s	43 s
 ø5	 ø6	 ø7	 ø8
19 s	37 s	12 s	52 s













Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Existing (2014)
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	249	621	200	96	568	23	165	152	72	29	317	515
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			211			24			76			269
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	262	654	211	101	598	24	174	160	76	31	334	542
Shared Lane Traffic (%)												
Lane Group Flow (vph)	262	654	211	101	598	24	174	160	76	31	334	542
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	34.6	34.6	11.7	34.6	34.6	11.8	39.0	39.0	11.8	39.0	39.0
Total Split (s)	17.0	43.0	43.0	17.0	43.0	43.0	21.0	39.0	39.0	21.0	39.0	39.0
Total Split (%)	14.2%	35.8%	35.8%	14.2%	35.8%	35.8%	17.5%	32.5%	32.5%	17.5%	32.5%	32.5%
Maximum Green (s)	10.3	36.4	36.4	10.3	36.4	36.4	14.2	32.5	32.5	14.2	32.5	32.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.3	2.3	2.6	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.5	6.5	6.8	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		25.5	25.5		25.5	25.5
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	11.7	42.1	42.1	10.0	40.4	40.4	11.5	39.8	39.8	6.6	29.9	29.9
Actuated g/C Ratio	0.10	0.35	0.35	0.08	0.34	0.34	0.10	0.33	0.33	0.06	0.25	0.25
v/c Ratio	0.82	0.55	0.32	0.72	0.52	0.05	0.55	0.14	0.14	0.17	0.40	0.93
Control Delay	74.2	35.1	5.5	81.2	35.3	11.1	58.3	28.5	6.9	55.8	38.3	46.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.2	35.1	5.5	81.2	35.3	11.1	58.3	28.5	6.9	55.8	38.3	46.3
LOS	E	D	A	F	D	B	E	C	A	E	D	D

Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Existing (2014)
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		38.6			40.9			37.1			43.7	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	29.5	64.3	0.0	21.7	57.6	0.0	18.8	12.6	0.0	3.3	29.9	60.5
Queue Length 95th (m)	#52.5	82.6	15.7	#45.2	74.6	5.7	28.7	20.4	9.8	7.9	43.1	#123.3
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	320	1189	669	147	1140	526	389	1123	554	389	939	615
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.55	0.32	0.69	0.52	0.05	0.45	0.14	0.14	0.08	0.36	0.88

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 55 (46%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 40.4

Intersection LOS: D

Intersection Capacity Utilization 71.8%









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.

Splits and Phases: 1: Earl Armstrong Road & River Road

 ø1	 ø2	 ø3	 ø4
17 s	43 s	21 s	39 s
 ø5	 ø6	 ø7	 ø8
17 s	43 s	21 s	39 s













Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Existing (2014)
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	505	5	10	509	39	9	12	20	26	16	235
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.453			0.454			0.746			0.749		
Satd. Flow (perm)	808	3390	1517	810	3390	1517	1331	3390	1517	1336	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			5			41			21			247
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	82	532	5	11	536	41	9	13	21	27	17	247
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	532	5	11	536	41	9	13	21	27	17	247
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	2	2	2	6	6	6	8	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	10.0	10.0
Minimum Split (s)	30.3	30.3	30.3	30.3	30.3	30.3	31.6	31.6	31.6	31.4	31.4	31.4
Total Split (s)	85.0	85.0	85.0	85.0	85.0	85.0	35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	70.8%	70.8%	70.8%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%
Maximum Green (s)	78.7	78.7	78.7	78.7	78.7	78.7	28.6	28.6	28.6	28.6	28.6	28.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.7	1.7	1.7	1.7	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	96.2	96.2	96.2	96.2	96.2	96.2	11.1	11.1	11.1	11.1	11.1	11.1
Actuated g/C Ratio	0.80	0.80	0.80	0.80	0.80	0.80	0.09	0.09	0.09	0.09	0.09	0.09
v/c Ratio	0.13	0.20	0.00	0.02	0.20	0.03	0.07	0.04	0.13	0.22	0.05	0.68
Control Delay	3.4	3.1	1.8	2.9	3.1	1.0	49.7	48.5	20.1	53.8	48.8	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.4	3.1	1.8	2.9	3.1	1.0	49.7	48.5	20.1	53.8	48.8	16.0
LOS	A	A	A	A	A	A	D	D	C	D	D	B

Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Existing (2014)
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		3.2			3.0			34.9			21.4	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	3.0	10.7	0.0	0.4	10.8	0.0	1.8	1.4	0.0	5.6	1.8	0.0
Queue Length 95th (m)	7.9	19.0	0.8	1.7	19.2	2.2	6.3	4.1	6.9	13.5	5.0	21.9
Internal Link Dist (m)		608.9			618.0			556.0			516.0	
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	647	2717	1217	649	2717	1224	317	808	378	318	808	550
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.20	0.00	0.02	0.20	0.03	0.03	0.02	0.06	0.08	0.02	0.45

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 45 (38%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 7.4














































Intersection LOS: A

Intersection Capacity Utilization 54.5%

ICU Level of Service A

























Analysis Period (min) 15

Splits and Phases: 2: Earl Armstrong Road & Spratt Road

														
														
														
85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s
35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s
85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s
35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s













Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Existing (2014)
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	269	603	11	10	509	39	6	10	11	26	16	235
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.413			0.411			0.746			0.750		
Satd. Flow (perm)	737	3390	1517	733	3390	1517	1331	3390	1517	1338	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			12			41			12			247
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	283	635	12	11	536	41	6	11	12	27	17	247
Shared Lane Traffic (%)												
Lane Group Flow (vph)	283	635	12	11	536	41	6	11	12	27	17	247
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.3	30.3	30.3	11.3	30.3	30.3	31.6	31.6	31.6	31.4	31.4	31.4
Total Split (s)	25.0	63.0	63.0	25.0	63.0	63.0	32.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	20.8%	52.5%	52.5%	20.8%	52.5%	52.5%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%
Maximum Green (s)	18.7	56.7	56.7	18.7	56.7	56.7	25.6	25.6	25.6	25.6	25.6	25.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.7	1.7	1.7	1.7	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)		10.0	10.0		10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		14.0	14.0		14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	0
Act Effect Green (s)	96.2	93.7	93.7	85.1	79.4	79.4	11.1	11.1	11.1	11.1	11.1	11.1
Actuated g/C Ratio	0.80	0.78	0.78	0.71	0.66	0.66	0.09	0.09	0.09	0.09	0.09	0.09
v/c Ratio	0.42	0.24	0.01	0.02	0.24	0.04	0.05	0.03	0.08	0.22	0.05	0.68
Control Delay	5.0	4.5	2.6	3.6	9.0	2.9	49.0	48.4	23.5	53.8	48.8	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	4.5	2.6	3.6	9.0	2.9	49.0	48.4	23.5	53.8	48.8	16.0
LOS	A	A	A	A	A	A	D	D	C	D	D	B

Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Existing (2014)
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		4.6			8.5			38.2			21.4	
Approach LOS		A			A			D			C	
Queue Length 50th (m)	11.0	13.3	0.0	0.4	21.5	0.0	1.2	1.1	0.0	5.6	1.8	0.0
Queue Length 95th (m)	22.2	35.6	1.9	1.7	36.7	4.1	4.9	3.7	5.3	13.5	5.0	21.9
Internal Link Dist (m)		608.9			618.0			556.0			516.0	
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	740	2647	1187	735	2243	1017	284	723	333	285	723	518
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.24	0.01	0.01	0.24	0.04	0.02	0.02	0.04	0.09	0.02	0.48

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 77 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 9.0







Intersection LOS: A

Intersection Capacity Utilization 54.7%

ICU Level of Service A

























Analysis Period (min) 15

Splits and Phases: 2: Earl Armstrong Road & Spratt Road

 ø1	 ø2	 ø4
25 s	63 s	32 s
 ø5	 ø6	 ø8
25 s	63 s	32 s













Future (2018) Background Traffic



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	448	566	84	46	565	103	237	494	58	30	112	118
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			88			108			50			124
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	472	596	88	48	595	108	249	520	61	32	118	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	472	596	88	48	595	108	249	520	61	32	118	124
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	37.0	37.0	11.7	37.0	37.0	11.8	36.0	36.0	11.8	36.0	36.0
Total Split (s)	19.0	37.0	37.0	19.0	37.0	37.0	21.0	52.0	52.0	12.0	43.0	43.0
Total Split (%)	15.8%	30.8%	30.8%	15.8%	30.8%	30.8%	17.5%	43.3%	43.3%	10.0%	35.8%	35.8%
Maximum Green (s)	12.3	30.4	30.4	12.3	30.4	30.4	14.2	46.0	46.0	5.2	37.0	37.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.0	4.0	4.2	4.0	4.0
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.0	2.0	2.6	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.0	6.0	6.8	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		23.4	23.4		23.4	23.4		21.0	21.0		21.0	21.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	30.8	59.3	59.3	8.8	34.9	34.9	13.1	27.8	27.8	5.2	15.1	15.1
Actuated g/C Ratio	0.26	0.49	0.49	0.07	0.29	0.29	0.11	0.23	0.23	0.04	0.13	0.13
v/c Ratio	0.56	0.36	0.11	0.39	0.60	0.21	0.69	0.66	0.16	0.23	0.28	0.41
Control Delay	42.9	21.7	5.1	61.0	39.9	7.3	61.9	46.4	13.7	59.4	47.7	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.9	21.7	5.1	61.0	39.9	7.3	61.9	46.4	13.7	59.4	47.7	11.8
LOS	D	C	A	E	D	A	E	D	B	E	D	B

Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Future (2018) Background
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		29.1			36.6			48.7			32.8	
Approach LOS		C			D			D			C	
Queue Length 50th (m)	47.6	43.0	0.0	10.1	56.8	0.0	26.9	56.4	1.9	3.5	12.3	0.0
Queue Length 95th (m)	64.2	65.5	9.5	20.8	79.5	12.6	39.4	68.8	11.5	8.3	19.4	14.8
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	844	1676	795	174	985	518	389	1300	612	142	1045	554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.36	0.11	0.28	0.60	0.21	0.64	0.40	0.10	0.23	0.11	0.22

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 36.7









Intersection LOS: D

























Intersection Capacity Utilization 60.5%













ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Earl Armstrong Road & River Road

 ø1	 ø2	 ø3	 ø4
19 s	37 s	21 s	43 s
 ø5	 ø6	 ø7	 ø8
19 s	37 s	12 s	52 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	269	708	278	104	634	38	212	184	78	44	392	556
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			293			40			82			240
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	283	745	293	109	667	40	223	194	82	46	413	585
Shared Lane Traffic (%)												
Lane Group Flow (vph)	283	745	293	109	667	40	223	194	82	46	413	585
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	34.6	34.6	11.7	34.6	34.6	11.8	39.0	39.0	11.8	39.0	39.0
Total Split (s)	17.0	43.0	43.0	17.0	43.0	43.0	21.0	39.0	39.0	21.0	39.0	39.0
Total Split (%)	14.2%	35.8%	35.8%	14.2%	35.8%	35.8%	17.5%	32.5%	32.5%	17.5%	32.5%	32.5%
Maximum Green (s)	10.3	36.4	36.4	10.3	36.4	36.4	14.2	32.5	32.5	14.2	32.5	32.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.3	2.3	2.6	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.5	6.5	6.8	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		25.5	25.5		25.5	25.5
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	10.3	36.7	36.7	10.0	36.4	36.4	12.7	42.0	42.0	7.1	34.0	34.0
Actuated g/C Ratio	0.09	0.31	0.31	0.08	0.30	0.30	0.11	0.35	0.35	0.06	0.28	0.28
v/c Ratio	1.00	0.72	0.44	0.77	0.65	0.08	0.64	0.16	0.14	0.24	0.43	0.97
Control Delay	109.3	41.8	5.7	87.6	39.8	9.4	60.2	28.6	6.9	56.3	37.1	56.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.3	41.8	5.7	87.6	39.8	9.4	60.2	28.6	6.9	56.3	37.1	56.3
LOS	F	D	A	F	D	A	E	C	A	E	D	E

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		48.3			44.7			39.1			48.7	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	~32.3	75.8	0.0	23.5	65.8	0.0	24.1	15.6	0.0	5.0	38.8	83.6
Queue Length 95th (m)	#58.3	96.1	17.8	#49.8	84.5	7.3	35.7	24.4	10.2	10.4	53.1	#154.3
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	282	1037	667	145	1028	488	389	1188	585	389	961	602
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.72	0.44	0.75	0.65	0.08	0.57	0.16	0.14	0.12	0.43	0.97

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 55 (46%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 46.4

Intersection LOS: D

Intersection Capacity Utilization 77.8%

ICU Level of Service D

Analysis Period (min) 15

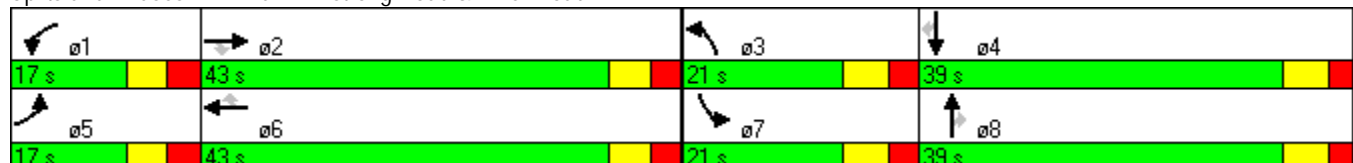
~ Volume exceeds capacity, queue is theoretically infinite.

























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: Earl Armstrong Road & River Road



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	558	5	14	553	42	10	25	34	28	20	254
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.433			0.431			0.743			0.739		
Satd. Flow (perm)	773	3390	1517	769	3390	1517	1326	3390	1517	1319	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			5			44			36			267
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	88	587	5	15	582	44	11	26	36	29	21	267
Shared Lane Traffic (%)												
Lane Group Flow (vph)	88	587	5	15	582	44	11	26	36	29	21	267
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	2	2	2	6	6	6	8	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	10.0	10.0
Minimum Split (s)	30.3	30.3	30.3	30.3	30.3	30.3	31.6	31.6	31.6	31.4	31.4	31.4
Total Split (s)	85.0	85.0	85.0	85.0	85.0	85.0	35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	70.8%	70.8%	70.8%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%
Maximum Green (s)	78.7	78.7	78.7	78.7	78.7	78.7	28.6	28.6	28.6	28.6	28.6	28.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.7	1.7	1.7	1.7	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	96.0	96.0	96.0	96.0	96.0	96.0	11.3	11.3	11.3	11.3	11.3	11.3
Actuated g/C Ratio	0.80	0.80	0.80	0.80	0.80	0.80	0.09	0.09	0.09	0.09	0.09	0.09
v/c Ratio	0.14	0.22	0.00	0.02	0.21	0.04	0.09	0.08	0.21	0.23	0.07	0.70
Control Delay	3.6	3.3	1.8	3.0	3.2	1.0	49.9	49.0	17.7	54.1	48.8	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	3.3	1.8	3.0	3.2	1.0	49.9	49.0	17.7	54.1	48.8	16.0
LOS	A	A	A	A	A	A	D	D	B	D	D	B

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay	3.3			3.1			33.7			21.7		
Approach LOS	A			A			C			C		
Queue Length 50th (m)	3.2	12.1	0.0	0.5	12.0	0.0	2.3	2.7	0.0	6.0	2.2	0.0
Queue Length 95th (m)	8.8	21.6	0.8	2.2	21.5	2.3	7.2	6.6	8.8	14.1	5.6	22.7
Internal Link Dist (m)	608.9			618.0			556.0			516.0		
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	619	2713	1215	616	2713	1223	316	808	389	314	808	565
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.22	0.00	0.02	0.21	0.04	0.03	0.03	0.09	0.09	0.03	0.47

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 45 (38%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 7.9

Intersection LOS: A

























Intersection Capacity Utilization 57.0%













ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Earl Armstrong Road & Spratt Road

											
ø2						ø4					
85 s						35 s					
ø6						ø8					
85 s						35 s					

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	297	671	12	23	587	42	6	18	19	28	30	266
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.372			0.383			0.735			0.744		
Satd. Flow (perm)	664	3390	1517	683	3390	1517	1311	3390	1517	1328	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			13			44			20			280
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	313	706	13	24	618	44	6	19	20	29	32	280
Shared Lane Traffic (%)												
Lane Group Flow (vph)	313	706	13	24	618	44	6	19	20	29	32	280
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.4	30.3	30.3	11.4	30.3	30.3	31.4	31.4	31.4	31.4	31.4	31.4
Total Split (s)	25.0	63.0	63.0	25.0	63.0	63.0	32.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	20.8%	52.5%	52.5%	20.8%	52.5%	52.5%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%
Maximum Green (s)	18.6	56.7	56.7	18.6	56.7	56.7	25.6	25.6	25.6	25.6	25.6	25.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)		10.0	10.0		10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		14.0	14.0		14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	0
Act Effect Green (s)	95.4	88.5	88.5	84.2	78.4	78.4	11.3	11.3	11.3	11.3	11.3	11.3
Actuated g/C Ratio	0.80	0.74	0.74	0.70	0.65	0.65	0.09	0.09	0.09	0.09	0.09	0.09
v/c Ratio	0.50	0.28	0.01	0.05	0.28	0.04	0.05	0.06	0.12	0.23	0.10	0.71
Control Delay	6.1	6.4	3.2	3.9	9.8	3.1	48.5	48.5	20.2	53.9	49.2	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	6.4	3.2	3.9	9.8	3.1	48.5	48.5	20.2	53.9	49.2	16.0
LOS	A	A	A	A	A	A	D	D	C	D	D	B

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		6.3			9.2			35.9			22.4	
Approach LOS		A			A			D			C	
Queue Length 50th (m)	12.6	26.3	0.0	0.8	26.1	0.0	1.2	2.0	0.0	6.0	3.4	0.0
Queue Length 95th (m)	25.8	42.1	2.0	2.9	45.4	4.6	4.8	5.2	6.6	14.0	7.6	23.1
Internal Link Dist (m)		608.9			618.0			556.0			516.0	
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	691	2500	1122	699	2215	1006	280	723	339	283	723	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.28	0.01	0.03	0.28	0.04	0.02	0.03	0.06	0.10	0.04	0.51

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 77 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 10.5

Intersection LOS: B

Intersection Capacity Utilization 58.8%

ICU Level of Service B

























Analysis Period (min) 15

Splits and Phases: 2: Earl Armstrong Road & Spratt Road

 ø1	 ø2	 ø4
25 s	63 s	32 s
 ø5	 ø6	 ø8
25 s	63 s	32 s













**Future (2018) Background Plus
Site-Generated Traffic**



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	448	581	113	51	621	144	345	617	58	40	146	118
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			119			152			40			124
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	472	612	119	54	654	152	363	649	61	42	154	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	472	612	119	54	654	152	363	649	61	42	154	124
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	37.0	37.0	11.7	37.0	37.0	11.8	36.0	36.0	11.8	36.0	36.0
Total Split (s)	19.0	37.0	37.0	19.0	37.0	37.0	21.0	52.0	52.0	12.0	43.0	43.0
Total Split (%)	15.8%	30.8%	30.8%	15.8%	30.8%	30.8%	17.5%	43.3%	43.3%	10.0%	35.8%	35.8%
Maximum Green (s)	12.3	30.4	30.4	12.3	30.4	30.4	14.2	46.0	46.0	5.2	37.0	37.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.0	4.0	4.2	4.0	4.0
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.0	2.0	2.6	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.0	6.0	6.8	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		23.4	23.4		23.4	23.4		21.0	21.0		21.0	21.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	29.2	53.3	53.3	9.2	30.8	30.8	14.2	31.1	31.1	5.2	19.7	19.7
Actuated g/C Ratio	0.24	0.44	0.44	0.08	0.26	0.26	0.12	0.26	0.26	0.04	0.16	0.16
v/c Ratio	0.59	0.41	0.16	0.42	0.75	0.30	0.93	0.74	0.14	0.30	0.28	0.35
Control Delay	45.2	26.3	5.4	61.6	47.4	7.2	84.3	46.2	15.4	61.2	43.5	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	26.3	5.4	61.6	47.4	7.2	84.3	46.2	15.4	61.2	43.5	9.5
LOS	D	C	A	E	D	A	F	D	B	E	D	A

Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Future (2018) Background plus Site Generated
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		31.6			41.2			57.3			32.7	
Approach LOS		C			D			E			C	
Queue Length 50th (m)	47.6	49.0	0.0	11.4	68.5	0.0	40.8	69.3	3.5	4.6	15.4	0.0
Queue Length 95th (m)	#68.9	73.9	11.6	22.7	89.0	14.6	#66.8	81.7	12.4	10.1	22.7	13.8
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	799	1505	739	175	871	503	389	1300	606	142	1045	554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.41	0.16	0.31	0.75	0.30	0.93	0.50	0.10	0.30	0.15	0.22

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 42.1

Intersection LOS: D

Intersection Capacity Utilization 75.5%









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: 1: Earl Armstrong Road & River Road

 ø1	 ø2	 ø3	 ø4
19 s	37 s	21 s	43 s
 ø5	 ø6	 ø7	 ø8
19 s	37 s	12 s	52 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	269	766	388	119	665	53	272	227	76	70	471	556
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			355			56			80			224
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	283	806	408	125	700	56	286	239	80	74	496	585
Shared Lane Traffic (%)												
Lane Group Flow (vph)	283	806	408	125	700	56	286	239	80	74	496	585
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	37.0	37.0	11.7	37.0	37.0	11.8	39.0	39.0	11.8	39.0	39.0
Total Split (s)	17.0	43.0	43.0	17.0	43.0	43.0	21.0	39.0	39.0	21.0	39.0	39.0
Total Split (%)	14.2%	35.8%	35.8%	14.2%	35.8%	35.8%	17.5%	32.5%	32.5%	17.5%	32.5%	32.5%
Maximum Green (s)	10.3	36.4	36.4	10.3	36.4	36.4	14.2	32.5	32.5	14.2	32.5	32.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.3	2.3	2.6	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.5	6.5	6.8	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		25.5	25.5		25.5	25.5
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	10.3	36.4	36.4	10.3	36.4	36.4	13.6	41.2	41.2	8.1	33.1	33.1
Actuated g/C Ratio	0.09	0.30	0.30	0.09	0.30	0.30	0.11	0.34	0.34	0.07	0.28	0.28
v/c Ratio	1.00	0.78	0.58	0.86	0.68	0.11	0.77	0.21	0.14	0.33	0.53	1.01
Control Delay	109.3	44.6	9.3	99.7	40.7	8.5	65.8	29.8	7.2	57.0	39.5	66.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.3	44.6	9.3	99.7	40.7	8.5	65.8	29.8	7.2	57.0	39.5	66.9
LOS	F	D	A	F	D	A	E	C	A	E	D	E

Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Future (2018) Background plus Site Generated
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		47.2			47.0			43.8			54.5	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	~32.3	84.0	8.3	27.2	70.1	0.0	31.3	19.8	0.0	8.0	48.4	~96.4
Queue Length 95th (m)	#58.3	105.7	34.6	#58.8	89.2	8.6	#45.4	30.0	10.2	14.8	64.1	#159.8
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	282	1028	707	145	1028	499	389	1163	573	389	934	580
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.78	0.58	0.86	0.68	0.11	0.74	0.21	0.14	0.19	0.53	1.01

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 55 (46%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 48.7

Intersection LOS: D

Intersection Capacity Utilization 80.4%

ICU Level of Service D

Analysis Period (min) 15

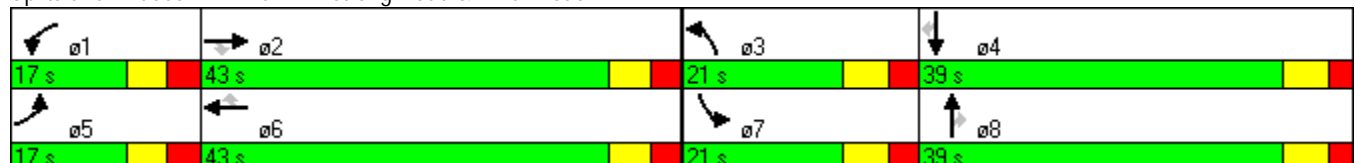
~ Volume exceeds capacity, queue is theoretically infinite.

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: Earl Armstrong Road & River Road



Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Future (2018) Background plus Site Generated
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	558	31	22	557	42	107	46	75	28	26	254
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.431			0.431			0.739			0.724		
Satd. Flow (perm)	769	3390	1517	769	3390	1517	1319	3390	1517	1292	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			33			44			79			267
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	88	587	33	23	586	44	113	48	79	29	27	267
Shared Lane Traffic (%)												
Lane Group Flow (vph)	88	587	33	23	586	44	113	48	79	29	27	267
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	2	2	2	6	6	6	8	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	10.0	10.0
Minimum Split (s)	30.3	30.3	30.3	30.3	30.3	30.3	31.6	31.6	31.6	31.4	31.4	31.4
Total Split (s)	85.0	85.0	85.0	85.0	85.0	85.0	35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	70.8%	70.8%	70.8%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%
Maximum Green (s)	78.7	78.7	78.7	78.7	78.7	78.7	28.6	28.6	28.6	28.6	28.6	28.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.7	1.7	1.7	1.7	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	91.5	91.5	91.5	91.5	91.5	91.5	15.8	15.8	15.8	15.8	15.8	15.8
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.76	0.76	0.13	0.13	0.13	0.13	0.13	0.13
v/c Ratio	0.15	0.23	0.03	0.04	0.23	0.04	0.65	0.11	0.29	0.17	0.06	0.62
Control Delay	5.3	4.7	1.7	4.7	4.7	1.5	65.9	44.1	12.2	46.2	43.3	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	4.7	1.7	4.7	4.7	1.5	65.9	44.1	12.2	46.2	43.3	11.9
LOS	A	A	A	A	A	A	E	D	B	D	D	B

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		4.7			4.5			43.9			17.6	
Approach LOS		A			A			D			B	
Queue Length 50th (m)	4.3	16.2	0.0	1.0	16.2	0.0	23.7	4.8	0.0	5.7	2.7	0.0
Queue Length 95th (m)	11.1	27.4	2.6	3.6	27.3	2.9	39.1	9.5	11.9	13.2	6.4	21.0
Internal Link Dist (m)		608.9			618.0			556.0			516.0	
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	587	2584	1164	587	2584	1167	314	808	422	308	808	565
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.23	0.03	0.04	0.23	0.04	0.36	0.06	0.19	0.09	0.03	0.47

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 45 (38%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 11.7

Intersection LOS: B

























Intersection Capacity Utilization 57.1%

ICU Level of Service B

Analysis Period (min) 15













Splits and Phases: 2: Earl Armstrong Road & Spratt Road

														
														
ø2	ø2	ø2	ø2	ø2	ø2	ø2	ø2	ø2	ø2	ø2	ø2	ø2	ø2	ø2
85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s
														
ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4
35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s
														
ø6	ø6	ø6	ø6	ø6	ø6	ø6	ø6	ø6	ø6	ø6	ø6	ø6	ø6	ø6
85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s	85 s
														
ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4	ø4
35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s
														
ø8	ø8	ø8	ø8	ø8	ø8	ø8	ø8	ø8	ø8	ø8	ø8	ø8	ø8	ø8
35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s	35 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	297	671	96	91	603	42	52	40	64	28	72	266
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.372			0.383			0.705			0.728		
Satd. Flow (perm)	664	3390	1517	683	3390	1517	1258	3390	1517	1299	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			101			44			67			280
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	313	706	101	96	635	44	55	42	67	29	76	280
Shared Lane Traffic (%)												
Lane Group Flow (vph)	313	706	101	96	635	44	55	42	67	29	76	280
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.4	30.3	30.3	11.4	30.3	30.3	31.6	31.6	31.6	31.4	31.4	31.4
Total Split (s)	25.0	63.0	63.0	25.0	63.0	63.0	32.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	20.8%	52.5%	52.5%	20.8%	52.5%	52.5%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%
Maximum Green (s)	18.6	56.7	56.7	18.6	56.7	56.7	25.6	25.6	25.6	25.6	25.6	25.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)		10.0	10.0		10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		14.0	14.0		14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	0
Act Effect Green (s)	93.0	81.9	81.9	84.5	77.6	77.6	12.0	12.0	12.0	12.0	12.0	12.0
Actuated g/C Ratio	0.78	0.68	0.68	0.70	0.65	0.65	0.10	0.10	0.10	0.10	0.10	0.10
v/c Ratio	0.51	0.31	0.09	0.18	0.29	0.04	0.44	0.12	0.32	0.22	0.22	0.69
Control Delay	6.5	8.4	1.8	4.5	10.3	3.2	61.2	48.9	15.3	52.8	50.5	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	8.4	1.8	4.5	10.3	3.2	61.2	48.9	15.3	52.8	50.5	15.3
LOS	A	A	A	A	B	A	E	D	B	D	D	B

Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Future (2018) Background plus Site Generated
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay	7.3			9.2			39.3			25.1		
Approach LOS	A			A			D			C		
Queue Length 50th (m)	13.0	27.9	0.0	3.5	27.5	0.0	11.6	4.5	0.0	6.0	8.2	0.0
Queue Length 95th (m)	25.8	44.5	5.7	8.4	46.7	4.6	22.8	9.2	11.8	14.0	14.5	23.1
Internal Link Dist (m)	608.9			618.0			556.0			516.0		
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	687	2314	1067	695	2192	997	268	723	376	277	723	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.31	0.09	0.14	0.29	0.04	0.21	0.06	0.18	0.10	0.11	0.51

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 77 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 12.8

Intersection LOS: B













Intersection Capacity Utilization 60.6%













ICU Level of Service B













Analysis Period (min) 15













Splits and Phases: 2: Earl Armstrong Road & Spratt Road













 ø1	 ø2	 ø4
25 s	63 s	32 s
 ø5	 ø6	 ø8
25 s	63 s	32 s













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	1	77	729	1	25	232
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	81	767	1	26	244
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1064	767			768	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1064	767			768	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	80			97	
cM capacity (veh/h)	239	402			846	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	1	81	767	1	26	244
Volume Left	1	0	0	0	26	0
Volume Right	0	81	0	1	0	0
cSH	239	402	1700	1700	846	1700
Volume to Capacity	0.00	0.20	0.45	0.00	0.03	0.14
Queue Length 95th (m)	0.1	5.2	0.0	0.0	0.7	0.0
Control Delay (s)	20.1	16.2	0.0	0.0	9.4	0.0
Lane LOS	C	C			A	
Approach Delay (s)	16.3		0.0		0.9	
Approach LOS	C					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			52.2%		ICU Level of Service	A
Analysis Period (min)			15			













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	1	43	385	1	94	749
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	45	405	1	99	788
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1392	405			406	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1392	405			406	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	93			91	
cM capacity (veh/h)	143	646			1152	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	1	45	405	1	99	788
Volume Left	1	0	0	0	99	0
Volume Right	0	45	0	1	0	0
cSH	143	646	1700	1700	1152	1700
Volume to Capacity	0.01	0.07	0.24	0.00	0.09	0.46
Queue Length 95th (m)	0.2	1.6	0.0	0.0	2.0	0.0
Control Delay (s)	30.3	11.0	0.0	0.0	8.4	0.0
Lane LOS	D	B			A	
Approach Delay (s)	11.4		0.0		0.9	
Approach LOS	B					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			51.6%		ICU Level of Service	A
Analysis Period (min)			15			













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	154	575	4	42	190
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	162	605	4	44	200
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	894	605			609	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	894	605			609	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	67			95	
cM capacity (veh/h)	298	497			969	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	16	162	605	4	44	200
Volume Left	16	0	0	0	44	0
Volume Right	0	162	0	4	0	0
cSH	298	497	1700	1700	969	1700
Volume to Capacity	0.05	0.33	0.36	0.00	0.05	0.12
Queue Length 95th (m)	1.2	9.8	0.0	0.0	1.0	0.0
Control Delay (s)	17.8	15.7	0.0	0.0	8.9	0.0
Lane LOS	C	C			A	
Approach Delay (s)	15.9		0.0		1.6	
Approach LOS	C					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			48.7%		ICU Level of Service	A
Analysis Period (min)			15			













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	9	60	335	16	110	639
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	9	63	353	17	116	673
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1257	353			369	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1257	353			369	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	91			90	
cM capacity (veh/h)	171	691			1189	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	9	63	353	17	116	673
Volume Left	9	0	0	0	116	0
Volume Right	0	63	0	17	0	0
cSH	171	691	1700	1700	1189	1700
Volume to Capacity	0.06	0.09	0.21	0.01	0.10	0.40
Queue Length 95th (m)	1.2	2.1	0.0	0.0	2.3	0.0
Control Delay (s)	27.3	10.7	0.0	0.0	8.4	0.0
Lane LOS	D	B			A	
Approach Delay (s)	12.9		0.0		1.2	
Approach LOS	B					
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			45.5%		ICU Level of Service	A
Analysis Period (min)			15			













						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	48	1	1	157	64	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	51	1	1	165	67	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	235	67	76			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	235	67	76			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	100	100			
cM capacity (veh/h)	753	996	1523			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	52	1	165	67	8	
Volume Left	51	1	0	0	0	
Volume Right	1	0	0	0	8	
cSH	769	1523	1700	1700	1700	
Volume to Capacity	0.07	0.00	0.10	0.04	0.00	
Queue Length 95th (m)	1.5	0.0	0.0	0.0	0.0	
Control Delay (s)	10.1	7.4	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	10.1	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			18.7%	ICU Level of Service		A
Analysis Period (min)			15			

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	34	1	1	109	171	63
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	36	1	1	115	180	66
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	297	180	246			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	297	180	246			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	100	100			
cM capacity (veh/h)	694	863	1320			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	37	1	115	180	66	
Volume Left	36	1	0	0	0	
Volume Right	1	0	0	0	66	
cSH	714	1320	1700	1700	1700	
Volume to Capacity	0.05	0.00	0.07	0.11	0.04	
Queue Length 95th (m)	1.1	0.0	0.0	0.0	0.0	
Control Delay (s)	10.4	7.7	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	10.4	0.1		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			19.5%	ICU Level of Service		A
Analysis Period (min)			15			

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	1	1	142	60	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	1	1	149	63	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	215	63	67			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	215	63	67			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	773	1001	1534			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	17	1	149	63	4	
Volume Left	16	1	0	0	0	
Volume Right	1	0	0	0	4	
cSH	825	1534	1700	1700	1700	
Volume to Capacity	0.02	0.00	0.09	0.04	0.00	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	
Control Delay (s)	9.7	7.3	0.0	0.0	0.0	
Lane LOS	A	A				
Approach Delay (s)	9.7	0.1		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			17.9%	ICU Level of Service		A
Analysis Period (min)			15			

























						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	26	1	1	83	139	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	1	1	87	146	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	236	146	179			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	236	146	179			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	100	100			
cM capacity (veh/h)	752	901	1397			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	28	1	87	146	33	
Volume Left	27	1	0	0	0	
Volume Right	1	0	0	0	33	
cSH	781	1397	1700	1700	1700	
Volume to Capacity	0.04	0.00	0.05	0.09	0.02	
Queue Length 95th (m)	0.8	0.0	0.0	0.0	0.0	
Control Delay (s)	9.9	7.6	0.0	0.0	0.0	
Lane LOS	A	A				
Approach Delay (s)	9.9	0.1		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			17.7%	ICU Level of Service		A
Analysis Period (min)			15			

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	98	5	1	44	33	27
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	103	5	1	46	35	28
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	83	35	63			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	83	35	63			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	99	100			
cM capacity (veh/h)	918	1038	1539			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	108	1	46	35	28	
Volume Left	103	1	0	0	0	
Volume Right	5	0	0	0	28	
cSH	965	1539	1700	1700	1700	
Volume to Capacity	0.11	0.00	0.03	0.02	0.02	
Queue Length 95th (m)	2.6	0.0	0.0	0.0	0.0	
Control Delay (s)	9.4	7.3	0.0	0.0	0.0	
Lane LOS	A	A				
Approach Delay (s)	9.4	0.2		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			4.7			
Intersection Capacity Utilization			15.7%	ICU Level of Service		A
Analysis Period (min)			15			

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	54	3	5	29	40	99
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	57	3	5	31	42	104
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	83	42	146			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	83	42	146			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	100	100			
cM capacity (veh/h)	915	1029	1436			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	60	5	31	42	104	
Volume Left	57	5	0	0	0	
Volume Right	3	0	0	0	104	
cSH	966	1436	1700	1700	1700	
Volume to Capacity	0.06	0.00	0.02	0.02	0.06	
Queue Length 95th (m)	1.4	0.1	0.0	0.0	0.0	
Control Delay (s)	9.2	7.5	0.0	0.0	0.0	
Lane LOS	A	A				
Approach Delay (s)	9.2	1.1		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			16.5%	ICU Level of Service		A
Analysis Period (min)			15			













Future (2023) Background Traffic



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	490	617	90	51	612	110	255	533	64	32	121	129
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95			116			51			136
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	516	649	95	54	644	116	268	561	67	34	127	136
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	649	95	54	644	116	268	561	67	34	127	136
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	37.0	37.0	11.7	37.0	37.0	11.8	36.0	36.0	11.8	36.0	36.0
Total Split (s)	19.0	37.0	37.0	19.0	37.0	37.0	21.0	52.0	52.0	12.0	43.0	43.0
Total Split (%)	15.8%	30.8%	30.8%	15.8%	30.8%	30.8%	17.5%	43.3%	43.3%	10.0%	35.8%	35.8%
Maximum Green (s)	12.3	30.4	30.4	12.3	30.4	30.4	14.2	46.0	46.0	5.2	37.0	37.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.0	4.0	4.2	4.0	4.0
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.0	2.0	2.6	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.0	6.0	6.8	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		23.4	23.4		23.4	23.4		21.0	21.0		21.0	21.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	32.4	57.8	57.8	9.2	32.1	32.1	13.4	29.0	29.0	5.2	16.0	16.0
Actuated g/C Ratio	0.27	0.48	0.48	0.08	0.27	0.27	0.11	0.24	0.24	0.04	0.13	0.13
v/c Ratio	0.58	0.40	0.12	0.42	0.71	0.24	0.73	0.69	0.17	0.24	0.28	0.42
Control Delay	42.4	23.4	5.2	61.6	44.9	7.5	63.9	46.2	14.2	59.8	46.8	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	23.4	5.2	61.6	44.9	7.5	63.9	46.2	14.2	59.8	46.8	11.2
LOS	D	C	A	E	D	A	E	D	B	E	D	B

Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Future (2023) Background
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		29.8			40.7			49.1			32.0	
Approach LOS		C			D			D			C	
Queue Length 50th (m)	51.3	49.4	0.0	11.4	66.1	0.0	29.1	60.7	2.8	3.7	13.1	0.0
Queue Length 95th (m)	71.3	74.4	10.1	22.7	87.5	13.0	42.2	73.3	12.7	8.7	20.3	15.1
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	888	1634	780	175	908	491	389	1300	613	142	1045	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.40	0.12	0.31	0.71	0.24	0.69	0.43	0.11	0.24	0.12	0.24

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 38.0









Intersection LOS: D

























Intersection Capacity Utilization 74.1%













ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Earl Armstrong Road & River Road

 ø1	 ø2	 ø3	 ø4
19 s	37 s	21 s	43 s
 ø5	 ø6	 ø7	 ø8
19 s	37 s	12 s	52 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	294	770	298	113	690	41	228	200	85	47	424	608
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Fr't			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			314			43			89			228
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	309	811	314	119	726	43	240	211	89	49	446	640
Shared Lane Traffic (%)												
Lane Group Flow (vph)	309	811	314	119	726	43	240	211	89	49	446	640
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	34.6	34.6	11.7	34.6	34.6	11.8	39.0	39.0	11.8	39.0	39.0
Total Split (s)	17.0	43.0	43.0	17.0	43.0	43.0	21.0	39.0	39.0	21.0	39.0	39.0
Total Split (%)	14.2%	35.8%	35.8%	14.2%	35.8%	35.8%	17.5%	32.5%	32.5%	17.5%	32.5%	32.5%
Maximum Green (s)	10.3	36.4	36.4	10.3	36.4	36.4	14.2	32.5	32.5	14.2	32.5	32.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.3	2.3	2.6	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.5	6.5	6.8	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		25.5	25.5		25.5	25.5
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	10.3	36.5	36.5	10.2	36.4	36.4	13.0	42.0	42.0	7.2	33.7	33.7
Actuated g/C Ratio	0.09	0.30	0.30	0.08	0.30	0.30	0.11	0.35	0.35	0.06	0.28	0.28
v/c Ratio	1.10	0.79	0.46	0.83	0.71	0.09	0.67	0.18	0.15	0.25	0.47	1.08
Control Delay	132.2	44.7	5.8	94.8	41.5	9.3	61.3	28.8	6.6	56.4	38.0	89.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	132.2	44.7	5.8	94.8	41.5	9.3	61.3	28.8	6.6	56.4	38.0	89.3
LOS	F	D	A	F	D	A	E	C	A	E	D	F

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay	55.0			47.1			39.6			67.7		
Approach LOS	E			D			D			E		
Queue Length 50th (m)	~39.0	84.6	0.0	25.8	73.3	0.0	25.9	17.1	0.0	5.3	42.7	~119.9
Queue Length 95th (m)	#64.8	106.4	18.7	#55.2	93.2	7.6	38.1	26.4	10.6	10.9	57.4	#185.0
Internal Link Dist (m)	470.0			583.9			518.0			548.0		
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	282	1031	680	145	1028	490	389	1185	588	389	953	590
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.79	0.46	0.82	0.71	0.09	0.62	0.18	0.15	0.13	0.47	1.08

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 55 (46%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 54.8

Intersection LOS: D

Intersection Capacity Utilization 83.3%

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: 1: Earl Armstrong Road & River Road

			
ø1	ø2	ø3	ø4
17 s	43 s	21 s	39 s
			
ø5	ø6	ø7	ø8
17 s	43 s	21 s	39 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	608	6	15	604	46	11	26	36	31	22	277
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Fr't			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.410			0.409			0.742			0.739		
Satd. Flow (perm)	732	3390	1517	730	3390	1517	1324	3390	1517	1319	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			6			48			38			292
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	97	640	6	16	636	48	12	27	38	33	23	292
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	640	6	16	636	48	12	27	38	33	23	292
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	2	2	2	6	6	6	8	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	10.0	10.0
Minimum Split (s)	30.3	30.3	30.3	30.3	30.3	30.3	31.6	31.6	31.6	31.4	31.4	31.4
Total Split (s)	85.0	85.0	85.0	85.0	85.0	85.0	35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	70.8%	70.8%	70.8%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%
Maximum Green (s)	78.7	78.7	78.7	78.7	78.7	78.7	28.6	28.6	28.6	28.6	28.6	28.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.7	1.7	1.7	1.7	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	95.9	95.9	95.9	95.9	95.9	95.9	11.4	11.4	11.4	11.4	11.4	11.4
Actuated g/C Ratio	0.80	0.80	0.80	0.80	0.80	0.80	0.10	0.10	0.10	0.10	0.10	0.10
v/c Ratio	0.17	0.24	0.00	0.03	0.23	0.04	0.10	0.08	0.21	0.26	0.07	0.71
Control Delay	3.9	3.4	1.8	3.1	3.4	1.0	49.6	48.8	17.4	54.7	48.5	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.9	3.4	1.8	3.1	3.4	1.0	49.6	48.8	17.4	54.7	48.5	16.0
LOS	A	A	A	A	A	A	D	D	B	D	D	B

Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Future (2023) Background
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay	3.5			3.2			33.4			21.8		
Approach LOS	A			A			C			C		
Queue Length 50th (m)	3.6	13.4	0.0	0.5	13.3	0.0	2.5	2.8	0.0	6.8	2.4	0.0
Queue Length 95th (m)	10.1	24.7	0.9	2.3	24.5	2.4	7.6	6.7	9.2	15.4	5.9	23.3
Internal Link Dist (m)	608.9			618.0			556.0			516.0		
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	585	2708	1213	583	2708	1221	316	808	390	314	808	584
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.24	0.00	0.03	0.23	0.04	0.04	0.03	0.10	0.11	0.03	0.50

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 45 (38%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 8.0

Intersection LOS: A

























Intersection Capacity Utilization 60.0%













ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Earl Armstrong Road & Spratt Road

 ø2	 ø4
85 s	35 s
 ø6	 ø8
85 s	35 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	324	732	13	24	638	46	7	19	20	31	31	290
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.347			0.359			0.734			0.744		
Satd. Flow (perm)	619	3390	1517	641	3390	1517	1310	3390	1517	1328	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			14			48			21			305
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	341	771	14	25	672	48	7	20	21	33	33	305
Shared Lane Traffic (%)												
Lane Group Flow (vph)	341	771	14	25	672	48	7	20	21	33	33	305
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.4	30.3	30.3	11.4	30.3	30.3	31.4	31.4	31.4	31.4	31.4	31.4
Total Split (s)	25.0	63.0	63.0	25.0	63.0	63.0	32.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	20.8%	52.5%	52.5%	20.8%	52.5%	52.5%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%
Maximum Green (s)	18.6	56.7	56.7	18.6	56.7	56.7	25.6	25.6	25.6	25.6	25.6	25.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)		10.0	10.0		10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		14.0	14.0		14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	0
Act Effect Green (s)	95.5	88.2	88.2	83.3	77.5	77.5	11.5	11.5	11.5	11.5	11.5	11.5
Actuated g/C Ratio	0.80	0.74	0.74	0.69	0.65	0.65	0.10	0.10	0.10	0.10	0.10	0.10
v/c Ratio	0.57	0.31	0.01	0.05	0.31	0.05	0.06	0.06	0.13	0.26	0.10	0.72
Control Delay	7.3	6.8	3.2	4.1	10.6	3.2	48.3	48.2	19.6	54.3	48.9	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	6.8	3.2	4.1	10.6	3.2	48.3	48.2	19.6	54.3	48.9	16.0
LOS	A	A	A	A	B	A	D	D	B	D	D	B

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay	6.9			9.9			35.7			22.3		
Approach LOS	A			A			D			C		
Queue Length 50th (m)	14.0	29.5	0.0	0.8	29.4	0.0	1.4	2.1	0.0	6.8	3.5	0.0
Queue Length 95th (m)	29.4	47.9	2.1	3.1	52.2	4.9	5.4	5.4	6.7	15.4	7.7	23.9
Internal Link Dist (m)	608.9			618.0			556.0			516.0		
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	660	2493	1119	669	2188	996	279	723	340	283	723	564
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.31	0.01	0.04	0.31	0.05	0.03	0.03	0.06	0.12	0.05	0.54

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 45 (38%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 11.0

Intersection LOS: B

Intersection Capacity Utilization 62.0%

ICU Level of Service B

























Analysis Period (min) 15

Splits and Phases: 2: Earl Armstrong Road & Spratt Road

 ø1	 ø2	 ø4
25 s	63 s	32 s
 ø5	 ø6	 ø8
25 s	63 s	32 s













Future (2023) Background Plus Site-Generated Traffic



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	490	632	120	55	669	151	363	656	64	42	154	129
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			126			159			41			136
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	516	665	126	58	704	159	382	691	67	44	162	136
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	665	126	58	704	159	382	691	67	44	162	136
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	37.0	37.0	11.7	37.0	37.0	11.8	36.0	36.0	11.8	36.0	36.0
Total Split (s)	19.0	37.0	37.0	19.0	37.0	37.0	21.0	52.0	52.0	12.0	43.0	43.0
Total Split (%)	15.8%	30.8%	30.8%	15.8%	30.8%	30.8%	17.5%	43.3%	43.3%	10.0%	35.8%	35.8%
Maximum Green (s)	12.3	30.4	30.4	12.3	30.4	30.4	14.2	46.0	46.0	5.2	37.0	37.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.0	4.0	4.2	4.0	4.0
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.0	2.0	2.6	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.0	6.0	6.8	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		23.4	23.4		23.4	23.4		21.0	21.0		21.0	21.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	28.2	51.6	51.6	9.5	30.4	30.4	14.2	32.5	32.5	5.2	21.1	21.1
Actuated g/C Ratio	0.24	0.43	0.43	0.08	0.25	0.25	0.12	0.27	0.27	0.04	0.18	0.18
v/c Ratio	0.67	0.46	0.17	0.43	0.82	0.32	0.98	0.75	0.15	0.31	0.27	0.36
Control Delay	48.1	28.4	5.6	61.9	51.3	7.2	94.4	45.6	15.6	61.6	42.2	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.1	28.4	5.6	61.9	51.3	7.2	94.4	45.6	15.6	61.6	42.2	9.0
LOS	D	C	A	E	D	A	F	D	B	E	D	A

Lanes, Volumes, Timings
1: Earl Armstrong Road & River Road

Future (2023) Background plus Site Generated
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		34.0			44.3			60.2			31.5	
Approach LOS		C			D			E			C	
Queue Length 50th (m)	53.2	55.8	0.0	12.2	76.0	0.0	43.2	73.5	4.3	4.8	16.0	0.0
Queue Length 95th (m)	#87.2	83.1	12.3	24.0	96.9	15.0	#71.5	85.9	13.4	10.5	23.2	14.1
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	772	1458	724	176	859	503	389	1300	607	142	1045	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.46	0.17	0.33	0.82	0.32	0.98	0.53	0.11	0.31	0.16	0.24

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 44.4

Intersection LOS: D

Intersection Capacity Utilization 79.3%









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: 1: Earl Armstrong Road & River Road

 ø1	 ø2	 ø3	 ø4
19 s	37 s	21 s	43 s
 ø5	 ø6	 ø7	 ø8
19 s	37 s	12 s	52 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	294	828	408	129	722	55	288	242	85	73	502	608
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			342			58			89			215
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	309	872	429	136	760	58	303	255	89	77	528	640
Shared Lane Traffic (%)												
Lane Group Flow (vph)	309	872	429	136	760	58	303	255	89	77	528	640
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	37.0	37.0	11.7	37.0	37.0	11.8	38.5	38.5	11.8	38.5	38.5
Total Split (s)	17.0	43.0	43.0	17.0	43.0	43.0	21.0	39.0	39.0	21.0	39.0	39.0
Total Split (%)	14.2%	35.8%	35.8%	14.2%	35.8%	35.8%	17.5%	32.5%	32.5%	17.5%	32.5%	32.5%
Maximum Green (s)	10.3	36.4	36.4	10.3	36.4	36.4	14.2	33.0	33.0	14.2	33.0	33.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.0	4.0	4.2	4.0	4.0
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.0	2.0	2.6	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.0	6.0	6.8	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		25.5	25.5		25.5	25.5
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	10.3	36.4	36.4	10.3	36.4	36.4	13.8	41.6	41.6	8.2	33.4	33.4
Actuated g/C Ratio	0.09	0.30	0.30	0.09	0.30	0.30	0.12	0.35	0.35	0.07	0.28	0.28
v/c Ratio	1.10	0.85	0.61	0.94	0.74	0.12	0.80	0.22	0.15	0.34	0.56	1.11
Control Delay	132.2	48.3	11.9	114.8	42.7	8.2	68.3	29.7	6.8	57.0	39.9	98.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	132.2	48.3	11.9	114.8	42.7	8.2	68.3	29.7	6.8	57.0	39.9	98.4
LOS	F	D	B	F	D	A	E	C	A	E	D	F

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		54.7			50.9			44.6			71.0	
Approach LOS		D			D			D			E	
Queue Length 50th (m)	~39.0	93.2	13.9	29.8	77.8	0.0	33.4	21.1	0.0	8.3	51.8	~123.7
Queue Length 95th (m)	#64.8	116.4	44.2	#65.1	98.3	8.8	#51.0	31.7	10.7	15.2	68.2	#188.4
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	282	1028	698	145	1028	501	389	1174	584	389	943	577
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.85	0.61	0.94	0.74	0.12	0.78	0.22	0.15	0.20	0.56	1.11

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 55 (46%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 57.0

Intersection LOS: E

Intersection Capacity Utilization 85.0%

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: Earl Armstrong Road & River Road

			
ø1	ø2	ø3	ø4
17 s	43 s	21 s	39 s
			
ø5	ø6	ø7	ø8
17 s	43 s	21 s	39 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	608	31	23	608	46	106	47	77	31	28	277
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.408			0.408			0.737			0.723		
Satd. Flow (perm)	728	3390	1517	728	3390	1517	1315	3390	1517	1290	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			33			48			81			292
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	97	640	33	24	640	48	112	49	81	33	29	292
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	640	33	24	640	48	112	49	81	33	29	292
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	2	2	2	6	6	6	8	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	10.0	10.0
Minimum Split (s)	30.3	30.3	30.3	30.3	30.3	30.3	31.6	31.6	31.6	31.4	31.4	31.4
Total Split (s)	85.0	85.0	85.0	85.0	85.0	85.0	35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	70.8%	70.8%	70.8%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%
Maximum Green (s)	78.7	78.7	78.7	78.7	78.7	78.7	28.6	28.6	28.6	28.6	28.6	28.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.7	1.7	1.7	1.7	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	91.6	91.6	91.6	91.6	91.6	91.6	15.7	15.7	15.7	15.7	15.7	15.7
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.76	0.76	0.13	0.13	0.13	0.13	0.13	0.13
v/c Ratio	0.17	0.25	0.03	0.04	0.25	0.04	0.65	0.11	0.30	0.19	0.07	0.64
Control Delay	5.5	4.8	1.6	4.7	4.8	1.5	66.1	44.3	12.1	47.0	43.5	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.5	4.8	1.6	4.7	4.8	1.5	66.1	44.3	12.1	47.0	43.5	12.1
LOS	A	A	A	A	A	A	E	D	B	D	D	B

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay	4.8			4.6			43.6			17.9		
Approach LOS	A			A			D			B		
Queue Length 50th (m)	4.8	17.8	0.0	1.1	17.8	0.0	23.4	5.0	0.0	6.5	2.9	0.0
Queue Length 95th (m)	12.2	30.0	2.6	3.7	30.0	3.0	38.7	9.7	12.1	14.6	6.7	21.9
Internal Link Dist (m)	608.9			618.0			556.0			516.0		
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	555	2587	1165	555	2587	1169	313	808	423	307	808	584
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.25	0.03	0.04	0.25	0.04	0.36	0.06	0.19	0.11	0.04	0.50

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 45 (38%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 11.5

Intersection LOS: B

Intersection Capacity Utilization 60.1%

ICU Level of Service B

























Analysis Period (min) 15

Splits and Phases: 2: Earl Armstrong Road & Spratt Road

											
ø2			ø4			ø6			ø8		
85 s			35 s			85 s			35 s		













Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Future (2023) Background plus Site Generated
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	324	732	97	92	654	46	53	41	65	31	73	290
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.344			0.359			0.704			0.728		
Satd. Flow (perm)	614	3390	1517	641	3390	1517	1256	3390	1517	1299	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			102			48			68			305
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		632.9			642.0			580.0			540.0	
Travel Time (s)		47.5			48.2			43.5			40.5	
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
Adj. Flow (vph)	341	771	102	97	688	48	56	43	68	33	77	305
Shared Lane Traffic (%)												
Lane Group Flow (vph)	341	771	102	97	688	48	56	43	68	33	77	305
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.4	30.3	30.3	11.4	30.3	30.3	31.6	31.6	31.6	31.4	31.4	31.4
Total Split (s)	25.0	63.0	63.0	25.0	63.0	63.0	32.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	20.8%	52.5%	52.5%	20.8%	52.5%	52.5%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%
Maximum Green (s)	18.6	56.7	56.7	18.6	56.7	56.7	25.6	25.6	25.6	25.6	25.6	25.6
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)		10.0	10.0		10.0	10.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		14.0	14.0		14.0	14.0	18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	0
Act Effect Green (s)	93.3	81.7	81.7	83.6	76.6	76.6	12.2	12.2	12.2	12.2	12.2	12.2
Actuated g/C Ratio	0.78	0.68	0.68	0.70	0.64	0.64	0.10	0.10	0.10	0.10	0.10	0.10
v/c Ratio	0.58	0.33	0.10	0.19	0.32	0.05	0.44	0.12	0.32	0.25	0.22	0.71
Control Delay	7.8	8.8	1.8	4.8	11.1	3.3	60.7	48.5	15.0	53.2	50.1	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	8.8	1.8	4.8	11.1	3.3	60.7	48.5	15.0	53.2	50.1	15.3
LOS	A	A	A	A	B	A	E	D	B	D	D	B

Lanes, Volumes, Timings
2: Earl Armstrong Road & Spratt Road

Future (2023) Background plus Site Generated
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay	7.9			9.9			39.0			24.8		
Approach LOS	A			A			D			C		
Queue Length 50th (m)	14.6	31.4	0.0	3.5	31.1	0.0	11.8	4.5	0.0	6.8	8.3	0.0
Queue Length 95th (m)	29.4	50.6	5.8	8.8	53.7	4.9	22.9	9.3	11.7	15.4	14.4	23.9
Internal Link Dist (m)	608.9			618.0			556.0			516.0		
Turn Bay Length (m)	60.0		80.0	60.0		80.0	100.0		25.0	100.0		25.0
Base Capacity (vph)	654	2307	1065	665	2165	986	268	723	377	277	723	564
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.33	0.10	0.15	0.32	0.05	0.21	0.06	0.18	0.12	0.11	0.54

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 77 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 13.2

Intersection LOS: B













Intersection Capacity Utilization 63.7%













ICU Level of Service B













Analysis Period (min) 15













Splits and Phases: 2: Earl Armstrong Road & Spratt Road













 ø1	 ø2	 ø4
25 s	63 s	32 s
 ø5	 ø6	 ø8
25 s	63 s	32 s













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	1	77	791	1	25	251
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	81	833	1	26	264
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1149	833			834	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1149	833			834	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	78			97	
cM capacity (veh/h)	212	369			799	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	1	81	833	1	26	264
Volume Left	1	0	0	0	26	0
Volume Right	0	81	0	1	0	0
cSH	212	369	1700	1700	799	1700
Volume to Capacity	0.00	0.22	0.49	0.00	0.03	0.16
Queue Length 95th (m)	0.1	5.8	0.0	0.0	0.7	0.0
Control Delay (s)	22.1	17.5	0.0	0.0	9.7	0.0
Lane LOS	C	C			A	
Approach Delay (s)	17.6		0.0		0.9	
Approach LOS	C					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			55.6%		ICU Level of Service	B
Analysis Period (min)			15			













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	1	43	487	1	94	749
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	45	513	1	99	788
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1499	513			514	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1499	513			514	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	92			91	
cM capacity (veh/h)	122	561			1052	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	1	45	513	1	99	788
Volume Left	1	0	0	0	99	0
Volume Right	0	45	0	1	0	0
cSH	122	561	1700	1700	1052	1700
Volume to Capacity	0.01	0.08	0.30	0.00	0.09	0.46
Queue Length 95th (m)	0.2	1.8	0.0	0.0	2.2	0.0
Control Delay (s)	34.8	12.0	0.0	0.0	8.8	0.0
Lane LOS	D	B			A	
Approach Delay (s)	12.5		0.0		1.0	
Approach LOS	B					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			51.6%		ICU Level of Service	A
Analysis Period (min)			15			













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	154	637	4	42	209
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	162	671	4	44	220
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	979	671			675	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	979	671			675	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	65			95	
cM capacity (veh/h)	264	457			916	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	16	162	671	4	44	220
Volume Left	16	0	0	0	44	0
Volume Right	0	162	0	4	0	0
cSH	264	457	1700	1700	916	1700
Volume to Capacity	0.06	0.35	0.39	0.00	0.05	0.13
Queue Length 95th (m)	1.3	11.1	0.0	0.0	1.1	0.0
Control Delay (s)	19.5	17.2	0.0	0.0	9.1	0.0
Lane LOS	C	C			A	
Approach Delay (s)	17.4		0.0		1.5	
Approach LOS	C					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			52.1%		ICU Level of Service	A
Analysis Period (min)			15			













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	9	60	427	16	110	639
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	9	63	449	17	116	673
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1354	449			466	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1354	449			466	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	90			89	
cM capacity (veh/h)	148	610			1095	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	9	63	449	17	116	673
Volume Left	9	0	0	0	116	0
Volume Right	0	63	0	17	0	0
cSH	148	610	1700	1700	1095	1700
Volume to Capacity	0.06	0.10	0.26	0.01	0.11	0.40
Queue Length 95th (m)	1.4	2.4	0.0	0.0	2.5	0.0
Control Delay (s)	31.1	11.6	0.0	0.0	8.7	0.0
Lane LOS	D	B			A	
Approach Delay (s)	14.1		0.0		1.3	
Approach LOS	B					
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			45.5%		ICU Level of Service	A
Analysis Period (min)			15			













						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	46	1	1	162	68	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	48	1	1	171	72	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	244	72	80			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	244	72	80			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	100	100			
cM capacity (veh/h)	744	991	1518			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	49	1	171	72	8	
Volume Left	48	1	0	0	0	
Volume Right	1	0	0	0	8	
cSH	760	1518	1700	1700	1700	
Volume to Capacity	0.07	0.00	0.10	0.04	0.00	
Queue Length 95th (m)	1.5	0.0	0.0	0.0	0.0	
Control Delay (s)	10.1	7.4	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	10.1	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		1.7				
Intersection Capacity Utilization		19.0%		ICU Level of Service		A
Analysis Period (min)		15				

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	34	1	1	112	174	63
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	36	1	1	118	183	66
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	303	183	249			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	303	183	249			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	100	100			
cM capacity (veh/h)	688	859	1316			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	37	1	118	183	66	
Volume Left	36	1	0	0	0	
Volume Right	1	0	0	0	66	
cSH	708	1316	1700	1700	1700	
Volume to Capacity	0.05	0.00	0.07	0.11	0.04	
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	
Control Delay (s)	10.5	7.7	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	10.5	0.1		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			19.7%	ICU Level of Service		A
Analysis Period (min)			15			

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	1	1	146	63	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	1	1	154	66	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	222	66	71			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	222	66	71			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	766	997	1530			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	17	1	154	66	4	
Volume Left	16	1	0	0	0	
Volume Right	1	0	0	0	4	
cSH	817	1530	1700	1700	1700	
Volume to Capacity	0.02	0.00	0.09	0.04	0.00	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	
Control Delay (s)	9.7	7.4	0.0	0.0	0.0	
Lane LOS	A	A				
Approach Delay (s)	9.7	0.1		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			18.1%	ICU Level of Service		A
Analysis Period (min)			15			

























						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	26	1	1	86	143	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	1	1	91	151	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	243	151	183			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	243	151	183			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	100	100			
cM capacity (veh/h)	745	896	1392			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	28	1	91	151	33	
Volume Left	27	1	0	0	0	
Volume Right	1	0	0	0	33	
cSH	773	1392	1700	1700	1700	
Volume to Capacity	0.04	0.00	0.05	0.09	0.02	
Queue Length 95th (m)	0.8	0.0	0.0	0.0	0.0	
Control Delay (s)	10.0	7.6	0.0	0.0	0.0	
Lane LOS	A	A				
Approach Delay (s)	10.0	0.1		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			17.9%	ICU Level of Service		A
Analysis Period (min)			15			













						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	98	5	1	46	37	27
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	103	5	1	48	39	28
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	89	39	67			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	89	39	67			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	99	100			
cM capacity (veh/h)	910	1033	1534			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	108	1	48	39	28	
Volume Left	103	1	0	0	0	
Volume Right	5	0	0	0	28	
cSH	957	1534	1700	1700	1700	
Volume to Capacity	0.11	0.00	0.03	0.02	0.02	
Queue Length 95th (m)	2.7	0.0	0.0	0.0	0.0	
Control Delay (s)	9.4	7.3	0.0	0.0	0.0	
Lane LOS	A	A				
Approach Delay (s)	9.4	0.2		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay		4.6				
Intersection Capacity Utilization		15.7%		ICU Level of Service		A
Analysis Period (min)		15				

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	54	3	5	32	44	99
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	57	3	5	34	46	104
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	91	46	151			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	91	46	151			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	100	100			
cM capacity (veh/h)	906	1023	1431			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	60	5	34	46	104	
Volume Left	57	5	0	0	0	
Volume Right	3	0	0	0	104	
cSH	957	1431	1700	1700	1700	
Volume to Capacity	0.06	0.00	0.02	0.03	0.06	
Queue Length 95th (m)	1.4	0.1	0.0	0.0	0.0	
Control Delay (s)	9.2	7.5	0.0	0.0	0.0	
Lane LOS	A	A				
Approach Delay (s)	9.2	1.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			16.5%	ICU Level of Service		A
Analysis Period (min)			15			

Sensitivity Analysis:
Future (2023) Background Plus
Site-Generated Traffic
Earl Armstrong Road and River Road



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	294	828	408	129	722	55	288	242	85	73	502	548
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			237			58			89			257
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		494.0			607.9			542.0			572.0	
Travel Time (s)		37.1			45.6			40.7			42.9	
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
Adj. Flow (vph)	309	872	429	136	760	58	303	255	89	77	528	577
Shared Lane Traffic (%)												
Lane Group Flow (vph)	309	872	429	136	760	58	303	255	89	77	528	577
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.7	34.6	34.6	11.7	34.6	34.6	11.8	39.0	39.0	11.8	39.0	39.0
Total Split (s)	20.0	43.0	43.0	18.0	41.0	41.0	19.0	45.4	45.4	13.6	40.0	40.0
Total Split (%)	16.7%	35.8%	35.8%	15.0%	34.2%	34.2%	15.8%	37.8%	37.8%	11.3%	33.3%	33.3%
Maximum Green (s)	13.3	36.4	36.4	11.3	34.4	34.4	12.2	38.9	38.9	6.8	33.5	33.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	3.0	2.9	2.9	3.0	2.9	2.9	2.6	2.3	2.3	2.6	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.6	6.6	6.7	6.6	6.6	6.8	6.5	6.5	6.8	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		25.5	25.5		25.5	25.5
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effect Green (s)	13.2	37.8	37.8	11.2	35.7	35.7	12.2	40.4	40.4	6.6	32.2	32.2
Actuated g/C Ratio	0.11	0.32	0.32	0.09	0.30	0.30	0.10	0.34	0.34	0.06	0.27	0.27
v/c Ratio	0.85	0.82	0.67	0.86	0.75	0.12	0.91	0.22	0.16	0.42	0.58	0.97
Control Delay	74.6	45.8	21.6	95.7	44.2	8.6	84.1	29.8	6.5	62.2	40.7	54.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.6	45.8	21.6	95.7	44.2	8.6	84.1	29.8	6.5	62.2	40.7	54.2
LOS	E	D	C	F	D	A	F	C	A	E	D	D

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		44.9			49.3			52.0			48.7	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	34.4	93.2	36.6	29.5	79.8	0.0	34.0	21.1	0.0	8.5	51.5	76.0
Queue Length 95th (m)	#55.3	116.4	71.1	#61.9	100.8	9.0	#57.4	30.8	10.4	15.7	67.7	#142.4
Internal Link Dist (m)		470.0			583.9			518.0			548.0	
Turn Bay Length (m)	185.0		85.0	175.0		150.0	140.0		25.0	105.0		135.0
Base Capacity (vph)	364	1066	640	160	1010	492	334	1140	569	186	946	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.82	0.67	0.85	0.75	0.12	0.91	0.22	0.16	0.41	0.56	0.95

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 47.9

Intersection LOS: D

Intersection Capacity Utilization 81.9%









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: 1: Earl Armstrong Road & River Road

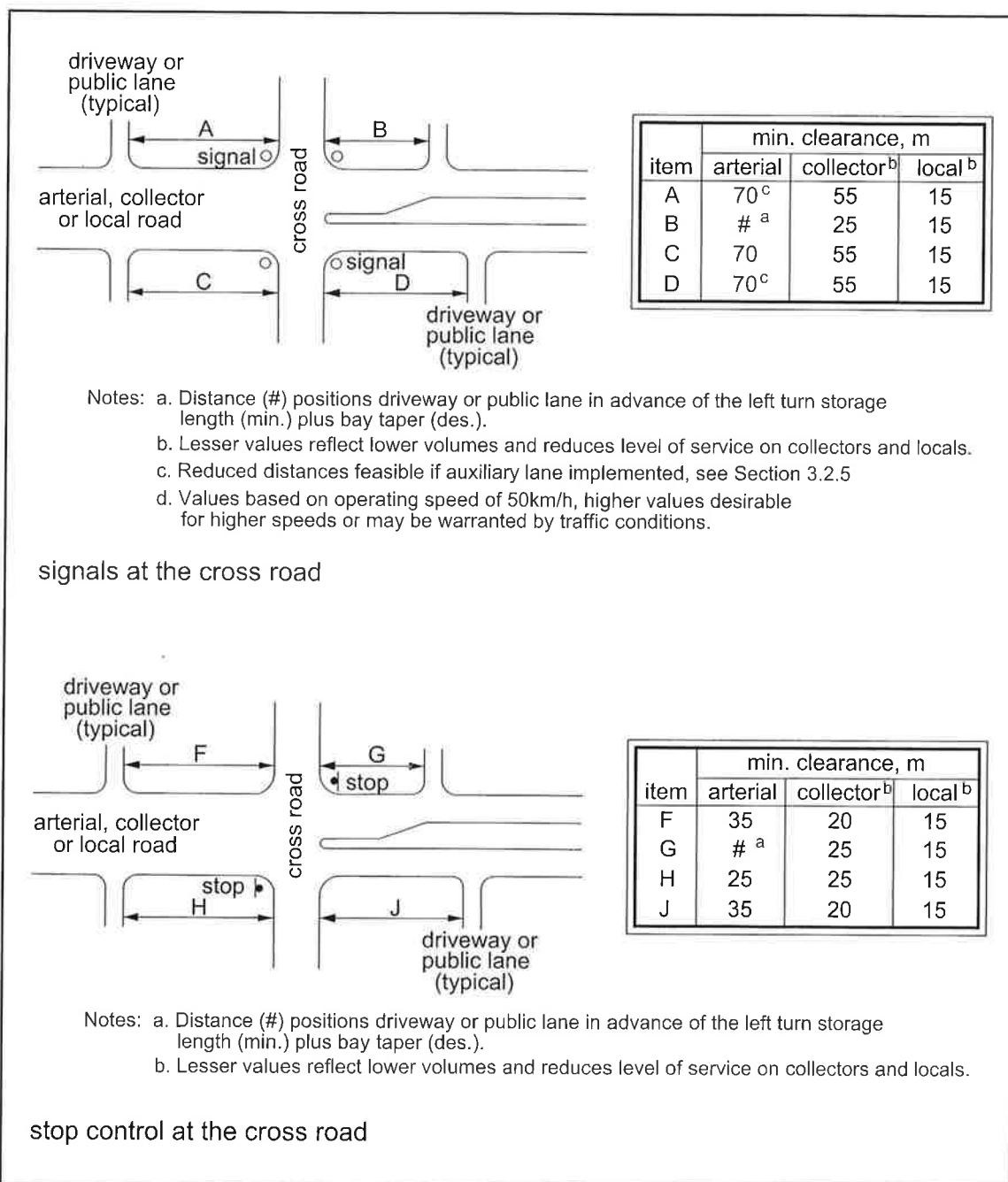
 ø1	 ø2	 ø3	 ø4
18 s	43 s	19 s	40 s
 ø5	 ø6	 ø7	 ø8
20 s	41 s	13.6 s	45.4 s

APPENDIX G

TECHNICAL STANDARDS



Figure 3.2.8.2 Suggested Minimum Corner Clearances to Accesses or Public Lanes at Major Intersections



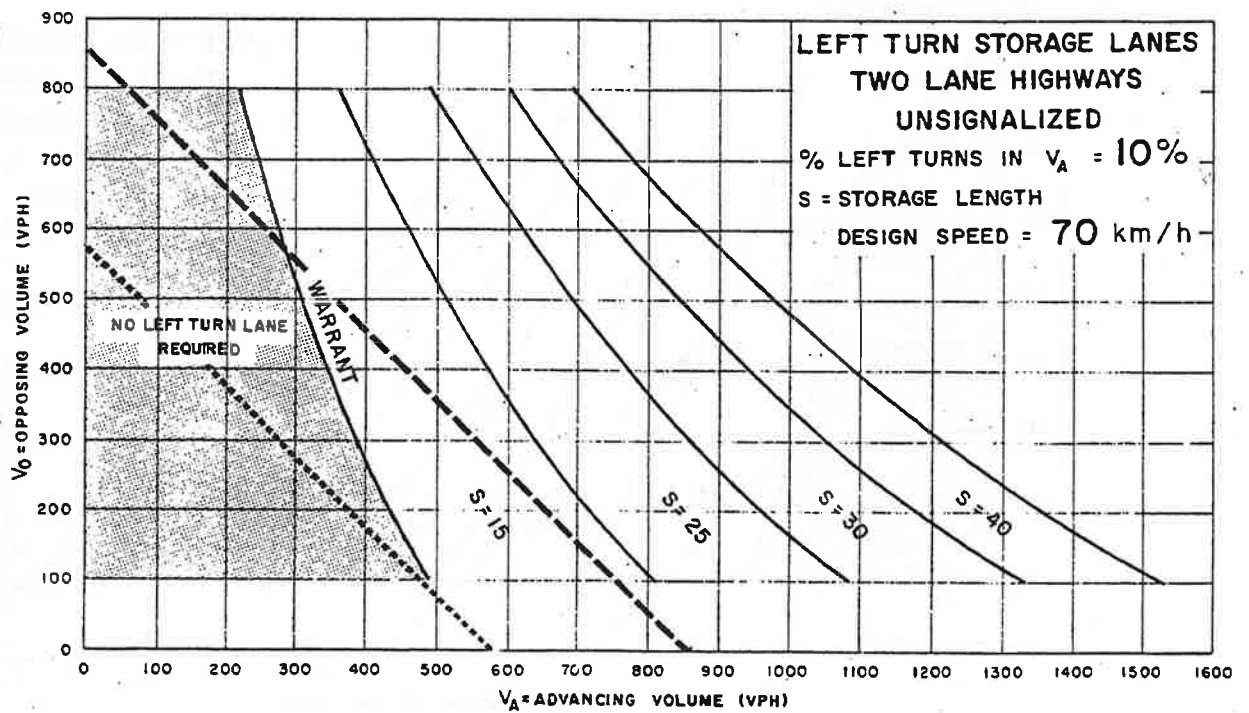
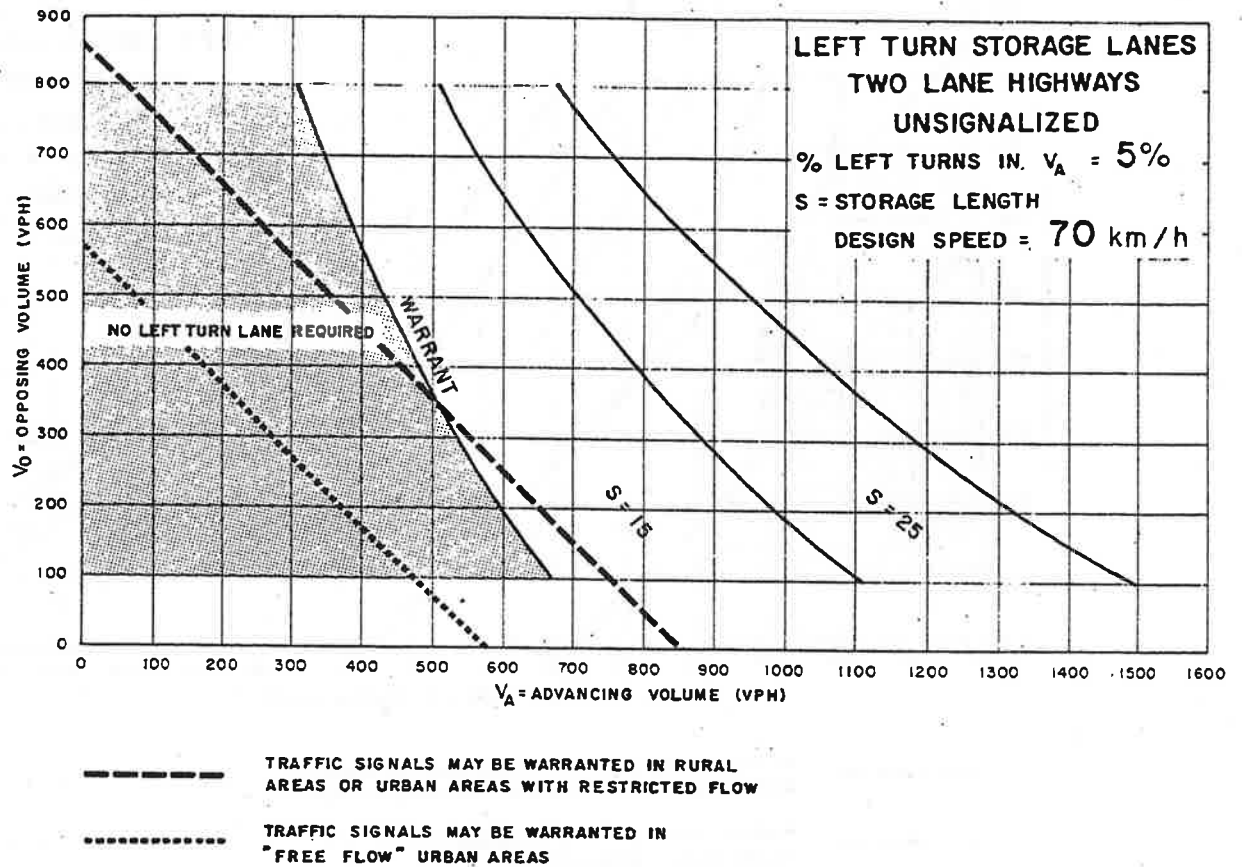


Figure EA-10

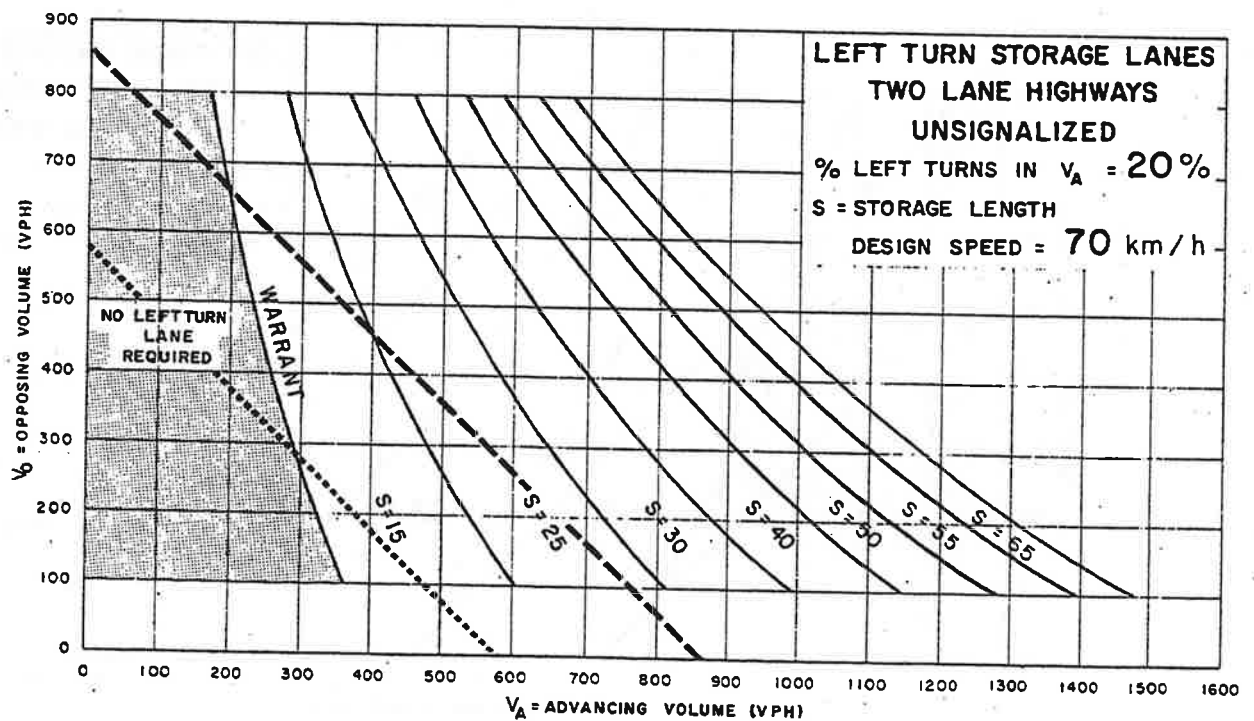
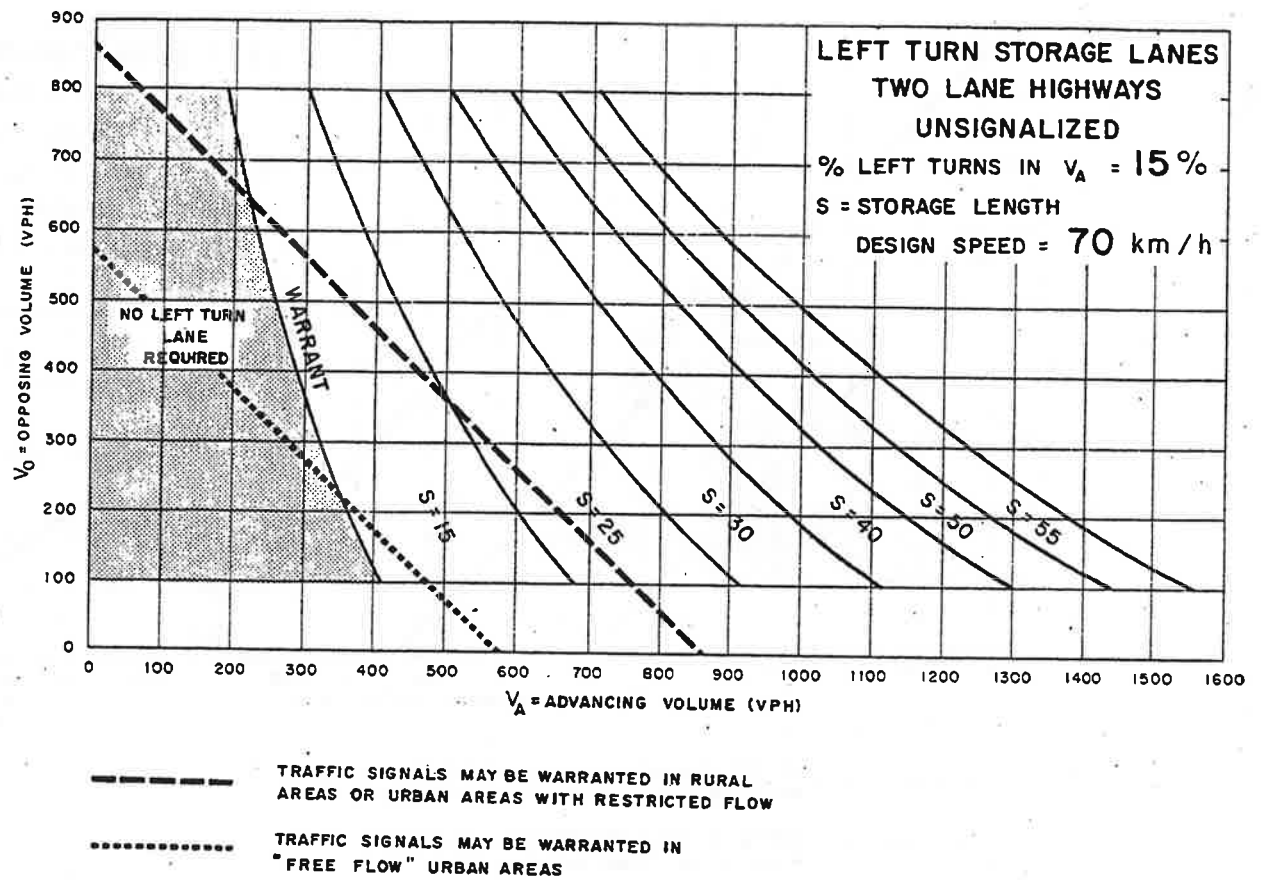


Figure EA-11