From: Jamie Hanson
To: Michael Henderson
Cc: Eric de Waal; Neil Struthers
Subject: Fwd: Yards Neighbourhood Plan- WSP Servicing and TIA Studies
Date: Friday, May 13, 2022 8:13:34 AM
Attachments: 2019-05-17 - RRI RRP Servcing Report - large Footprint Builidng (WSP 2018).pdf
image001.jpg
2018-02-01 - Servicing Report.pdf
Servicing Templates.pdf
Railyard Renewal Project TIA Final (2018-03-02).pdf
RPT-151-09273-02-Railyard Renewal TIA Update-20190516-signed FINAL.pdf

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Hi Michael,

Please find attached the additional information related to the Yards as per our discussion yesterday.

Thanks,
Jamie

From: Robert Mosiondz <RMOSIOND@regina.ca>
Sent: Thursday, May 12, 2022 3:50:48 PM
To: Jamie Hanson <JHANSON@regina.ca>
Subject: Yards Neighbourhood Plan- WSP Servicing and TIA Studies

Hi Jamie
Attached are the 2018/2019 WSP Reports relating to the Yards Servicing and TIA for the original mixed-use residential/commercial concept plan referenced in the 2018 report, as well as the large footprint building on the westerly side of the yards site. The Yards Neighbourhood Plan (OCP- Part B.18) focuses primarily on policy around development of the mixed use plan, but does make accommodation within the Policy Section [i.e. 4. 2. c) ii.] the alternate land uses such as "*recreation, sports, entertainment, convention centre, or similar*" on lands noted as Area B (see Figure 2- Land Use Plan).

The underground infrastructure currently being reviewed/designed by KGS as part of the Dewdney Avenue Corridor Rehabilitation (DACR) Project are based on worse case scenarios to accommodate either development provision.

Let me know if you need additional info or wish to discuss.

Rob Mosiondz, B.Sc.
A/Manager, Land Development Branch
Land, Real Estate & Facilities

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CITY OF REGINA

REGINA REVITALIZATION INITIATIVE RAILYARD RENEWAL PROJECT

TRANSPORTATION IMPACT ANALYSIS FOR LARGE FOOTPRINT FACILITY

MAY 16, 2019

FINAL

REGINA REVITALIZATION INITIATIVE RAILYARD RENEWAL PROJECT

TRANSPORTATION IMPACT ANALYSIS FOR LARGE FOOTPRINT FACILITY

CITY OF REGINA

FINAL

PROJECT NO.: 151-09273-02
DATE: MAY 2019

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REVISION HISTORY

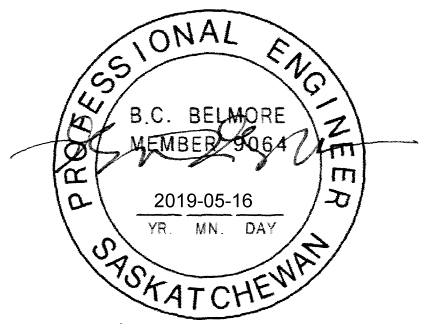
VERSION	DATE	DESCRIPTION
1	April 26, 2019	Draft for Review
2	May 16, 2019	Final Report

SIGNATURES

PREPARED BY

Destiny Piper, P. Eng.
Transportation Planner

REVIEWED BY



Bruce Belmore, P. Eng., PTOE, AVS
Director – Canada West Transportation Planning

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APPENDICES

1 INTRODUCTION

WSP Canada Inc. was retained by the City of Regina to update the transportation impact analysis for the Railyard Renewal Project (RRP) to include a large footprint facility that would be used for an entertainment facility or arena within the Rail District Neighbourhood Plan. The RRP is one of the primary components of the Regina Revitalization Initiative (RRI).

The Railyard Renewal Project is located at the old CP Intermodal Land site, north of the City's downtown area and is bounded by CP rail main line to the south, Dewdney Avenue to the north, Albert Street to the west, and Broad Street to the east.

1.1 STUDY PURPOSE AND OBJECTIVES

The purpose of this study is to identify and assess the potential transportation impacts at the study intersections associated with the large footprint facility on the RRP site, and to identify required mitigation measures (if any) to allow the adjacent roadways to safely accommodate traffic generated by the proposed development. The objectives of this study are to:

- Identify required infrastructure improvements including road network, intersection lane configuration, signals, pedestrian and transit access to facilitate traffic and pedestrian flow, and to improve safety and operational performance along Dewdney Avenue based on the development including a large footprint facility; and,
- Identify the potential impacts to Dewdney Avenue and the required modifications (if any) to accommodate traffic during an event at the large footprint facility.

1.2 BACKGROUND

The Regina Revitalization Initiative is the largest urban revitalization project ever undertaken in the City of Regina and consists of three (3) primary components: the Stadium Project; Railyard Renewal Project; and, the redevelopment of Taylor Field Neighbourhood.

The City of Regina previously completed the Rail District Neighbourhood Plan and accompanying technical reports for the Railyard Renewal Project. The original 17.5-acre mixed use neighbourhood plan consisted primarily of residential development with small retail, office, and associated community/cultural developments.

In 2019, the City of Regina requested that WSP evaluate the development site and review the potential impacts of incorporating a large footprint facility on the Railyard Renewal development site. For the purpose of this study, the large footprint facility is assumed to be an arena with a seating capacity of 10,000 people. The large footprint facility will be located on the western portion of the site, as illustrated in **Figure 1-1.**

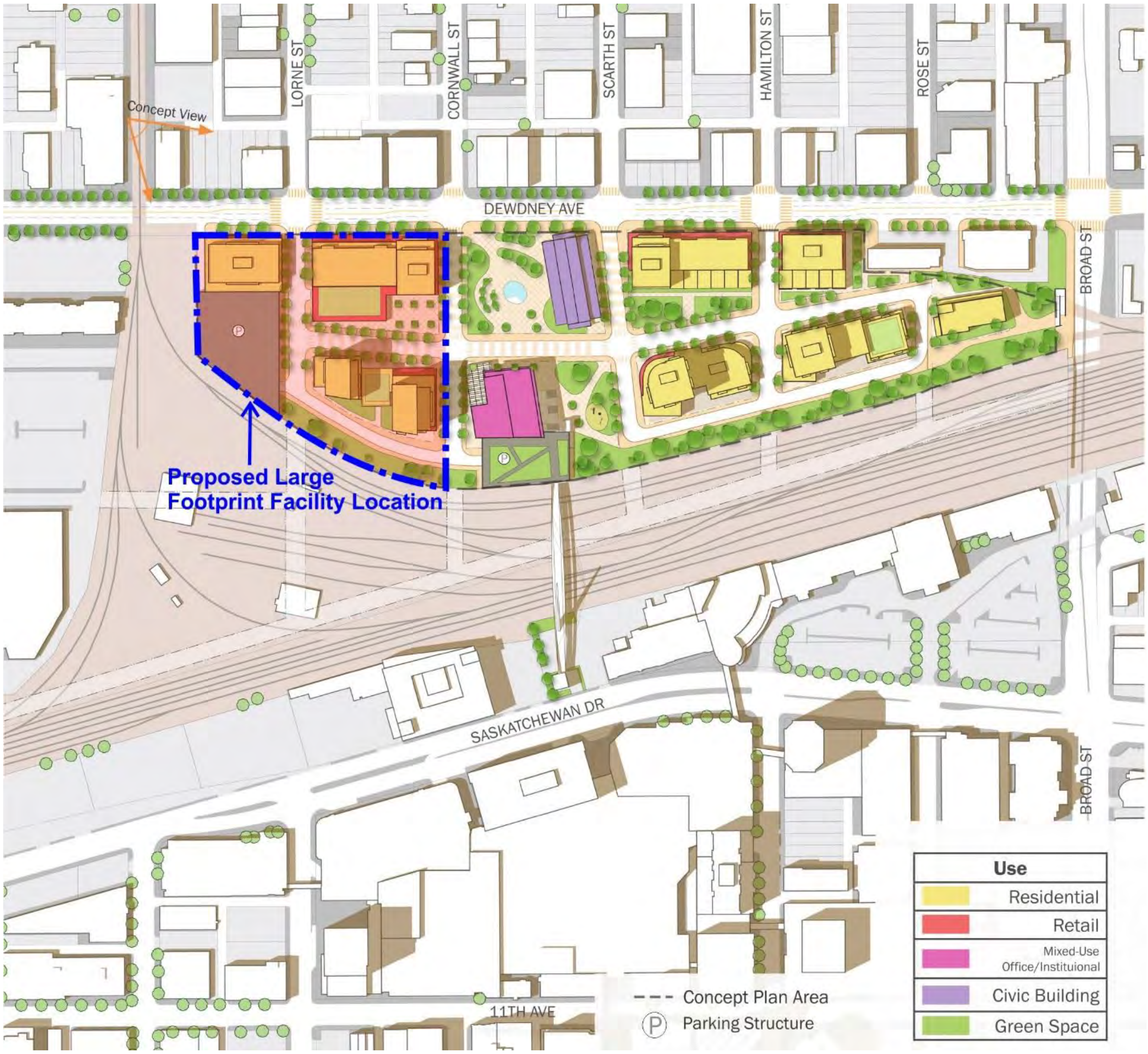

Figure 1-1 Proposed Large Footprint Facility Location

1.3 METHODOLOGY

In order to meet the study objectives, the following methodology was used:

- Estimate the trips generated by the updated land use plan based on ITE's Trip Generation Manual (9th Edition).
- Analyze the delay, LOS and queue lengths of the study intersections at weekday AM, PM, and Off-peak periods for the analysis horizon traffic using Synchro Studio 10 (Synchro).
- Analyze the delay, LOS and queue lengths of the study intersections during a weekday evening event for the analysis horizon traffic using Synchro Studio 10 (Synchro).
- Review internal traffic circulation, public transit, pedestrian traffic, and parking needs for the RRP development.
- Identify any improvements necessary for the intersections and pedestrian facilities to accommodate the forecasted vehicle and pedestrian volumes.

2 WEEKDAY TRAFFIC FORECAST

This section presents the forecasted future traffic volumes for the updated land use plan for the RRP development for the subject roadways and study intersections.

2.1 BACKGROUND TRAFFIC GROWTH

Background traffic (non-site traffic) is the traffic that exists without the addition of the trips generated by the proposed development.

The background traffic forecast prepared in the original *Regina Revitalization Initiative Railyard Renewal Project Transportation Impact Analysis* dated March 2, 2018 was used for the morning and afternoon hour background traffic volumes. The background traffic was based on the City of Regina's 2040 EMME model outputs.

The forecasted future 2040 background traffic turning movements at each study intersection are illustrated in **Figure 2-1.**

2.2 WEEKDAY TRIP GENERATION

Table 2-1 summarizes the revised development details for the proposed development in the RRP site. The major land uses identified for the RRP site include residential, retail, office, community and cultural uses, as well as a large footprint facility assumed to be a 10,000-seat arena.

Table 2-1 Proposed Development Summary

DEVELOPMENT	UNITS	PREVIOUS LAND USE PLAN (MARCH 2018)	REVISED LAND USE PLAN (APRIL 2019)
Residential	Dwelling Units	1,071	652
Retail	Gross Floor Area (m^2)	10,000	4,000
Office	Gross Floor Area (m^2)	8,800	6,400
Community	Gross Floor Area (m^2)	3,200	3,200
Cultural	Gross Floor Area (m^2)	4,100	4,100
Large Footprint Facility	Gross Floor Area (m^2)	--	12,250

The Institute of Transportation Engineers (ITE) Trip Generation Manual (9^{th} Edition) was used in this study to estimate the traffic generated by the proposed development. The ITE Trip Generation Manual 10^{th} Edition was used for the large footprint facility.

The corresponding land uses in the ITE Trip Generation Manual that were used to estimate the traffic generated by the proposed developments are summarized in **Table 2-2.**

NOTE: These design documents are prepared solely for the use by the party with whom the design professional has entered into a contract and there are no representations of any kind made by the design professional to any party with whom the design professional has not entered into a contract.

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Figure 2.1
2040 Background Traffic
Regina Revitalization Initiative - Railyard Renewal Project TIA

Table 2-2 Corresponding ITE Land Use

PROPOSED DEVELOPMENT	ITE LAND USE (CODE)
Residential Buildings (3 to 10 Levels)	Mid-Rise Apartment (223)
Residential Buildings (More than 10 Levels)	High-Rise Apartment (222)
Retail	Speciality Retail Centre (826)
Office	General Office (710)
Community	Recreational Community Centre (495)
Cultural	No Corresponding ITE Land Use
Large Footprint Facility	Arena (460) *

* ITE Trip Generation Manual 10th Edition was utilized for the Arena Land Use

As indicated in the *Regina Revitalization Initiative Railyard Renewal Project Transportation Impact Analysis (March 2, 2018)*, it is anticipated that most of the traffic generated by the proposed cultural development would be internal trips and travelling on weekends when events typically are occurring. Therefore, the cultural development generated trips would be negligible and were not included in this study.

Tables 2-3 to 2-8 summarize the estimated trips that would be generated by the proposed RRP development.

Table 2-3 Trip Generation – Residential Building (3 to 10 Levels)

UNITS: 324	AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	31%	69%	100%	58%	42%
Rates (Trips/Unit)	0.30	0.09	0.21	0.39	0.23	0.16
Total Trips	97	30	67	126	73	53

Table 2-4 Trip Generation – Residential Building (More Than 10 Levels)

UNITS: 328	AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	25%	75%	100%	61%	39%
Rates (Trips/Unit)	0.30	0.08	0.23	0.35	0.21	0.14
Total Trips	98	25	74	115	70	45

Table 2-5 Trip Generation – Retail

TOTAL GFA: 43,056 ft^2	AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	62%	38%	100%	44%	56%
Rates (Trips/1,000ft^2)	0.96	0.60	0.36	2.71	1.19	1.52
Total Trips	41	26	16	117	51	55

Table 2-6 Trip Generation – Office

TOTAL GFA: 68,890 ft^2	AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	88%	12%	100%	17%	83%
Rates (Trips/1,000ft^2)	1.56	1.37	0.19	1.49	0.25	1.24
Total Trips	107	95	13	103	17	85

Table 2-7 Trip Generation – Community

TOTAL GFA: 34,440 ft^2	AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	66%	34%	100%	49%	51%
Rates (Trips/1,000ft^2)	2.05	1.35	0.70	2.74	1.34	1.40
Total Trips	70	46	24	94	47	48

The ITE Trip Generation Manual does not have a corresponding trip rate for the arena land use for the weekday morning peak hour. For this assessment, it was assumed that the morning peak hour rate would be 80% of the afternoon peak hour rate and the directional distribution would be reversed.

Table 2-8 Trip Generation – Large Footprint Facility

TOTAL GFA: 131,860 ft^2	AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	64%	36%	100%	36%	64%
Rates (Trips/1,000ft^2)	0.38	0.24	0.14	0.47	0.17	0.30
Total Trips	50	32	18	62	22	40

2.2.1 INTERNAL AND PASSBY TRIPS

Internal trips should be considered for a multi-use development. According to the ITE Trip Generation Handbook, a multi-use development is typically a single real-estate project that consists of two or more ITE land use classifications between which trips can be made without using the off-site road system. The internal trips can be made either by walking or by vehicles using internal roadways. In this study, the proposed development is deemed to be a multi-use development (residential, office, and retail), thus to estimate the trips made on the external streets, the internal trips that are not made on the major street system should be deducted from the total trips. To account for the internal trips, ITE NCHRP 684 Internal Trip Capture Estimation Tool was used in this study. **Table 2-9** summaries the estimated internal trip capture percentages by land uses and the detailed analysis results were attached in **Appendix A**. ITE does not provide an internal trip capture rate for community land use, therefore the average internal capture rate for residential, retail, and office was applied to the community development.

Table 2-9 Internal Capture Rates

LAND USE	AM PEAK HOUR		PM PEAK HOUR	
	IN	OUT	IN	OUT
Residential	2%	3%	11%	7%
Retail	19%	31%	14%	23%
Office	7%	31%	29%	7%
Community	9%	22%	18%	12%

Pass-by trips are trips made as intermediary stops along the course of a trip between an origin and a primary trip destination. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the site (i.e. Dewdney Avenue). Although these trips will be included in the driveway volumes to the site, they will not increase the overall traffic volumes on the study roads. The ITE Trip Generation Handbook (ITE, August 2014) reports the average pass-by trip by land use.

In accordance with the ITE Trip Generation Handbook, an average of 34% of the trips generated by a shopping center are pass-by trips. In this study, it is assumed that 35%, to be consistent with the original traffic impact assessment of the development, of the total trips generated by the retail development will be pass-by trips for the afternoon peak hour.

The ITE Trip Generation Handbook does not indicate a pass-by rate for the morning peak hour. In addition, the draft Rail District Neighbourhood Plan (November 27, 2017) indicates that the following land uses will not be permitted within the neighbourhood: gas stations, automobile repair, car washes, car dealerships, or drive-through establishments such as restaurants or banks. As such, no pass-by was assumed for the morning peak hour.

It is estimated that the pass-by trips will account for 26 trips (13 trips entering and 13 trips exiting) during the afternoon peak hour.

2.2.2 COMMUTE TRIPS

The RRP site is located close to the downtown core which is currently served by Regina public transit. A pedestrian connection over the CP rail tracks is proposed to link the railyard site to the downtown core.

The original traffic impact assessment completed for the RRP development site, in consultation with the City, estimated that that approximately 20% of commute trips would be made by public transit, walking, and bicycle.

This traffic impact assessment will also assume that 20% of trips will be completed by public transit, walking or by bicycle for the weekday assessment.

2.2.3 TRIP GENERATION SUMMARY

Table 2-10 summarizes the estimated new vehicle trips that will be generated by the proposed railyard development at full build out.

Table 2-10 Trip Generation Summary

DEVELOPMENT	AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT
Site-Generated Trips						
Residential	196	55	141	241	143	98
Retail	41	26	16	117	51	65
Office	107	95	13	103	17	85
Community/Culture	70	46	24	94	47	48
Large Footprint Facility	50	32	18	62	22	40
Total Trips	**465**	**253**	**211**	**617**	**281**	**336**
Trip Reductions						
Internal Trips	37	20	17	74	34	40
External Trips	427	233	194	543	247	296
Public Transit Trips	85	47	38	109	49	60
Pass-by Trips (Retail)	-	-	-	26	13	13
Total Reduced Trips	**549**	**300**	**249**	**752**	**343**	**409**
External Site-Generated Trips						
External Vehicle Trips (Residential)	152	43	109	175	102	73
External Vehicle Trips (Retail/Office/Community/Large Footprint Facility)	190	144	46	233	82	151
Total Development Trips	**342**	**187**	**155**	**408**	**184**	**224**

The overall number of trips entering and exiting the development site during the morning and afternoon peak hour is expected to be lower with the large footprint facility, when compared to the original land use plan. The morning peak hours is anticipated to have approximately 100 fewer total trips and the afternoon peak hours is anticipated to have approximately 120 fewer total trips.

2.3 TRIP DISTRIBUTION AND ASSIGNMENT

Since the proposed RRP development will include a mix of residential, retail, and office land uses; trip distribution for the proposed development was estimated based on the population and employment distribution within Regina and the road network in the vicinity of the RRP site. Population distribution was estimated based on the current main residential areas in the City, while employment distribution was estimated based on the size and location of major employment centers in Regina. The population and employment distribution estimates are shown in **Table 2-11.**

Table 2-11 Population and Employment Distribution

DIRECTIONS FROM THE SITE	POPULATION DISTRIBUTION	EMPLOYMENT DISTRIBUTION
North	25%	45%
West	20%	10%
South	40%	25%
East	15%	20%

The proposed retail, office, and large footprint facility development will attract trips from residential areas, so these trips were distributed to the road network using population distribute splits. The trips generated by the proposed residential development were distributed to the road network using employment distribution splits. The trip distribution for pass-by trips generated by the proposed retail development was estimated based on the existing eastbound and westbound traffic volumes on Dewdney Avenue.

Trip distributions for the proposed residential, retail, office, and large footprint facility developments are illustrated in **Figures 2-2** to **2-3. Figures 2-4** to **2-6** illustrate the estimated trip assignment at the study intersections during both the morning and afternoon peak hours.

2.4 COMBINED TRAFFIC

Combined traffic volumes (post-development traffic) include both background traffic and the traffic generated by the proposed development. Combined traffic volumes were calculated by superimposing the trips generated by the proposed development onto the future background traffic volumes. The forecasted 2040 morning and afternoon peak hour post-development traffic volumes are shown in **Figure 2-7.**

Figure 2-8 shows the traffic turning movements at the study intersections with the proposed right-in / right-out intersection treatment at the Scarth Street and Rose Street intersections as recommended in the in the original *Regina Revitalization Initiative Railyard Renewal Project Transportation Impact Analysis (March 2, 2018)*.

Note that the Cornwall Street intersection is now proposed to be a full movement signalized intersection due to the closure of the south leg at the Lorne Street intersection as a result of including the large footprint facility.

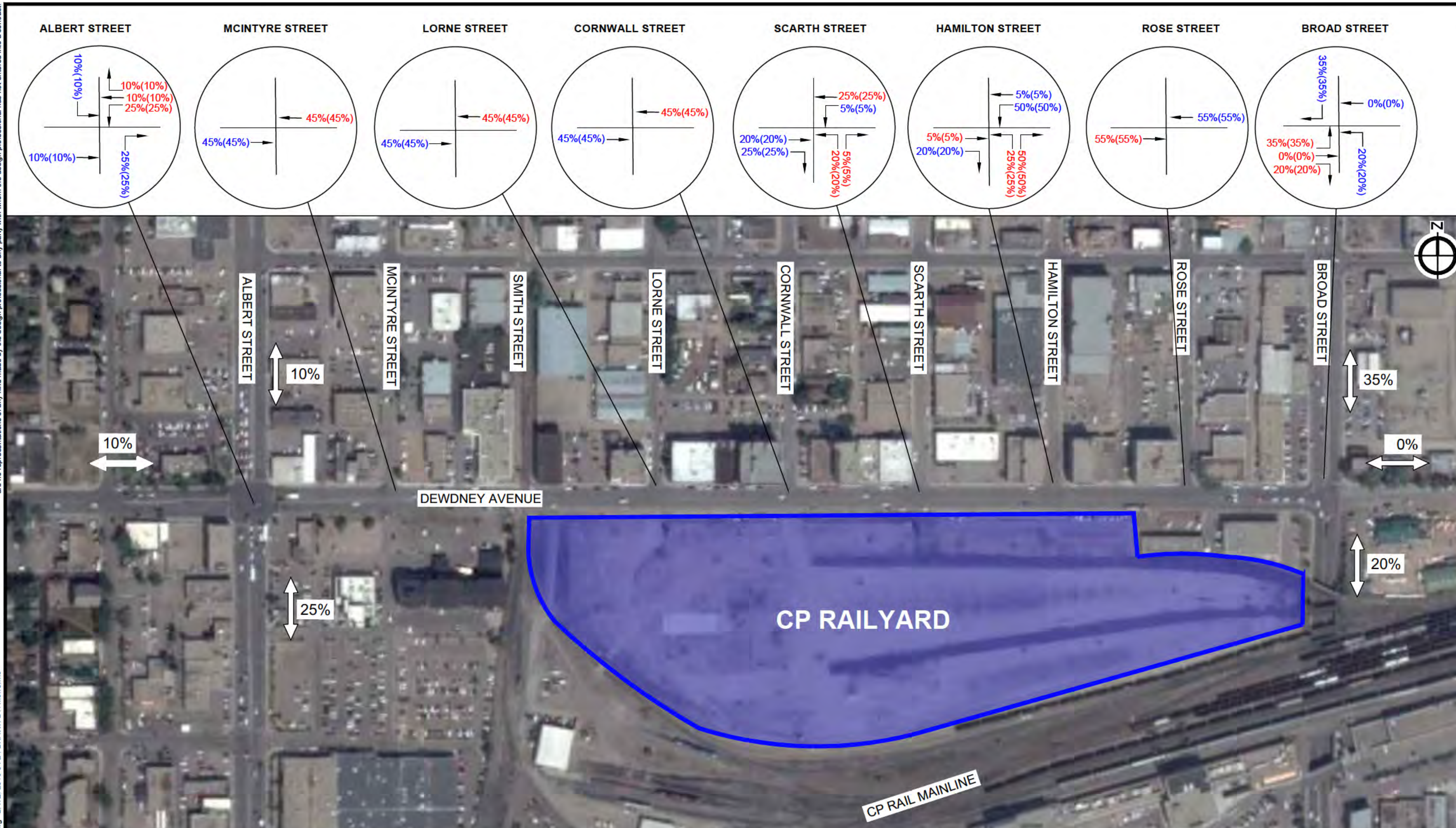

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Figure 2.2
Trip Distribution - Residential

Regina Revitalization Initiative - Railyard Renewal Project TIA

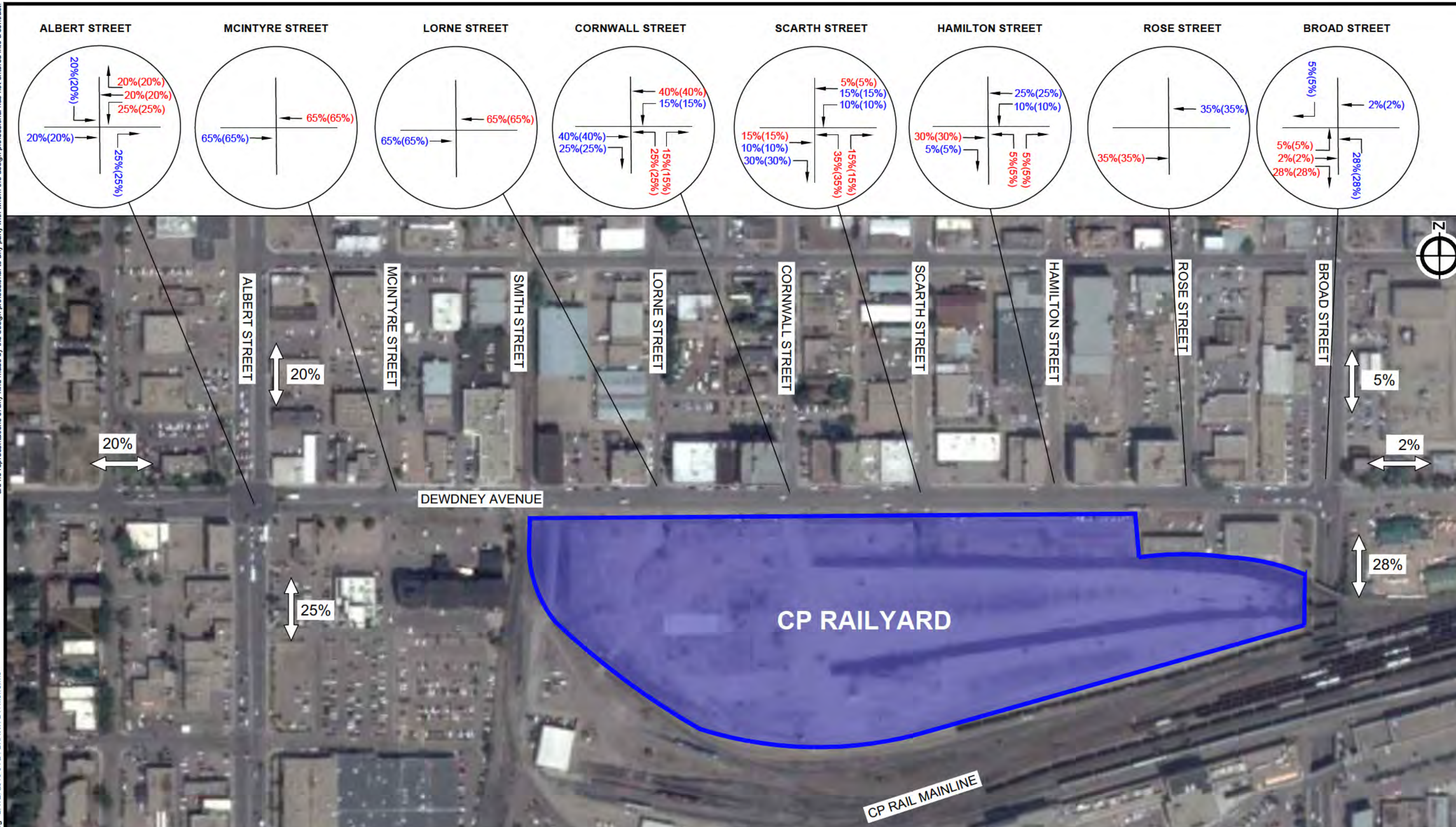

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Figure 2.3
Trip Distribution - Office, Retail, & Community
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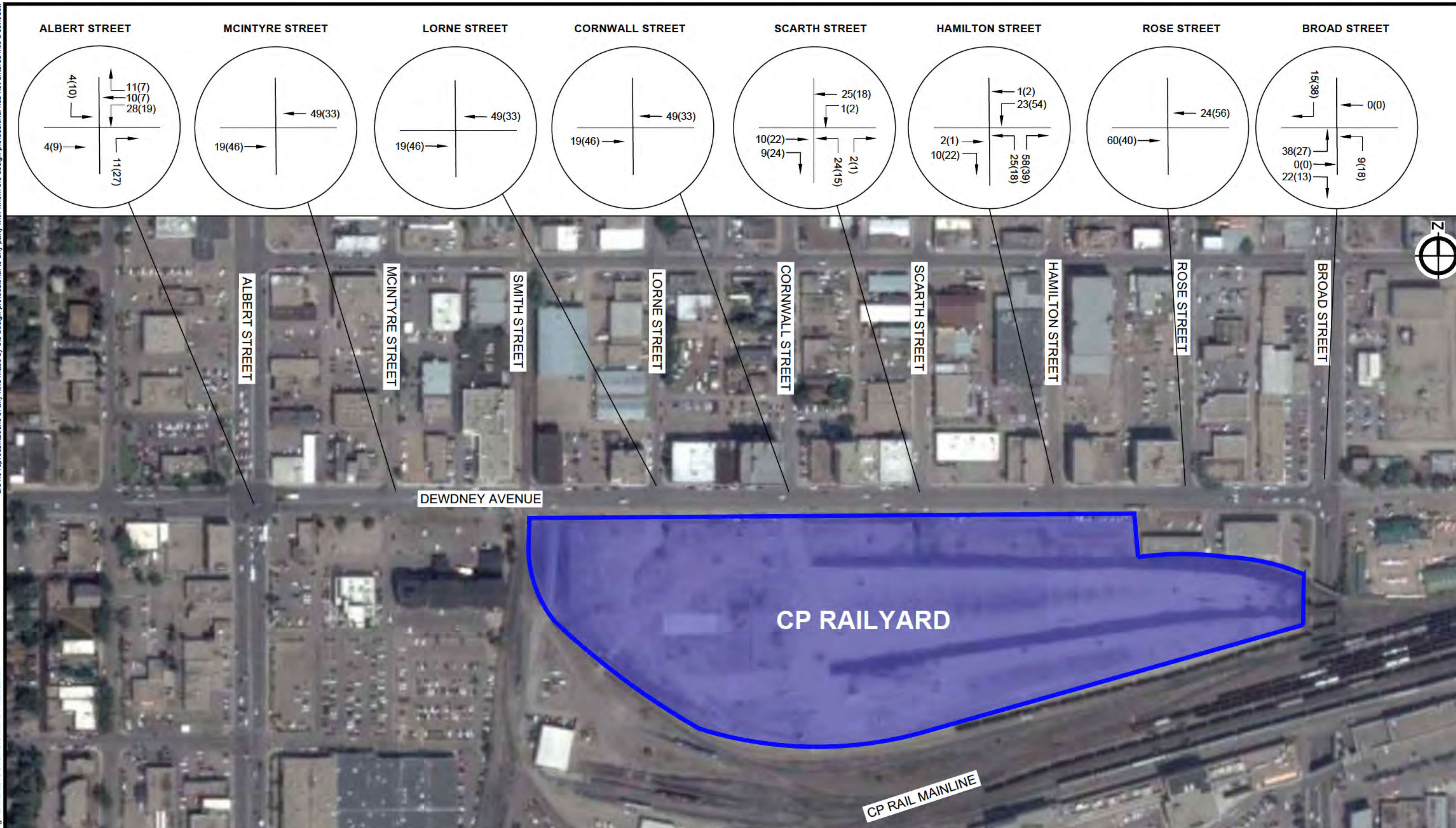

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Figure 2.4
Trip Assignment - Residential

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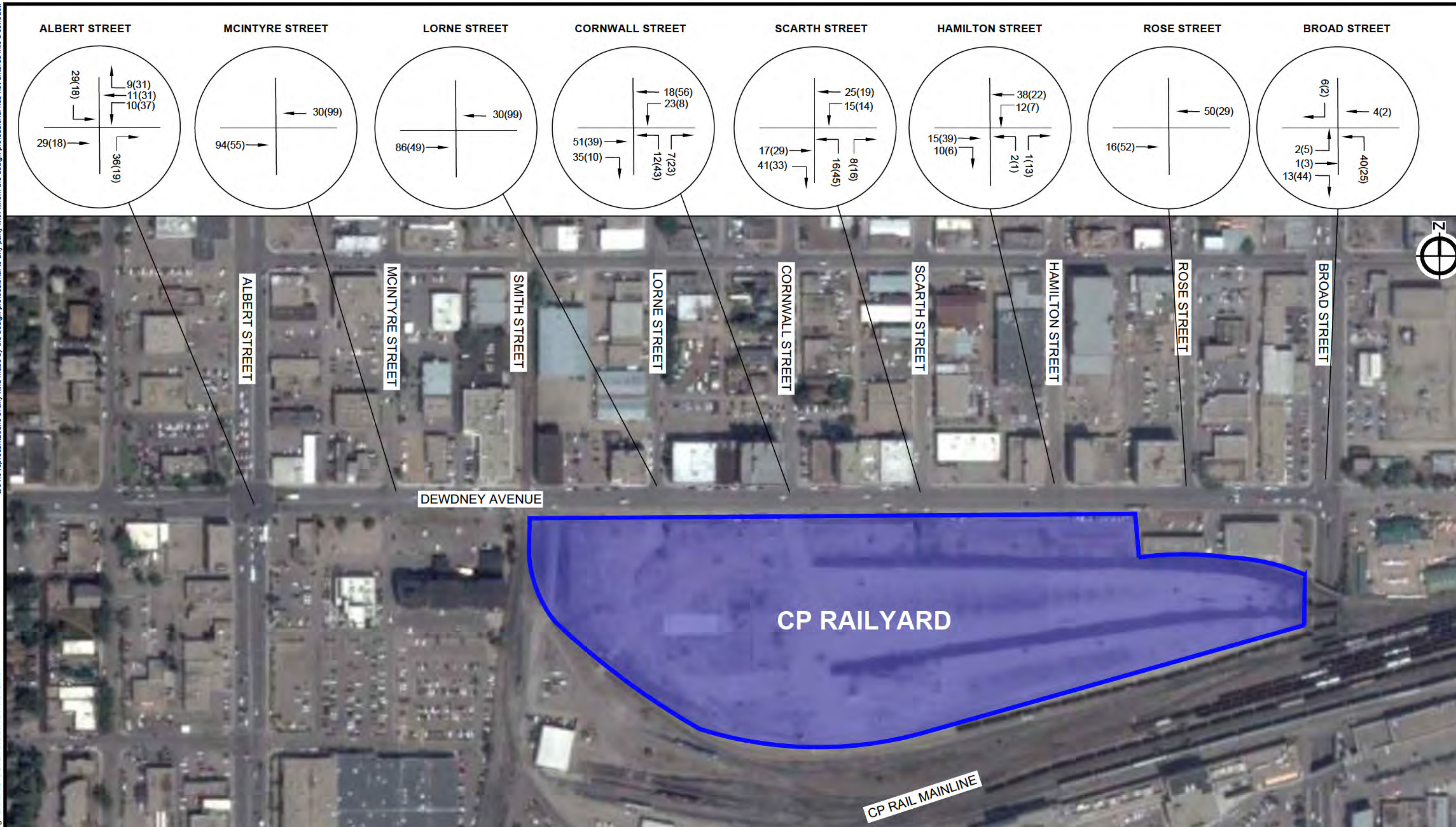

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Figure 2.5
Trip Assignment - Office, Retail, & Community
Regina Revitalization Initiative - Railyard Renewal Project TIA

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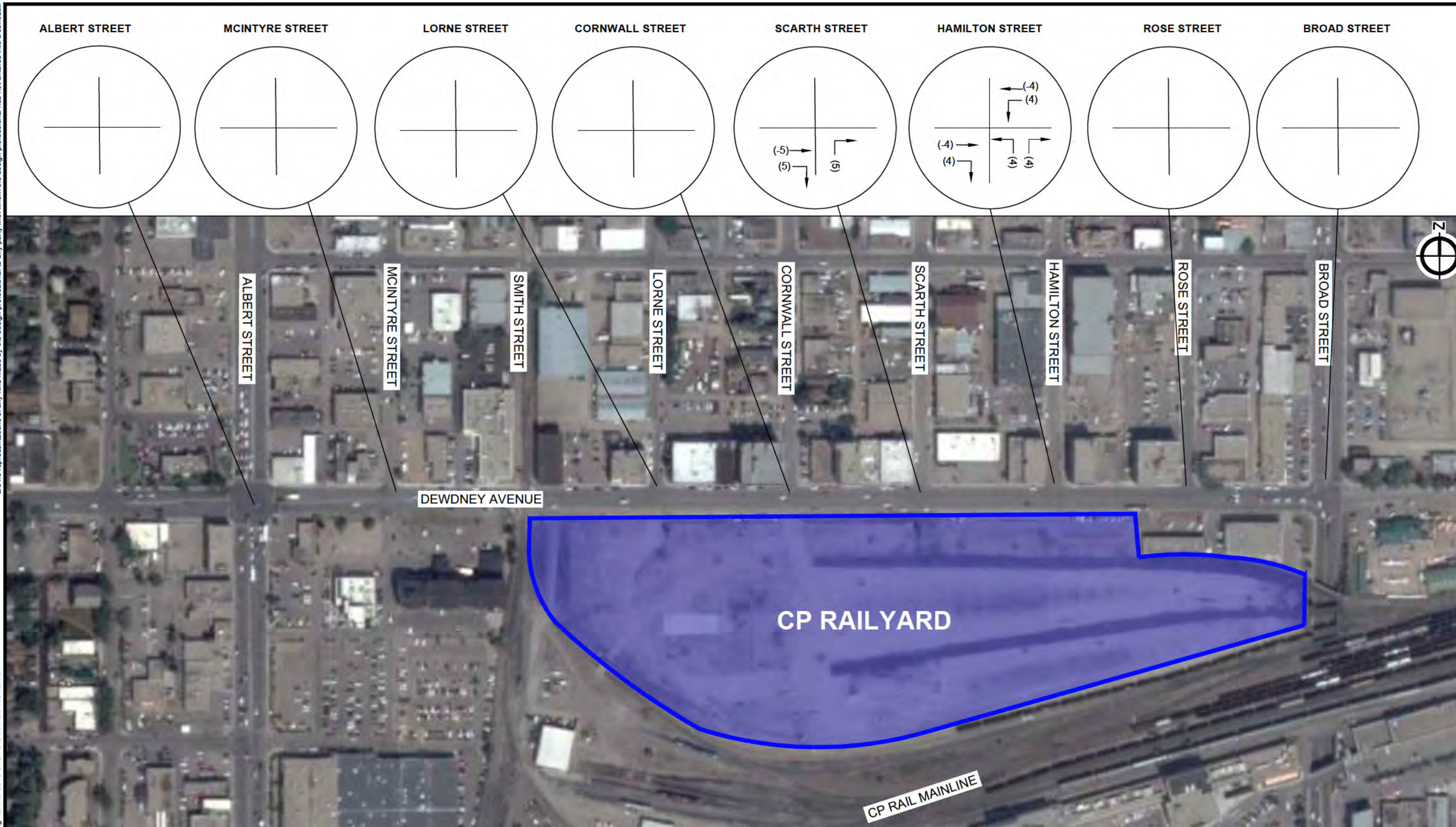

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Figure 2.6
Trip Assignment - Pass-by Trips (Retail)
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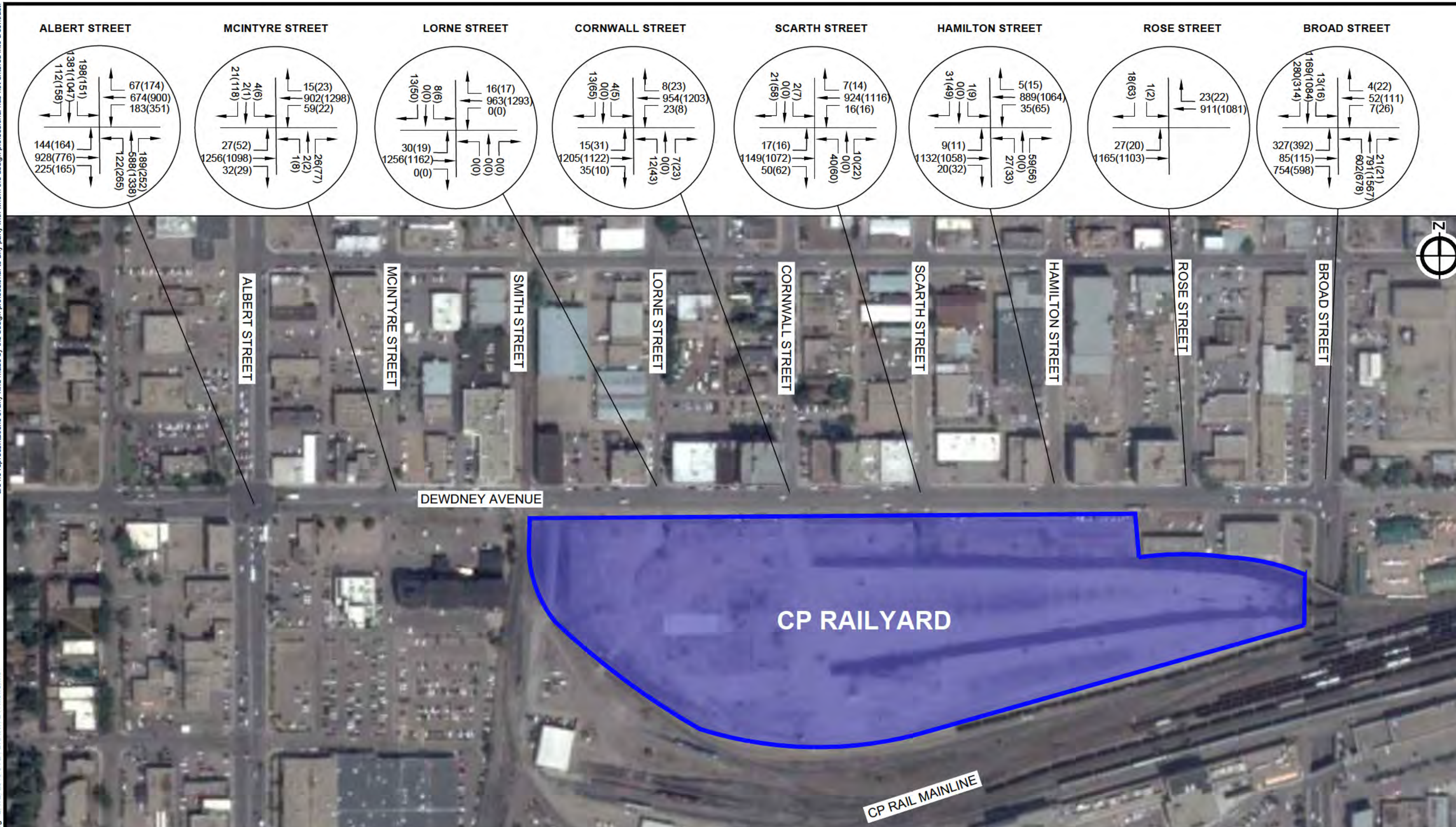

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Figure 2.7
2040 Post-Development Traffic

Regina Revitalization Initiative - Railyard Renewal Project TIA

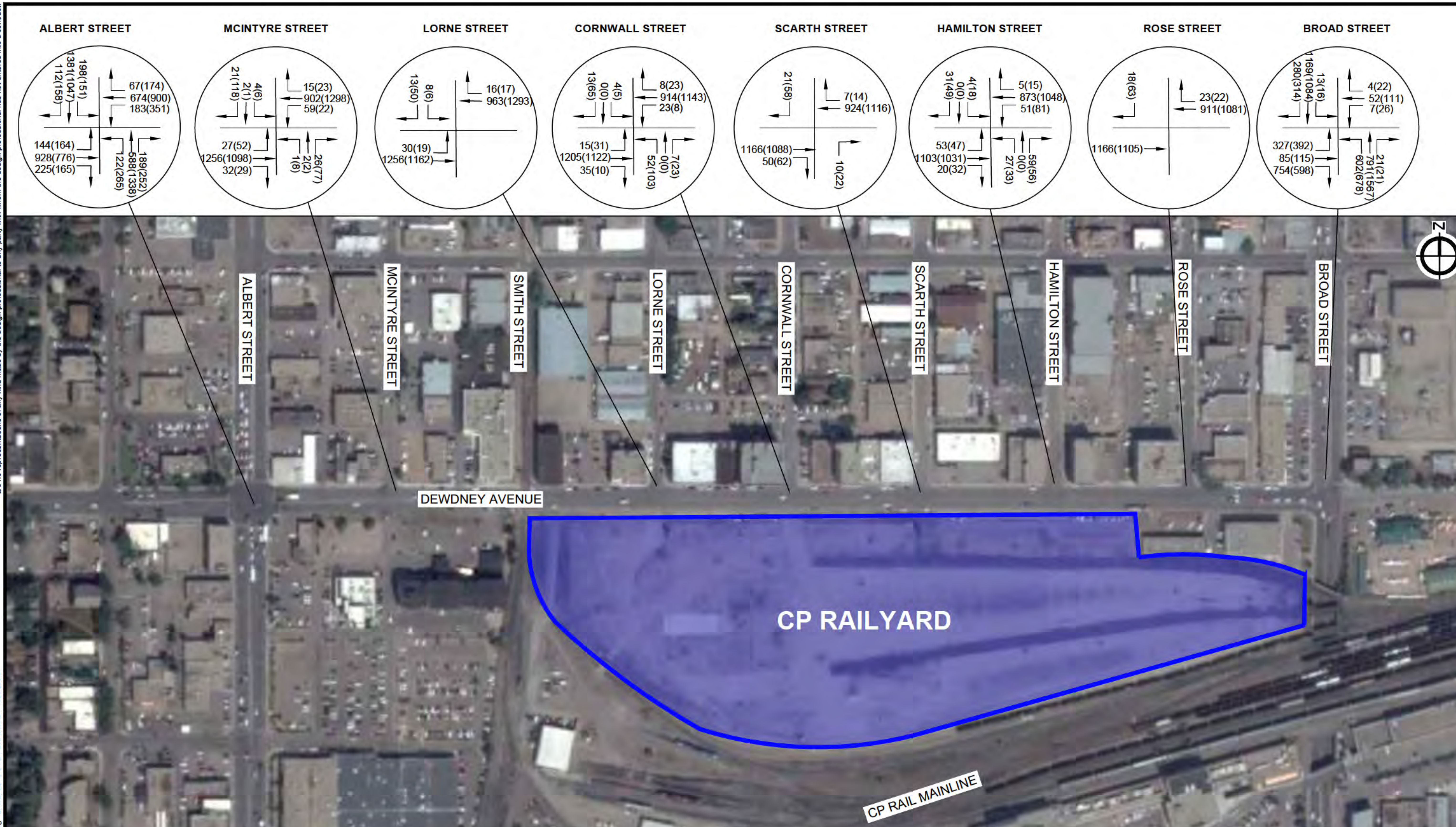

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Figure 2.8 - 2040 Post-Development Traffic (Right-In / Right-Out)

Regina Revitalization Initiative - Railyard Renewal Project TIA

3 EVENT TRAFFIC FORECAST

This section presents the forecasted future traffic volumes for a weekday evening event hosted at the large footprint facility for the subject roadways and study intersections.

3.1 EVENT BACKGROUND TRAFFIC VOLUMES

The event background traffic volume is the traffic that exists without the additional of the trips generated by the event occurring on the RRP development site. This will include a portion of the background traffic growth and the RRP development itself.

The following assumptions were used to develop the event background traffic volumes:

— It is anticipated that attendees will arrive overall a greater time period pre-event.

— The critical peak hour of the event will occur at the end of the event when attendees are leaving at the same time.

— The critical peak hour is anticipated to occur between 9:00 p.m. and 10:00 p m. This time frame was chosen as arena events typically start around 7:00 p m. and have a duration of just over 2 hours.

The City of Regina's 2018 Traffic Count Data for Dewdney Avenue was utilized to determine the time of day variance for the Dewdney Avenue Corridor. It was estimated that the amount of traffic on Dewdney Avenue between 9:00 p.m. and 10:00 p m. is approximately 34% when compared to the afternoon peak hour.

For this assessment, the event background traffic volume was estimated by taking 34% of the 2040 afternoon peak hour post-development (Right-in / Right-out) traffic volumes.

The 2040 evening event background traffic volumes are illustrated in **Figure 3-1.**

3.2 EVENT TRIP GENERATION

For the purposes of the event trip generation analysis, an event with an attendance of 10,000, equal to 100 percent of the seating capacity, was chosen for a conservative analysis.

The mode split (i.e. how attendees will arrive/depart from an event) is needed to estimate the number of vehicular trips generated by the large footprint facility during an event. At the old Mosaic Stadium, approximately 1.0% of the event attendees arrived by transit and another 3% arrived by the Football Express. At the new Mosaic Stadium, approximately 1.0% arrive by regular transit and another 25% to 30% of attendees arrive by the Mosaic Stadium Shuttle.

For this assessment, it is assumed that 3.5% of attendees would depart by transit from the event. A larger mode split for transit was not chosen (i.e. different than the new Mosaic Stadium), because it is not known if a shuttle service will be offered at this facility and it is anticipated that fewer attendees will arrive by transit during the winter months. The chosen transit mode split provides a conservative analysis for the Dewdney Avenue corridor during an event.

The 5% mode split for walking and cycling is consistent with the assumptions used during the Mosaic Stadium analysis.

The measured vehicle occupancy rate for people per vehicle in Canadian locations range from 2.4 to 2.6 for sporting events.[1]

[1] ND LEA Engineers & Planners Inc. *True North Centre Transportation Review, (November 2001).*

To estimate the traffic demand generated from an attendance of 10,000 people, the following factors were assumed:

- 3.5% mode split to transit;
- 5% mode split to walking/cycling;
- average of 2.4 people per vehicle; and
- 90 percent of traffic departs in one-hour period.

The resultant traffic demand during the one-hour departure after an event is approximately 3,430 vehicle trips. It is assumed that 3,430 vehicle trips will be exiting post-event.

3.3 EVENT TRIP DISTRIBUTION AND ASSIGNMENT

The proposed large footprint facility will attract trips from the residential areas around the city. The event trips were distributed to the road network using the population distribution splits, as summarized in **Table 3-1.**

Table 3-1 Event Traffic Distribution

DIRECTIONS FROM THE SITE	POPULATION DISTRIBUTION
North	25%
West	20%
South	40%
East	15%

The event traffic trip assignment was completed by evaluating the available parking within a 10-minute walking distance of the large footprint facility. **Section 6.2 Event Parking Requirements** discusses the details of the available parking in the surrounding area.

To determine the traffic assignment generated from an attendance of 10,000 people, the following factors were assumed:

- The pedestrian bridge linking the RRP site to the downtown was in place;
- 40% of attendees parked north of the railway tracks (i.e. on-site and within the Warehouse District); and,
- 60% of attendees parked south of the railway tracks (i.e. Downtown).

Therefore:

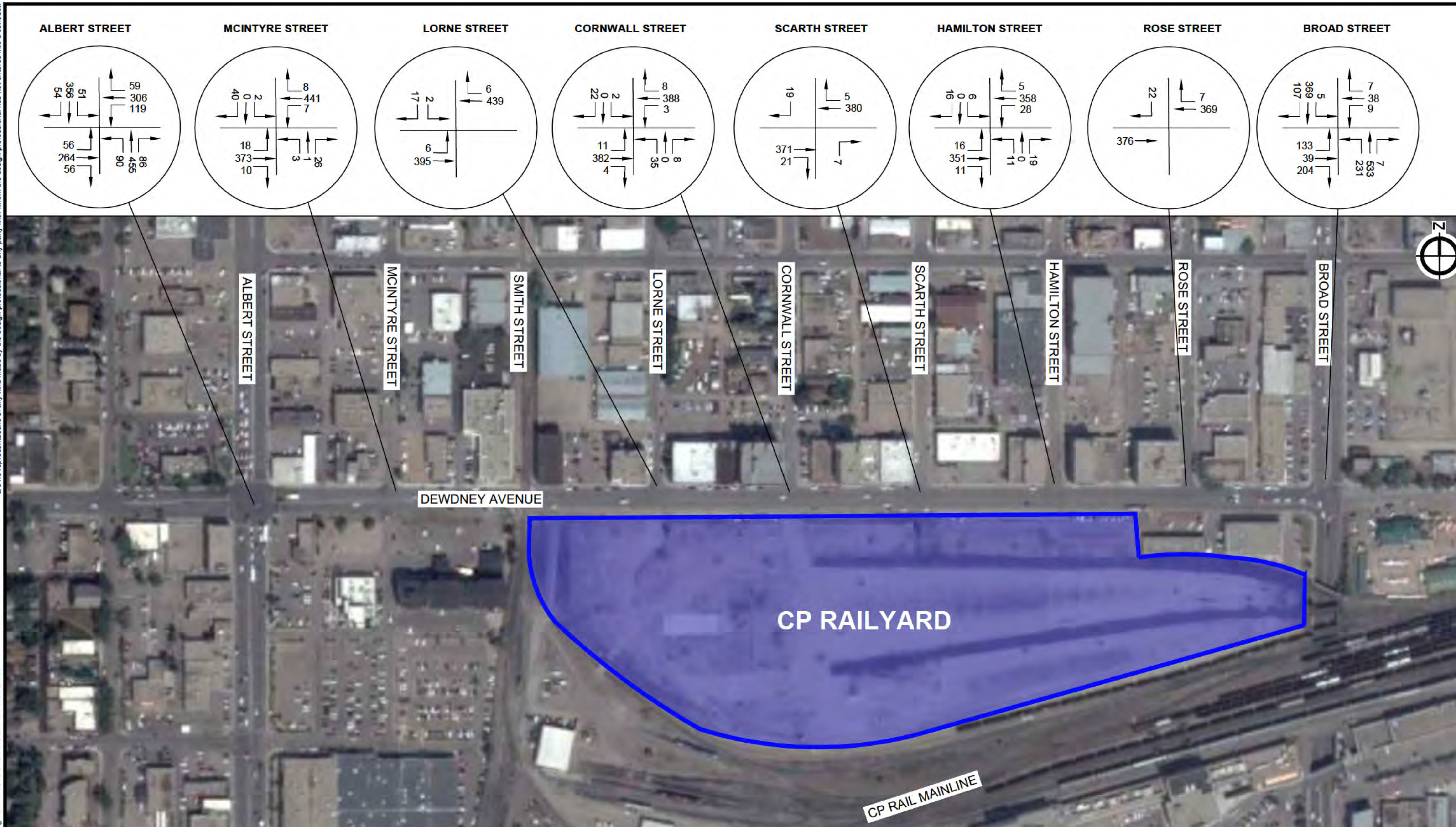
- 1,370 vehicle trips are exiting from the site/Warehouse District; and,
- 2,060 vehicle trips are exiting from the downtown area.

The event vehicle trips were assigned to the network based on the residential distribution and parking origins. The vehicle assignment accounts for the routes that drivers will use to reach their destination. All trips were assumed to be able to circulate freely and would choose the travel path that was most convenient. Additional assignment assumptions include that vehicles will opt to use 6th, 7th or 8th Avenue to exit the Warehouse District and trips destined to the west will use both Dewdney Avenue and Saskatchewan Drive.

The assigned event-generated trips for the large footprint facility are illustrated in **Figure 3-2.**

The event-generated trips (**Figure 3-2**) were added to the event background traffic volumes (**Figure 3-1**) to obtain the 2040 Weekday Evening Post-Event Traffic Forecast, illustrated in **Figure 3-3.**

NOTE: These design documents are prepared solely for the use by the party with whom the design professional has entered into a contract and there are no representations of any kind made by the design professional to any party with whom the design professional has not entered into a contract.



LEGEND:

10 TRAFFIC VOLUMES

9:00pm - 10 00pm

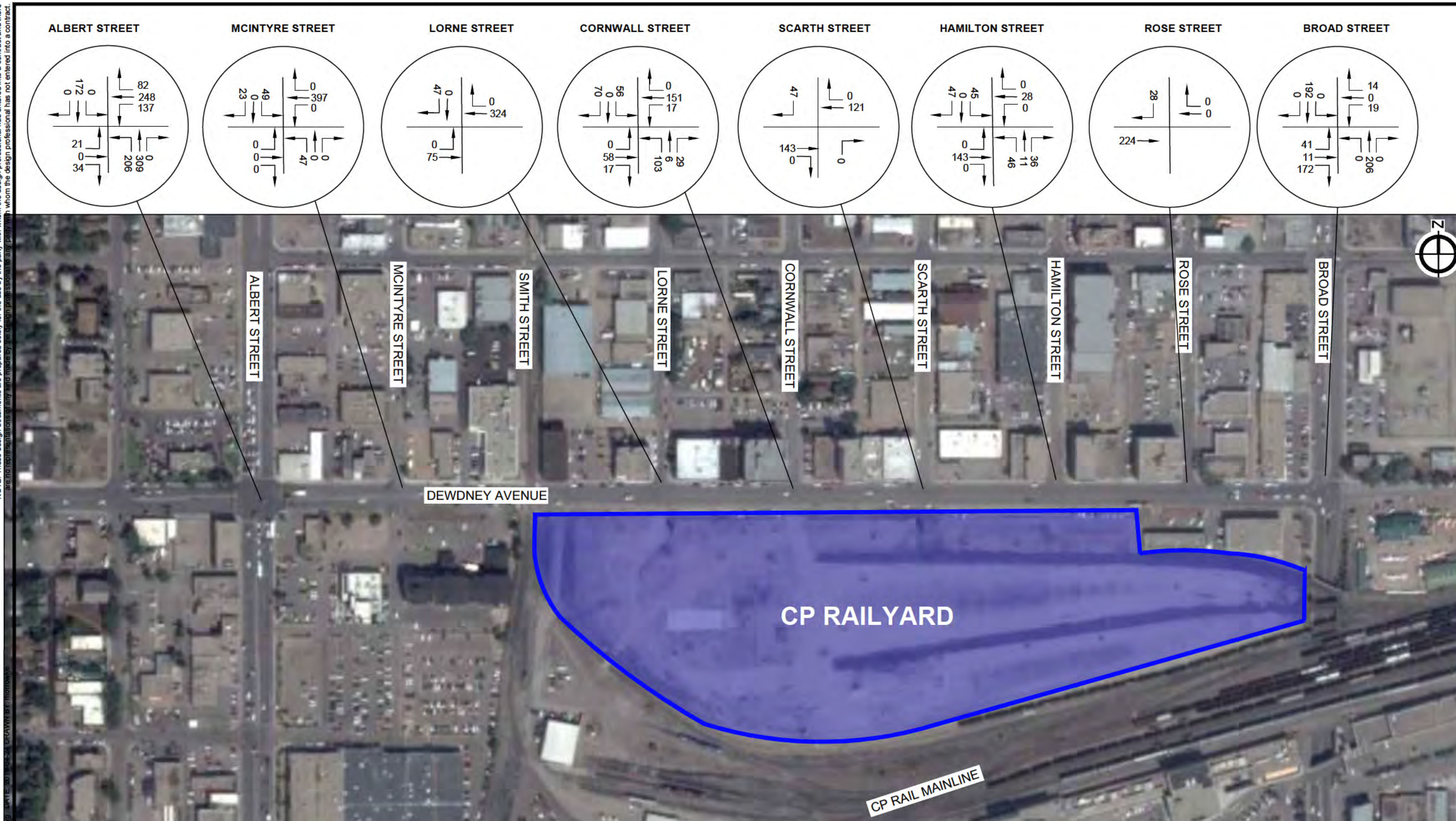
WSP Canada
395 Maxwell Cres.
Regina, SK, S4N 5X9
t. 306.205.7942
wsp.com

Issued Date - 2019-04-24
Not to Scale

Figure 3.1 - 2040 Weekday Evening (9pm-10pm) Background Traffic Forecast

Regina Revitalization Initiative - Railyard Renewal Project TIA

DRAWING: 151-09273-02-RRI Update.dwg DATE: 2019-04-24 DRAWN BY: morrowke



LEGEND:

10 TRAFFIC VOLUMES

POST-EVENT

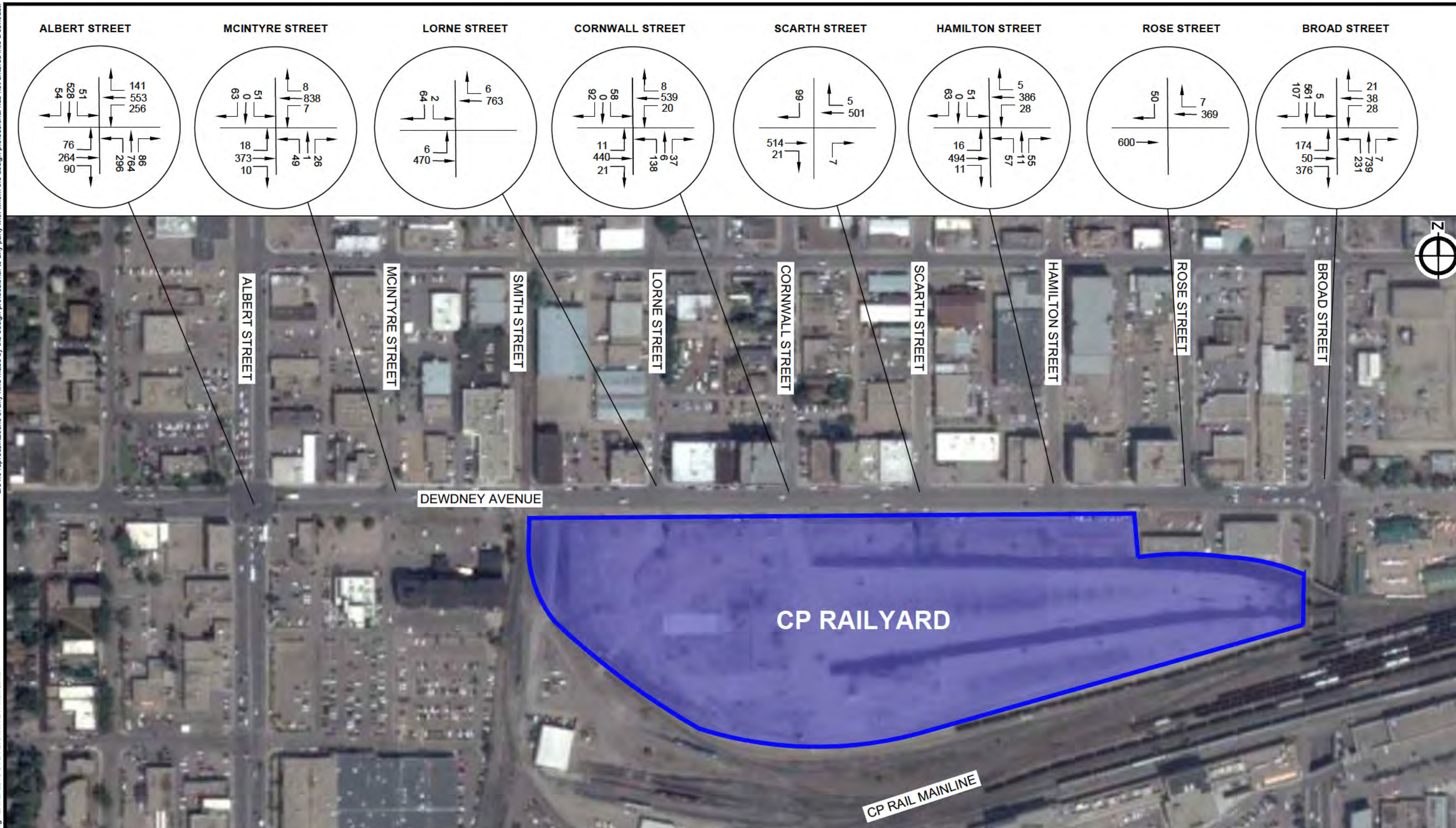
WSP Canada
395 Maxwell Cres.
Regina, SK, S4N 5X9
t. 306.205.7942
wsp.com

Issued Date - 2019-04-24
Not to Scale

Figure 3.2 - Arena-Generated Traffic Volumes (Post-Event)

Regina Revitalization Initiative - Railyard Renewal Project TIA

DRAWING: 151-09273-02-RRI Update



LEGEND:

10 TRAFFIC VOLUMES

9:00pm - 10 00pm / Post-Event

WSP Canada
395 Maxwell Cres.
Regina, SK, S4N 5X9
t. 306.205.7942
wsp.com

Issued Date - 2019-04-24
Not to Scale

Figure 3.3 - 2040 Weekday Evening (9pm-10pm) Total Traffic Forecast (Post-Event)

Regina Revitalization Initiative - Railyard Renewal Project TIA

NOTE: These design documents are prepared solely for the use by the party with whom the design professional has entered into a contract and there are no representations of any kind made by the design professional to any party with whom the design professional has not entered into a contract.

DRAWING: 151-09273-02-RRI Update.dwg DATE: 2019-04-24 DRAWN BY: morrowke

4 TRAFFIC OPERATIONS ASSESSMENT

This section presents the intersection assessment results for each study intersection and the proposed intersection control type (i.e., stop or signal control) and required lane configurations to meet the future traffic demand.

To evaluate the traffic operational performance, the following factors were assumed:

- The off-peak hour volume was considered at 80% of the afternoon peak hour post-development volumes, which is based on the time of day traffic distribution for Dewdney Avenue.
- Dewdney Avenue was analyzed as a 4-lane cross-section during the morning and afternoon peak hours.
- Dewdney Avenue was reduced to a 2-lane cross-section during the off-peak and evening event hours to allow on-street parking.
- The intersections of Dewdney Avenue and Cornwall Street and Dewdney Avenue and Hamilton Street were analyzed at signalized intersections.
- The intersections of Dewdney Avenue and Scarth Street and Dewdney Avenue and Rose Street were analyzed as right-in/right-out intersections.

Detailed Synchro reports are provided in **Appendix B**.

4.1 ALBERT STREET / DEWDNEY AVENUE

The Albert Street / Dewdney Avenue intersection is currently controlled by signals. **Table 4-1** summarizes the traffic operational performance at this intersection during the morning and afternoon peak hours under the 2040 post-development traffic conditions and **Table 4-2** summaries the off-peak traffic and weekday evening post-event traffic operational performance.

Table 4-1 Albert Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (AM & PM Peak Hour)

Signalized Intersection

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	30.2	C	0.60	36	40.4	D	0.73	42
EB-T,T	57.0	E	0.94	160	59.4	E	0.92	132
EB-R	14.4	B	0.43	38	8.8	A	0.35	20
WB-L	74.9	E	0.93	77	78.0	E	0.99	133
WB-T,T	39.3	D	0.67	101	40.7	D	0.79	132
WB-R	1.3	A	0.13	2	11.5	B	0.30	27
NB-L	63.5	E	0.83	55	75.6	E	0.96	105
NB-T,T,TR	31.1	C	0.52	71	67.1	E	1.02	183
SBL	28.6	C	0.66	45	71.1	E	0.89	64
SB-T,T,TR	39.1	D	0.86	147	59.5	E	0.96	139
INT Summary	40.9	D	0.94	-	57.4	E	1.02	--

Table 4-2 Albert Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (Off-Peak & Post-Event Peak Hour)

Signalized Intersection

TRAFFIC MOVEMENTS	Off Peak Hour				Weekday Evening Post-Event Peak Hour			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	32.3	C	0.61	31	33.7	C	0.43	21
EB-T,T	54.0	D	0.85	99	48.3	D	0.53	41
EB-R	6.0	A	0.31	13	2.3	A	0.26	2
WB-L	62.7	E	0.91	97	48.3	D	0.79	65
WB-T,T	40.0	D	0.73	103	45.3	D	0.70	77
WB-R	8.6	A	0.27	19	10.8	B	0.33	19
NB-L	44.5	D	0.81	78	19.7	B	0.65	68
NB-T,T,TR	35.7	D	0.76	129	18.8	B	0.37	71
SBL	49.4	D	0.74	51	14.6	B	0.17	14
SB-T,T,TR	36.8	D	0.66	98	24.8	C	0.30	58
INT Summary	39.7	D	0.91	--	29.0	C	0.79	--

The above capacity analysis reveals that the existing lane configuration at the Albert Street / Dewdney Avenue intersection is nearing its limits of available capacity during the forecasted 2040 afternoon peak hour post-development traffic scenario. Vehicles are anticipated to experience delay and congestion during the afternoon peak hour. The Albert Street / Dewdney Avenue intersection is expected to operate at acceptable levels of service during the morning peak hours and off-peak hours.

Adding lanes to the intersection to improve traffic operational performance will be difficult due to the right-of-way constraints and the existing nearby developments. Transportation demand management strategies and active transportation programs to reduce future traffic demand should be considered by the City.

The Railyard Renewal Secondary Plan area identifies the future east extensions of 9th Avenue and 10th Avenue into the proposed RRP development site. These roadway extensions will provide two more access points on Albert Street for the Railyard site. These two future access points are anticipated to reduce the traffic burden at the Albert Street / Dewdney Avenue intersection. Additional traffic analysis will be required if further developments are proposed and when the two roadway extensions are constructed in the Secondary Plan area.

The Albert Street / Dewdney Avenue intersection is anticipated to operate well, with individual movements operating at a LOS D or better during the weekday event post-event peak hour.

4.2 MCINTYRE STREET / DEWDNEY AVENUE

The McIntyre Street / Dewdney Avenue intersection is currently controlled by stop signs on McIntyre Street. Left turn lanes are provided for the east and westbound traffic. Two eastbound through lanes and two westbound through lanes are anticipated to be maintained during off-peak hours at this intersection. **Table 4-3** summarizes the traffic operational performance at this intersection during the morning and afternoon peak hours under the 2040 post-development traffic conditions and **Table 4-4** summarizes the off-peak traffic and weekday evening post-event traffic operational performance.

Table 4-3 McIntyre Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (AM & PM Peak Hour)

Stop-controlled Intersection

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	10.5	B	0.04	1	13.4	B	0.11	3
EB-T,TR	0.0	A	0.54	--	0.0	A	0.45	--
WB-L	13.7	B	0.13	4	11.5	B	0.04	1
WB-T,TR	0.0	A	0.38	--	0.0	A	0.54	--
NB-LT	>150	F	0.15	3	>300	F	0.55	11
NB-R	15.3	C	0.08	2	14.9	B	0.18	5
SB-LT	>150	F	0.23	5	>250	F	0.39	8
SB-R	12.3	B	0.04	1	18.9	C	0.33	11
INT Summary	1.4	A	0.53	--	3.5	A	0.53	--

Table 4-4 McIntyre Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (Off-Peak & Post-Event Peak Hour)

Stop-controlled Intersection

TRAFFIC MOVEMENTS	Off Peak Hour				Weekday Evening Post-Event Peak Hour			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	11.6	B	0.08	2	10.1	B	0.03	1
EB-T,TR	0.0	A	0.38	--	0.0	A	0.16	--
WB-L	10.4	B	0.03	1	8.2	A	0.01	0
WB-T,TR	0.0	A	0.45	--	0.0	A	0.36	--
NB-LT	118.4	F	0.22	5	31.6	D	0.29	8
NB-R	13.0	B	0.13	3	9.7	A	0.04	1
SB-LT	115.0	F	0.17	4	48.6	E	0.41	14
SB-R	15.3	C	0.23	7	12.6	B	0.13	3
INT Summary	2.1	A	0.45	--	3.7	A	0.41	--

The McIntyre Street / Dewdney Avenue intersection is anticipated to operate well overall during the morning, afternoon and off-peak hours. However, the northbound and southbound left/through movements are expected to experience longer delays (LOS F) during the morning, afternoon, and off-peak hours. The 95th percentile queue lengths indicate that during these time periods it is expected that one to two vehicles could be queued waiting to complete the northbound or southbound left or through movement.

The McIntyre Street / Dewdney Avenue intersection is anticipated to operate well (LOS A) overall, with individually movements operating at a LOS E or better, during the weekday evening post-event peak hour.

Considering the traffic volumes of the north and southbound left/through movements are anticipated to be low, it is anticipated that the existing intersection treatment and traffic control type at this intersection will be adequate to accommodate the forecasted future traffic.

4.3 LORNE STREET / DEWDNEY AVENUE

The Lorne Street / Dewdney Avenue intersection will be converted to a three-leg stop-controlled intersection since the large footprint facility is anticipated to remove the south leg of the intersection. Full movements are recommended at this intersection to allow traffic to divert from Lorne Street in the event that there is a train to the west.

On-street parking is recommended to be restricted to allow two through lanes (one way) on Dewdney Avenue during the morning and afternoon peak hours. On-street parking will be permitted on the curb lanes during the off-peak hours and one through lane will be provided on Dewdney Avenue during this time. The curb lanes in the vicinity of the intersection will function as right turn lanes.

Table 4-5 summarizes the traffic operational performance at this intersection during the morning and afternoon peak hours under the 2040 post-development traffic conditions and **Table 4-6** summarizes the off-peak traffic and weekday evening post-event traffic operational performance.

Table 4-5 Lorne Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (AM & PM Peak Hour)

Stop-controlled Intersection

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-LT	10.9	B	0.05	2	12.7	B	0.04	1
EB-T,T	1.1	A	0.54	--	0.8	A	0.48	--
WB-T,TR	0.0	A	0.41	--	0.0	A	0.53	--
SB-LTR	41.2	E	0.19	5	28.7	D	0.28	8
INT Summary	1.1	A	0.54	--	1.1	A	0.53	--

Table 4-6 Lorne Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (Off-Peak & Post-Event Peak Hour)

Stop-Controlled Intersection

TRAFFIC MOVEMENTS	Off Peak Hour				Weekday Evening Post-Event Peak Hour			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-LT	11.1	B	0.03	1	9.6	A	0.01	0
WB-R	0.0	A	0.01	--	0.0	A	0.0	--
WB-T	0.0	A	0.67	--	0.0	A	0.49	--
SB-LTR	35.8	E	0.30	9	17.7	C	0.20	5
INT Summary	0.9	A	0.67	--	0.9	A	0.49	--

The above capacity analysis reveals that the Lorne Street / Dewdney Avenue intersection is anticipated to operate well (LOS A) overall, with individual movements operating at a LOS E or better during the morning and afternoon peak hours with two through lanes (one way) on Dewdney Avenue and LOS E or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configuration with minor-street stop-control at this intersection can accommodate the forecasted future traffic.

The Lorne Street / Dewdney Avenue intersection is anticipated to operate well during the weekday evening post-event scenario with one through lane on Dewdney Avenue.

4.4 CORNWALL STREET / DEWDNEY AVENUE

The Cornwall Street / Dewdney Avenue intersection will be the first intersection accessing the RRP site from the west. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements. On-street parking is recommended to be restricted during peak hours. Thus, two through lanes (one way) will be available on Dewdney Avenue in the morning and afternoon peak hours. One through lane will be provided in the off-peak hours since on-street parking will be permitted on the curb lanes. The curb lanes in the vicinity of the intersection will function as right turn lanes.

Table 4-7 summarizes the traffic operational performance at this intersection during the morning and afternoon peak hours under the 2040 post-development traffic conditions and **Table 4-8** summarizes the off-peak traffic and weekday evening post-event traffic operational performance.

Table 4-7 Cornwall Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (AM & PM Peak Hour)

Signalized Intersection

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	7.3	A	0.04	4	9.0	A	0.13	7
EB-T,TR	9.2	A	0.56	123	9.0	A	0.53	84
WB-L	8.6	A	0.11	6	7.8	A	0.03	2
WB-T,TR	6.5	A	0.42	68	9.2	A	0.55	88
NB-LTR	15.1	B	0.23	10	26.1	C	0.45	26
SB-LTR	6.1	A	0.07	3	9.6	A	0.23	10
INT Summary	8.2	A	0.56	--	9.9	A	0.55	--

Table 4-8 Cornwall Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (Off-Peak & Post-Event Peak Hour)

Signalized Intersection

TRAFFIC MOVEMENTS	Off Peak Hour				Weekday Evening Post-Event Peak Hour			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	7.0	A	0.11	6	7.9	A	0.03	3
EB-T	24.5	C	0.89	276	11.2	B	0.51	74
EB-R	1.9	A	0.01	1	3.8	A	0.02	3
WB-L	6.2	A	0.03	2	7.8	A	0.05	5
WB-T	33.6	C	0.90	284	14.5	B	0.63	115
WB-R	3.2	A	0.02	3	1.9	A	0.01	1
NB-LTR	36.6	D	0.47	30	29.6	C	0.67	30
SB-LTR	11.2	B	0.23	10	12.3	B	0.46	16
INT Summary	28.2	C	0.90	--	14.8	B	0.67	--

The Cornwall Street / Dewdney Avenue intersection is anticipated to operate well (LOS C or better) overall, with individual movements operating at a LOS Cor better during the morning and afternoon peak hours with two through lanes (one way) on Dewdney Avenue and LOS D or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configuration and traffic control at this intersection will be capable of accommodating the forecasted future traffic.

The Lorne Street / Dewdney Avenue intersection is anticipated to operate well (LOS B) during the weekday evening post-event scenario with one through lane on Dewdney Avenue.

4.5 SCARTH STREET / DEWDNEY AVENUE

The Scarth Street / Dewdney Avenue intersection is recommended to be stop-controlled with free flow conditions on Dewdney Avenue. To maintain adequate flow on Dewdney Avenue and minimize collision risks, traffic movements from/to Scarth Street are recommended to be restricted to right-in and right-out movements.

Table 4-9 summarizes the traffic operational performance at this intersection during the morning and afternoon peak hours under the 2040 post-development traffic conditions and **Table 4-10** summarizes the off-peak traffic and weekday evening post-event traffic operational performance.

Table 4-9 Scarth Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (AM & PM Peak Hour)

TRAFFIC MOVEMENTS	Stop-controlled, Right-in/Right-out Intersection							
	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-T,TR	0.0	A	0.50	--	0.0	A	0.45	--
WB-T,TR	0.0	A	0.39	--	0.0	A	0.46	--
NB-R	14.2	B	0.03	1	13.7	B	0.05	2
SB-R	12.4	B	0.05	1	14.4	B	0.14	4
INT Summary	0.2	A	0.39	--	0.5	A	0.46	--

Table 4-10 Scarth Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (Off-Peak & Post-Event Peak Hour)

TRAFFIC MOVEMENTS	Stop-controlled, Right-in/Right-out Intersection							
	Off Peak Hour				Weekday Evening Post-Event Peak Hour			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-R	0.0	A	0.03	--	0.0	A	0.01	--
EB-T	0.0	A	0.56	--	0.0	A	0.33	--
WB-R	0.0	A	0.01	--	0.0	A	0.0	--
WB-T	0.0	A	0.58	--	0.0	A	0.32	--
NB-R	17.4	C	0.06	2	11.9	B	0.01	0
SB-R	19.4	C	0.17	5	12.8	B	0.13	4
INT Summary	0.6	A	0.58	--	0.8	A	0.33	--

The Scarth Street / Dewdney Avenue intersection is anticipated to operate well (LOS A) overall, with individual movements operating at a LOS B or better during the morning and afternoon peak hours with two through lanes (one way) on Dewdney Avenue and LOS C or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configuration and traffic control at this intersection will be capable of accommodating the forecasted future traffic.

The Scarth Street / Dewdney Avenue intersection is anticipated to operate well (LOS A) during the weekday evening post-event scenario with one through lane on Dewdney Avenue.

4.6 HAMILTON STREET / DEWDNEY AVENUE

The Hamilton Street / Dewdney Avenue intersection will be the first intersection accessing to the railyard site from the east. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements on Dewdney Avenue. On-street parking is recommended to be restricted during peak hours. Thus, two through lanes (one way) will be available on Dewdney Avenue in the morning and afternoon peak hours. One through lane will be provided in the off-peak hours since on-street parking will be permitted on the curb lanes. The curb lanes in the vicinity of the intersection will function as right turn lanes.

Table 4-11 summarizes the traffic operational performance at this intersection during the morning and afternoon peak hours under the 2040 post-development traffic conditions and **Table 4-12** summarizes the off-peak traffic and weekday evening post-event traffic operational performance.

Table 4-11 Hamilton Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (AM & PM Peak Hour)

Signalized Intersection

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	7.0	A	0.14	8	9.0	A	0.17	11
EB-T,TR	16.1	B	0.61	134	8.0	A	0.50	79
WB-L	7.5	A	0.17	8	11.6	B	0.30	20
WB-T,TR	13.1	B	0.48	83	8.0	A	0.50	80
NB-LTR	9.3	A	0.26	11	13.7	B	0.29	11
SB-LTR	2.0	A	0.10	2	11.0	B	0.22	9
INT Summary	14.0	B	0.61	--	8.4	A	0.50	--

Table 4-12 Hamilton Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (Off-Peak & Post-Event Peak Hour)

TRAFFIC MOVEMENTS	Signalized Intersection							
	Off Peak Hour				Weekday Evening Post-Event Peak Hour			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	7.7	A	0.14	8	7.3	A	0.03	4
EB-T	19.9	B	0.80	233	11.9	B	0.52	103
EB-R	3.8	A	0.02	4	2.4	A	0.01	1
WB-L	9.0	A	0.23	14	6.6	A	0.06	5
WB-T	19.6	B	0.81	238	10.1	B	0.40	84
WB-R	2.7	A	0.01	2	0.6	A	0.00	1
NB-LTR	14.7	B	0.26	14	13.8	B	0.38	13
SB-LTR	13.0	B	0.20	11	11.6	B	0.35	12
INT Summary	18.5	B	0.81	--	11.2	B	0.52	--

The Hamilton Street / Dewdney Avenue intersection is anticipated to operate well (LOS B or better) overall during both the morning and afternoon peak hours with two through lanes (one way) on Dewdney Avenue. The intersection is anticipated to operate well (LOS B) in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configuration and traffic control at this intersection will be capable of accommodating the forecasted future traffic.

The Scarth Street / Dewdney Avenue intersection is anticipated to operate well (LOS B) during the weekday evening post-event scenario with one through lane on Dewdney Avenue.

4.7 ROSE STREET / DEWDNEY AVENUE

The Rose Street / Dewdney Avenue intersection is a three-legged intersection and is recommended to be controlled by a stop sign on Rose Street. Traffic movements from/to Rose Street are recommended to be restricted to right-in and right-out.

Table 4-13 summarizes the traffic operational performance at this intersection during the morning and afternoon peak hours under the 2040 post-development traffic conditions and **Table 4-14** summarizes the off-peak traffic and weekday evening post-event traffic operational performance.

Table 4-13 Rose Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (AM & PM Peak Hour)

Stop-Controlled, Right-in/Right-out Intersection

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-T,T	0.0	A	0.37	--	0.0	A	0.34	--
WB-T,TR	0.0	A	0.39	--	0.0	A	0.45	--
SB-R	12.4	B	0.04	1	14.3	B	0.15	4
INT Summary	0.1	A	0.39	-	0.4	A	0.45	--

Table 4-14 Rose Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (Off-Peak & Post-Event Peak Hour)

Stop-Controlled, Right-in/Right-out Intersection

TRAFFIC MOVEMENTS	Off Peak Hour				Weekday Evening Post-Event Peak Hour			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-T	0.0	A	0.57	--	0.0	A	0.38	--
WB-T	0.0	A	0.37	--	0.0	A	0.24	--
WB-R	0.0	A	0.20	--	0.0	A	0.00	--
SB-R	12.6	B	0.11	3	11.1	B	0.08	2
INT Summary	0.3	A	0.57	--	0.5	A	0.38	--

The Rose Street / Dewdney Avenue intersection is anticipated to operate well (LOS A) overall, with individual movements operating at a LOS B or better during the morning and afternoon peak hours with two through lanes (one way) on Dewdney Avenue and LOS B or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configuration and traffic control at this intersection will be capable of accommodating the forecasted future traffic.

The Rose Street / Dewdney Avenue intersection is anticipated to operate well (LOS A) during the weekday evening post-event scenario with one through lane on Dewdney Avenue.

4.8 BROAD STREET / DEWDNEY AVENUE

The Broad Street / Dewdney Avenue intersection is currently controlled by signals. **Table 4-15** summarizes the traffic operational performance at this intersection during the morning and afternoon peak hours under the 2040 post-development traffic conditions and **Table 4-16** summarizes the off-peak traffic and weekday evening post-event traffic operational performance.

Table 4-15 Broad Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (AM & PM Peak Hour)

Signalized Intersection

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	46.3	D	0.76	121	>300	F	1.66	182
EBT	29.8	C	0.15	30	43.5	D	0.35	39
EBR	39.8	D	0.97	194	20.1	C	0.86	67
WBL	24.9	C	0.02	5	30.3	C	0.09	10
WBTR	33.2	C	0.15	21	47.4	D	0.50	43
NBL	>250	F	1.51	271	94.5	F	1.09	293
NBT,TR	16.2	B	0.46	76	17.0	B	0.73	205
SBL	30.4	C	0.08	8	41.4	D	0.22	10
SBT,T	129.8	F	1.18	231	120.2	F	1.15	208
SBR	13.0	B	0.51	41	12.8	B	0.56	42
INT Summary	93.0	F	1.51	--	77.9	E	1.66	--

Table 4-16 Broad Street / Dewdney Avenue 2040 Post-Development Traffic Operations Summary (Off-Peak & Post-Event Peak Hour)

Signalized Intersection

TRAFFIC MOVEMENTS	Off Peak Hour				Event Peak Hour			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EB-L	>250	F	1.51	135	51.7	D	0.71	52
EB-T	46.9	D	0.34	33	42.2	D	0.19	20
EB-R	11.3	B	0.76	29	12.6	B	0.70	37
WB-L	33.2	C	0.09	9	33.5	C	0.13	11
WB-TR	51.1	D	0.51	36	33.8	C	0.29	18
NB-L	40.3	D	0.85	231	10.6	B	0.46	46
NB-T,TR	11.7	B	0.59	148	8.7	A	0.34	73
SB-L	35.8	D	0.14	8	19.2	B	0.01	4
SB-T,T	63.7	E	0.97	159	16.4	B	0.31	77
SB-R	8.1	A	0.47	25	4.5	A	0.14	12
INT Summary	50.4	D	1.51	--	16.0	B	0.71	--

The Broad Street / Dewdney Avenue intersection is expected to operate poorly (LOS E or worse) during the morning and afternoon peak hours. Lengthy delays and congestion are anticipated for the northbound left and southbound through movements during both the morning and afternoon peak hours, as well as the eastbound left during the afternoon peak hour. The intersection is anticipated to operate with delay (LOS D) during the off-peak hours. The eastbound left turn movement is expected to operate poorly (LOS F) in the off-peak hours.

The above capacity analysis reveals that the existing lane configuration at the Broad Street / Dewdney Avenue intersection are not expected to be capable of accommodating the forecasted 2040 peak hour traffic volumes.

Adding lanes to the intersection to improve traffic operational performance will be difficult due to the right-of-way constraints and the railway overpass bridge on Broad Street to the south. Transportation demand management strategies and active transportation programs to reduce future traffic demand should be considered by the City.

The Broad Street / Dewdney Avenue intersection is anticipated to operate well (LOS B) during the weekday evening post-event, with individual movements operating at a LOS C or better.

5 ROADWAY NETWORK

5.1 RAILYARD SITE INTERNAL ROADWAY NETWORK

The internal roadway network within the Railyard site is based on a grid system with the extension of existing north-south local streets and walkways (Cornwall Street, Scarth Street and Hamilton Street) south across Dewdney Avenue into the site. Due to the placement of the large footprint facility, Lorne Street will not extend into the RRP development site and will terminate at Dewdney Avenue. A site access will be provided just west of the Lorne Street intersection that will provide access to parking for the large footprint facility, as illustrated in **Figure 5-1**.

Figure 5-1 RRP Internal Road Network

The north-south local streets will be linked by an east-west local street, extending from Cornwall Street to Rose Street, to facilitate movement throughout the site for pedestrians, cyclists and drivers. These internal streets will be contained within a 22-meter right-of-way with 11 meters assigned to the street for two vehicle travel lanes and parking on both sides and 5.5-meters on each side for pedestrian amenities. The pedestrian boulevards will accommodate 2.5-meter sidewalks and zones for street trees, furnishings, utility boxes and streetlights. Pedestrian crossings and traffic control (signage and pavement markings) should be designed to enhance pedestrian safety to create safe interfaces between different modes of travel and a comfortable environment for circulation. The internal streets and intersections should be designed to accommodate the movement of emergency vehicles (e.g., fire truck) and garbage trucks.

Items that will require additional review if the large footprint facility is chosen to be included on the RRP site plan include:

- Emergency services will require a circulation route around the entire facility for fire suppression and ambulance access;
- Adequate clear-throat distances should be provided at the facilities parking lot entrances to maintain on-site circulation and reduce the blocking of vehicles entering or exiting the site;

- Parallel parking should be considered at the main entrance instead of 90-degree parking to ensure uninterrupted traffic flow;
- An Event Traffic and Parking Management Plan will need to be completed to identify the pick-up and drop-off locations, on-site circulation, and clear pedestrian paths for pre- and post-event.

5.2 DEWDNEY AVENUE CROSS SECTIONS (ALBERT STREET TO BROAD STREET)

The *Regina Revitalization Initiative Railyard Renewal Project Transportation Impact Analysis (March 2, 2018)* presented the Dewdney Avenue cross sections for the corridor in front of the RRP development site. These cross-sections utilized complete streets principles help to balance the use of cars, bicycles, pedestrians and public transit vehicles in the right-of-way. The proposed mid-block road cross section is illustrated in **Figure 5-2** and the road cross section at signalized intersections is shown in **Figure 5-3.**

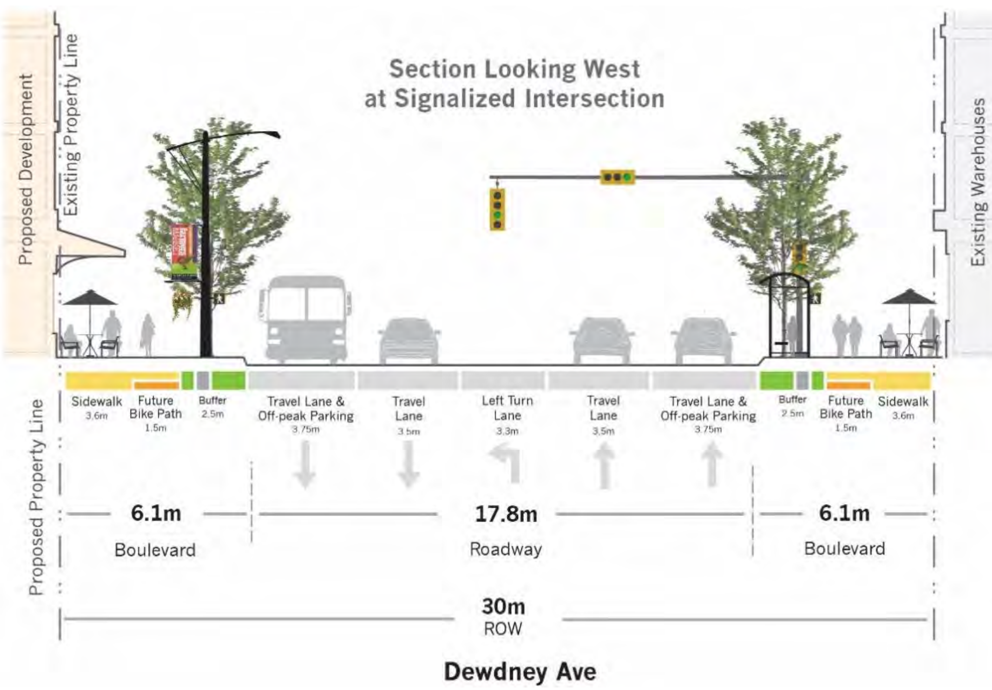
The traffic operations analysis completed in **Section 4** of this report utilized these original cross sections to evaluate the study intersections and the Dewdney Avenue Corridor. The study intersections located in front of the RRP development (Lorne Street, Cornwall Street, Scarth Street, Hamilton Street, Rose Street) operated well overall during the morning, afternoon, off-peak, and the weekday evening post-event peak hours.

The weekday evening post-event traffic analysis assumed that on-street parking will be permitted on the curb lanes during the off-peak hours and one through lane would be provided on Dewdney Avenue during this time. The study intersections located in front of the RRP development are anticipated to operate well during the weekday evening post-event scenario.

If it is found that the delay or congestion reaches unacceptable levels post-event, parking can be restricted along Dewdney Avenue during an event to accommodate the traffic pre- and post-event. This strategy has already been implemented in Regina around Mosaic Stadium during events.

The Dewdney Avenue cross sections presented in **Figure 5-2** and **Figure 5-3** are expected to continue to be adequate to accommodate the RRP development.

Figure 5-2 Proposed Mid-Block Cross Section



Source: WSP and Urban Strategies Inc.

Figure 5-3 Proposed Cross Section at Signalized Intersection

5.3 DEWDNEY AVENUE (CITY LIMITS TO BROAD STREET)

Dewdney Avenue is one of the key east-west arterials within the city of Regina. Dewdney Avenue connects the Railyard Renewal Project, the Warehouse District, the new Mosaic Stadium, redevelopment of Taylor Field Neighbourhood, the Pasqua Hospital (as one of the two main hospitals in Regina), the RCMP depot, the North Central community, Westerra (one of our newest neighbourhoods planned with cycling amenities), future First Nations development, and the Global transportation hub, as illustrated in **Figure 5-4.**

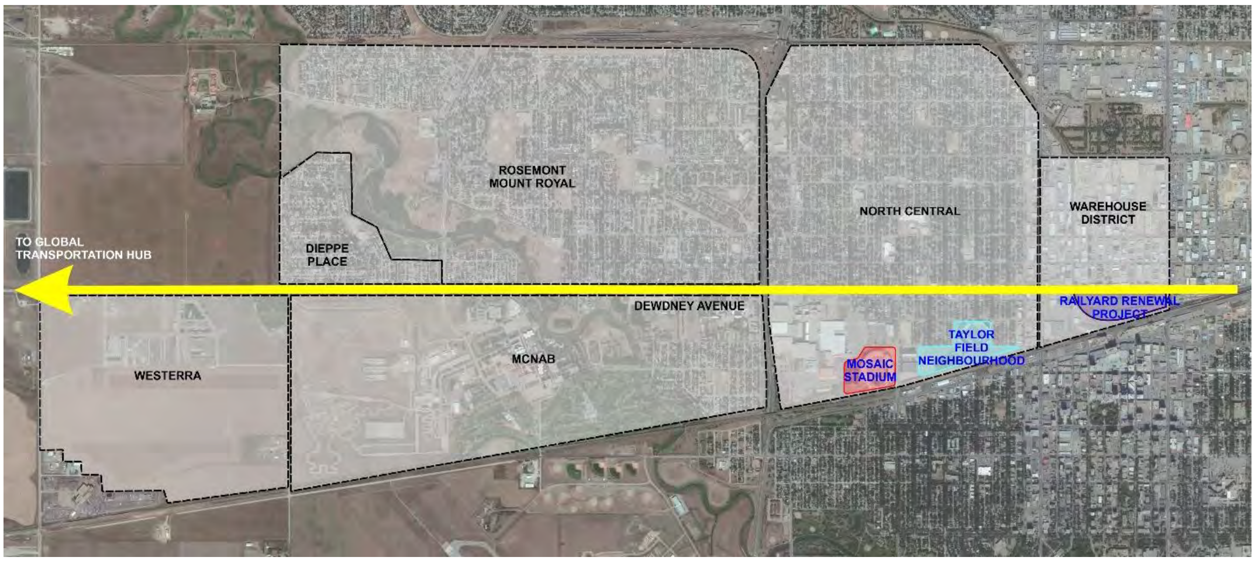


Figure 5-4 Dewdney Avenue Corridor

While the cross sections along this corridor will vary to meet the various needs of each neighbourhood, there exists an opportunity to develop the corridor with continuity between the various sections and modes. Opportunities that exist, include but are not limited to:

— Identify multimodal solutions for pedestrians and cyclist such as, the incorporation of cycling lanes from the Devonian Park pathway to the off-street cycling lanes are planned for Dewdney Avenue between Albert Street and Broad Street);

— Identify transit priority measures and Bus Rapid Transit measures along Dewdney Avenue to provide alternative transportation choices for both work and play;

— Provide shuttle buses to improve parking at the Hospital, game day at Mosaic Stadium, the large footprint facility, or other transit priority measures;

— Support alternative mode choices for providing a safe ride home can also be included in the development plan for those attending sporting events or enjoying the nightlife in the Warehouse District;

— Identify key locations for traffic calming measures to provide a safe environment for pedestrians; and,

— Prepare for the inclusion of micro-mobility options, such as electric scooters as a form of transportation.

6 PARKING REQUIREMENTS

A priority of the redevelopment is to support walking, cycling, and use of public transportation while ensuring the needs of the site are met but not oversupplied in terms of parking and loading spaces/areas – this means providing an appropriate number of parking stalls and ensuring safety of users during loading.

Parking demand is subject to many elements including the neighbourhood design, and availability and quality of infrastructure for alternative modes of transportation (e.g. walking, cycling, and transit). Research indicates that in urban areas with mixed uses and good transit access, and where the city's goals include increasing mode share for walking, cycling, and transit, limited parking should be provided with an "efficiency-based"[2] parking approach. This approach is based in the idea that parking supply is designed to fill to capacity on a regular basis, rather than designed to provide an oversupply. Urban neighbourhoods with a variety of land uses, and quality active modes and transit infrastructure can successfully apply an efficiency-based parking approach.

6.1 CITY OF REGINA PARKING REQUIREMENTS

Parking requirements for the proposed RRP development was determined using the City of Regina's Zoning Bylaw No. 9250 [1992/9250].

The City's Zoning Bylaw specifies the number of parking stalls required based on the type of uses and the associated GFA. **Table 6-1** summarizes the total number of stalls required for each land use, as specified by the Zoning Bylaw – Parking and Loading Regulations for Commercial Uses (Section 14B.5.3).

Table 6-1 Parking Requirements by City of Regina Bylaw

Land Use	City of Regina Zoning Bylaw 9250		
	Units	Rates (No. of Spaces per Unit	Minimum No. of Parking Stalls Required
Residential	652 Dwelling Units	1 Space per Dwelling Unit	652
Retail	4,000 m^2	1 Space per 20 m^2 GFA	200
Office	6,400 m^2	1 Space per 60 m^2 GFA	107
Community	3,200 m^2	1 Space per 20 m^2 GFA	160
Cultural	4,100 m^2	1 Space per 20 m^2 GFA	410
Large Footprint Facility	10,000 seats	No Requirement	--
Total	--	--	**1,529**

The City's Zoning Bylaw indicates that sports stadia, over 10,000 seats, have no requirements for the minimum number of parking spaces that must be provided. **Figure 5-2** illustrates that some parking will be provided surrounding the large footprint facility. Initial estimates show approximately 200 parking stalls; however, this number is subject to change as the plan becomes more defined. The final plan should maintain some parking for the large footprint facility for day-to-day operations. The presented parking minimum do not include event parking.

In total, the City's Zoning Bylaw indicates that 1,529 parking stalls should be provided on the RRP development site. These rates do not take into consideration the efficiencies that can be achieved with a blend of land uses. These rates also do not reflect the accessibility of this site by modes other than private vehicle.

[2] Parking Management: Strategies, Evaluation and Planning, Victoria Transport Policy Institute, 2016

In additional to vehicle parking stalls, the development will also need to comply with the City's Zoning Bylaws for bicycle and accessible parking needs.

To reduce the number of parking stalls needed on-site, several Transportation and Parking Demand Management Strategies can be implemented. Further details are discussed in **Section 8.0.**

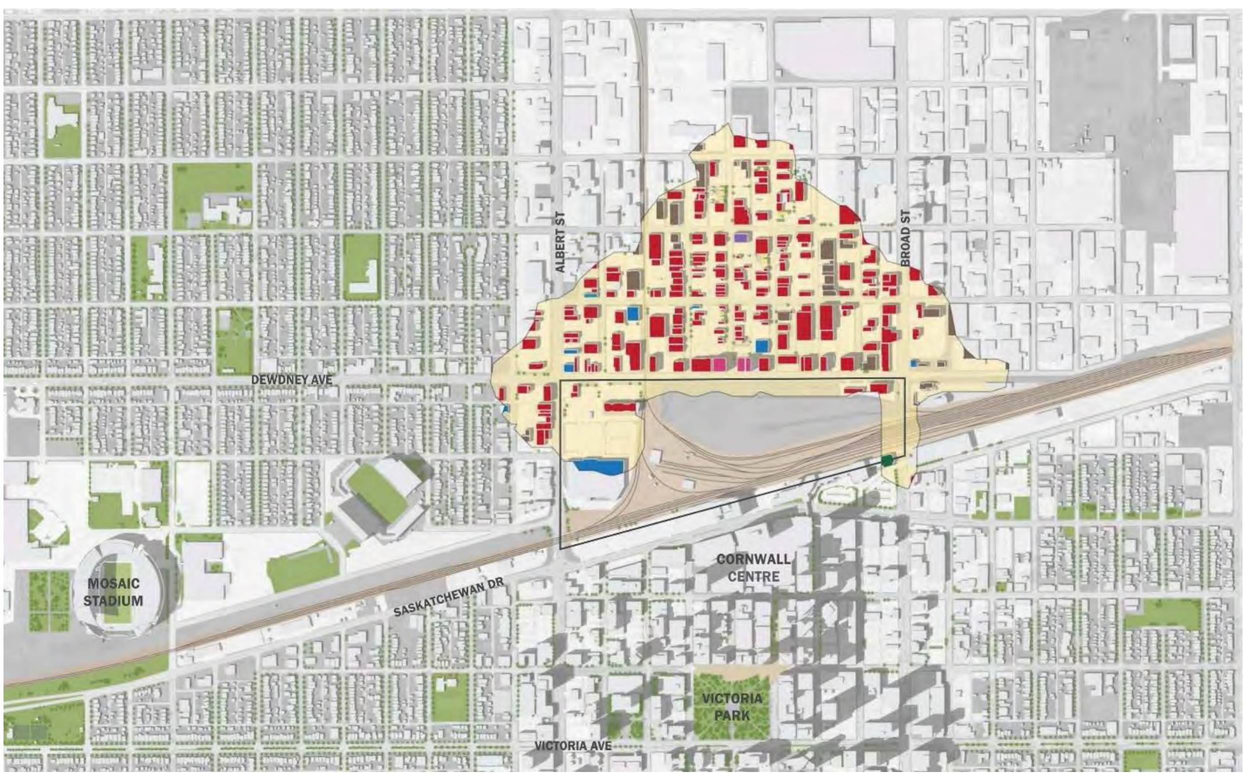
6.2 EVENT PARKING REQUIREMENTS

For the purposes of the event parking requirements, an event with an attendance of 10,000, equal to 100 percent of the seating capacity, was chosen for a conservative analysis. To determine the traffic demand generated from an attendance of 10,000 people, the following factors were assumed:

— 3.5 percent mode split to transit;
— 5 percent mode split to walking/cycling;
— average of 2.4 people per vehicle; and

The resultant parking demand is approximately 3,800 vehicles. This parking demand is considered to be on the conservative side, given that no event transit shuttle is assumed and measured values for people per vehicle for Canadian locations range from 2.4 to 2.6 for sporting events.

The potential parking destinations was evaluated surrounding the RRP development site. **Figure 6-1** illustrates the area currently accessible within a 10-minute walk of the RRP development, without the pedestrian bridge, and **Figure 6-2** illustrates the area accessible with the construction of a pedestrian bridge.



Source: Urban Strategies Inc.

Figure 6-1 Area Accessible within 10-minute Walk (No Pedestrian Bridge)

Source: Urban Strategies Inc.

Figure 6-2 Area Accessible within 10-minute Walk (with Pedestrian Bridge)

Note that the construction of the pedestrian bridge will put much of the downtown within a short walking distance of the RRP development site.

The on-street public parking was estimated to determine where event attendees may park. **Table 6-2** summarizes the on-street public parking supply within a 10-minute walk from the RRP development. The percent occupied representations the percentage of vehicles that would normally be parked on the street if an event was not occurring. The percentage used from this analysis was estimated from previous parking occupancy studies completed for Mosaic Stadium in 2017.

Table 6-2 Parking Supply Summary

LOCATION	PARKING SUPPLY	PERCENT OCCUPIED	ESTIMATED PARKING AVAILABILITY
On-site	214	0%	214
Warehouse District	1,900*	35%	1,240*
Downtown Public Parking	5,000*	35%	3,250*

* On-street Public Parking Estimates

Not included in the summary, but also available is the off-street private parking in the Warehouse District and in the Downtown. The number of off-street private parking stalls in the Warehouse District was not available at the time of this study; however, the Downtown Off-Street Private Parking estimated at +7,000 parking stalls.

Table 6-2 summarizes estimated on-street public parking available within a 10-minute walk from the large footprint facility. Without a pedestrian bridge to the downtown, there is approximately 1,450 parking spaces available, which results in an estimated shortfall of 2,350 parking stalls.

With the construction of a pedestrian bridge. the estimated parking supply available is estimated at 4,700 parking spaces. The pedestrian bridge is a crucial component in providing an adequate amount of parking for the large footprint facility during an event.

Based on the on-street public parking availability it is estimated that 40% of attendees will park on-site or in the Warehouse District and 60% of attendees will park in the Downtown.

The presented parking demand is based on the information available at the time of this study. Several considerations that may influence the parking demand during an event including:

- A Transit Shuttle Service, similar to the service provided for Mosaic Stadium, may reduce the demand for event parking. However, considering that events may be held during the winter months, attendee's desires to wait for a transit shuttle at night and in the cold may be limited.
- Providing safe and secure bicycle parking may reduce the parking demand for events that are held during the temperate months.
- An effective communication plan can alter attendee's mode choice and travel patterns.
- Event planning pre- and post-event can attract attendees to come sooner and stay longer which will reduce the immediate traffic demand pre- and post-event.
- An Event Traffic and Parking Plan is recommended to address the parking demand and identify mitigation measures needed to safely accommodate traffic and pedestrians pre- and post-event.
- Off-street parking in the Warehouse District is not taken into account in the supply calculations.

7 TRANSPORTATION DEMAND MEASURES

Transportation Demand Management (TDM) is one of the approaches that Canadian municipalities and regional transportation authorities are using to create sustainable, more efficient and reliable transportation systems. By definition, TDM is a multi-faceted and multi modal approach used to reduce or redistribute transportation demand. The primary purpose of TDM is to reduce the number of vehicles using the road network by influencing individual travel behaviour and providing a wide variety of mobility options to those who wish to travel. TDM is a key tool in transportation planning and operations and represents a cost-effective way to ease congestion, expand transportation choice, and reduce the need to expand capacity.

The City's Transportation Master Plan (2015) depicts TDM policies and actions that the City should adopt and implement. These policies and actions are expected to influence travel behaviour towards more sustainable choices including shifting modes away from single occupant vehicles (SOVs) to active modes, transit, and carpooling; reducing the number of trips they make (e.g. telecommuting), and travelling more efficiently (e.g. travelling outside of peak hours).

The forecasted future traffic volumes are expected to exceed the existing intersection capacity at the two major intersections on Albert Street and Broad Street. The following TDM strategies can be considered to minimize infrastructure needs by reducing the number and length of auto trips, and by shifting vehicle trips away from Dewdney Avenue.

7.1 ALTERNATIVE ROUTES

The existing traffic flow patterns indicate that approximately 75% of the trips on Dewdney Avenue between Albert Street and Broad Street are pass-by trips (origins or destinations are outside of the corridor area).

If alternate routes with suitable traffic operation performance (less congestion, shorter delay, and fewer stops) are available, commuters may use alternative routes to reach their destinations instead of using Dewdney Avenue. Saskatchewan Drive to the south and 7th Avenue to the north are potential roadways that commuters may use as alternate routes to Dewdney Avenue. 7th Avenue is located approximately 350 m north of and parallel to Dewdney Avenue and is a two-lane collector road in the City's Warehouse District. 7th Avenue could possess capacity to accommodate diverted traffic from Dewdney Avenue. If access management strategies (minimize number of accesses along the corridor) is applied and on-street parking is restricted during the morning and afternoon peak hours, 7th Avenue may attract more traffic and result in reduced traffic demand on Dewdney Avenue. Between Albert Street and Broad Street, Saskatchewan Drive is a divided arterial road running through the City's downtown area. Saskatchewan Drive may not be an ideal alternate route to divert the traffic from Dewdney Avenue as it is anticipated to be congested already in the peak hours. However, some low-cost methods could be implemented to improve traffic operation performance along the corridor, such as restricting on-street parking during peak hours and optimizing traffic signal timing.

7.2 PUBLIC TRANSIT

Public transit presents a realistic alternative to private automobile travel because it provides accessible service for long and short commutes, and is comfortable in inclement weather.

The City of Regina currently provides several transit routes surrounding the CP railyard site, including:

- Bus Routes #1, 2, 3, and 5 are available on Albert Street;
- Bus Routes #1 and 10 are available on Broad Street; and

— Bus Routes #4 and 5 are available on Dewdney Avenue.

INCREASED SERVICE FREQUENCY

The City could consider increasing the transit service frequency on Dewdney Avenue to meet the future transit patron demand as a result of the Railyard Renewal Project. In addition, the City should provide safe, secure bike parking at major transit stops and stations. Valuing the people who ride public transit with proper provision of shelters and services is essential to increasing ridership.

SUBSIDIZE TRANSIT USE

Subsidizing transit tickets or transit passes for tenants/residents/visitors would incentivize greater transit use and reduce parking demand.

7.3 PEDESTRIAN FACILTIES

Walking is the simplest and most sustainable form of transportation. It carries zero cost, is versatile and is impervious to congestion or delay on the roads. Except in the most extreme temperatures, walking is a viable means of travel for all short trips.

Sidewalks are provided along both sides of Albert Street and Broad Street, except at the Broad Street underpass where only the west side sidewalk is provided. There is no sidewalk on the east side. Sidewalks are provided only on the north side of Dewdney Avenue between Albert Street and Broad Street.

Trails or lanes dedicated to cyclists are not provided in the RRP surrounding area.

PEDESTRIAN FACILITY IMPROVEMENTS

To encourage walking within the City centre, in addition to improving the existing pedestrian facility conditions, more pedestrian facilities such as sidewalks, crosswalks and shared pathways should be developed. Pedestrian accessibility features, such as ramps, audible signals and countdown timers that make walking an easy choice for everyone should also be added.

PEDESTRIAN BRIDGE

The pedestrian bridge will be an critical linkage between the downtown and the RRP development site. The proposed pedestrian bridge linking the railyard with downtown is anticipated to reduce the automobile traffic demand from the RRP development. It will also provide a direct connection between the parking available in the downtown and the large footprint facility during events. This pedestrian bridge will help meet the parking demands generated by the large footprint facility.

7.4 CYCLING FACILITIES

Cycling plays an important role in transportation demand management and can substitute directly for automobile trips. Communities that improve cycling conditions often experience significant increases in bicycle travel and related reductions in vehicle travel.

CYCLING IMPROVEMENTS

Providing adequate bicycle facilities, including Bike Lanes, Bicycle Boulevards, Cycle Tracks, Bicycle End-of-Trip Facilities and other infrastructure, will encourage cycling as a daily mode of transportation.

It is recommended that the City of Regina create more bicycle-friendly infrastructure throughout the City including the RRP and Downtown areas and integrate it with the City policies, practices and programs. A Pedestrian and

Bicycle Master Plan is recommended to be developed to assess the existing pedestrian and bicycle facilities within the City and to create a comprehensive City-wide pedestrian and cycling network, as well as to provide supporting policies and programs to encourage walking and cycling. A dedicated bike lane is recommended to be provided on the pedestrian bridge linking the railyard with downtown.

SECURE BIKE PARKING

Bike thefts can make biking unattractive and can result in a decrease in bike users. Provision of convenient and secure bicycle parking is an important part of cycling infrastructure. The City may require private parking lots and garages for cars, as well as commercial and residential buildings to provide bicycle parking. Effective bicycle parking requires a properly designed rack in an appropriate location.

END OF TRIP FACILITIES

Providing change rooms equipped with showers and lockers encourages bike use to and from the site. These should have sufficient capacity to support the anticipated number of active modes users across the site. They should be located within each building for user convenience.

BIKE-SHARE PROGRAM

Running a small bike-share program at the site would allow for small to medium distance trips to be made via bike even for people that do not own their own or prefer not to use theirs for some trips. The service could be set up to be accessed only by certain tenants during specific times, and the bikes potentially stored in secure bike storage. This service is a growing trend at certain offices and campuses within Canada.

7.5 RIDE SHARING STRATEGIES

The use of cars as the main mode of mobility is beginning to decline. Data from the US Department of Transportation shown in **Figure 7-1** shows that driving peaked around 2005, and the trend shows a downward projection since then for vehicle kilometres travelled. There is also a steady decrease in the number of 17-year olds with licences.

Many reasons likely underlie this data, some of which include: the changing preferences of the younger generation, higher fuel prices, increasing congestion in urban areas and the lowering utility of the motor vehicle as the fastest means of mobility. Policies encouraging urban development and redevelopment near city centres and the relationship with land values and parking costs, etc. may also contribute to the decline of cars as the main mode of mobility.

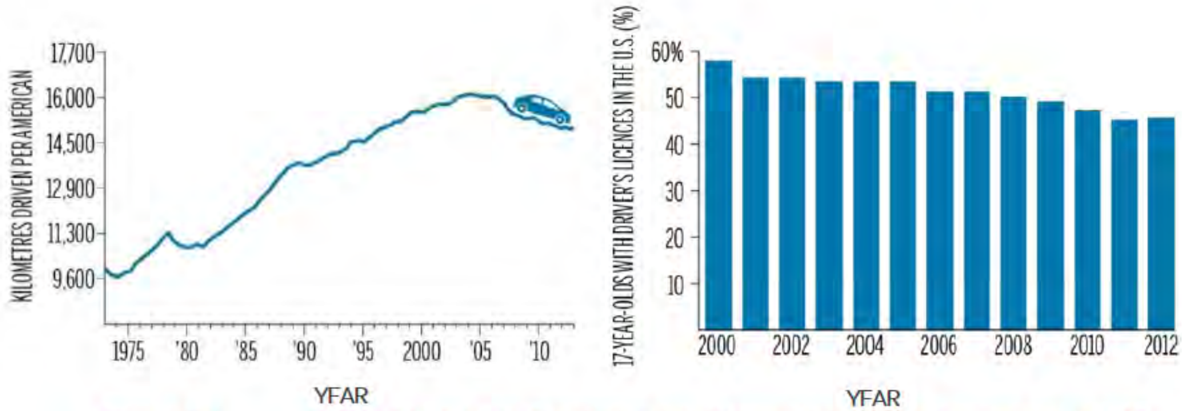


Figure 7-1 US VKT (Vehicle Km Travelled) and 17-year-old driver's licenses in the US[3]

New technologies and changing personal preferences are impacting the means of mobility. New technologies like GPS and smart mobile phones enable us to have access to a large volume and variety of data and on-demand applications. This is aligning with today's younger generation preferring more urban lifestyles, the resulting in many new forms of urban mobility that do not include private motor vehicle use, such as:

- Ride-sharing or carpooling
- Bike-sharing
- Scooters
- Car-sharing
- Ride-sourcing through Transport Network Companies (TNCs) like Uber and Lyft
- Ride-sourcing and ride-sharing together via one app

Car-sharing is growing significantly. Overall in Canada, car-sharing memberships have increased by 50% from 2014 to 2015, and fleets grew 26%.[4] Bike share is also becoming increasingly popular around the world.

Ridesharing Strategies play an important role in transportation demand management. Ride Sharing strategies can reduce congestion and reduce the required parking supply of a development.

CARPOOLING

Carpooling is a form of ridesharing and can reduce traffic congestion. For example, if every citizen in Regina carpooled with one other person for their trip to work, the number of autos on the road would be reduced by up to half, there would be substantial reductions in fuel consumption, congestion and delays, and the costs associated with such delays would diminish. While this is not likely to happen, it does illustrate the positive impact that can result from carpooling.

Carpooling is most effective when it is undertaken on a company-wide or office-wide/specific location basis, with formal monitoring and website support to "match" appropriate people. Although there are some start-up costs, it should largely be a self-sustaining system once fully operational. It is recommended that the City develop a website to support carpooling.

[3] Office of Highway Policy Information, Highway Statistics Series via Macleans: http://www.macleans.ca/economy/business/young-and-carless/
[4] Innovative Mobility Carsharing Outlook, Transportation Sustainability Research Centre, University of California Berkeley (2015) http://tsrc.berkeley.edu/sites/default/files/Summer%202015%20Carsharing%20Outlook_Final%20(1)_0.pdf

CAR-SHARING STALLS

Dedicated stalls for car-sharing services may encourage site users to use car-share and reduce the parking demand (with respect to the City's existing bylaws).

Car-sharing should be encouraged in any on-site parkades through collaborations with car-share operators. Precedents exist Canada-wide where public parkade operators work with car-share operators and permit car-share users to end trips within the parkades both in designated stalls and generally elsewhere in the parkade – just not too deep underground to lose the wireless signal. This necessitates public access into the parkade to allow other car-share users to enter the facility to get the vehicle. Clearly, if the parkade were to have gated areas with further controlled access, this area would not work for car-share parking.

RIDE-SHARING/RIDE-SOURCING STALLS

Creating a loading zone dedicated to ride-share/ride-sourcing provides an added convenience.

7.6 PARKING MANAGEMENT

Parking Management is a term for strategies that encourage more efficient use of existing parking facilities, reduce parking demand and shift travel to non-single-occupant-vehicle modes. Managing parking helps to reduce the undesirable impacts of parking demand on local and regional traffic levels and the resulting impacts on community livability and design. At the same time, smart management of parking helps to ensure access to retail businesses, provides access for visitors to regional and neighborhood attractions and supports neighborhood vitality.

REMOVE PARKING MINIMUMS

There are a number of land use/zoning bylaws, policy reviews and documents across Canada and from European organizations that support a large reduction in parking requirements. There is a general trend towards reducing the requirement for parking and allowing supply of parking to be commercially driven, determined based on operational models and parking available nearby.

For example, removing parking minimums is a common tactic used in Calgary, along with many other major cities, to change how people travel. Reduced parking requirements can also be achieved by implementing provisions for a transit orientated development.

SHARED PARKING STRATEGY

Shared parking is a strategy in transportation planning that allows a parking space to serve multiple land uses without conflict, made possible by temporal variations in parking demand of these land uses. Parking bylaws and traditional parking generation approaches can often overestimate the required amount of parking within a mixed land use development, and result in costly buildout of unnecessary parking stalls – effectively encouraging private vehicle use. The goal of shared parking is to provide adequate parking to support a development, while minimizing negative outcomes such as increased development cost and land requirements, and to encourage sustainable modes of transportation.

A shared parking analysis is most accurate when specific information regarding each land use is known, as a specific temporal variation in demand exists between many land uses. Considerations include: parking can be shared between land uses peaking at different times of day, reserved stalls should be minimized, and joint use public facilities – rather than single land use parking areas – should be maximized to facilitate the most efficient use of this resource.

UNBUNDLED FLOOR SPACE AND PARKING SUPPLY

Parking is often included in rents/unit sales whether the user wants it or not – creating an inefficient allocation of this resource. Unbundling it involves users choosing to pay for a stall or not. Building developers and managers sell/rent parking stalls separately from the main floor space allowing only those who want parking to have it.

Informal unbundling can occur also wherein a building manager maintains a list of unused stalls to be rented by other tenants or other users as mentioned earlier.

COST BASED PARKING STRATEGY AND SETTING TIME LIMITS

The supply of free or inexpensive parking at the destination is a key decision factor cited for choosing to drive a personal auto rather than taking a bus, bike, walk or carpool. When free or inexpensive parking is offered, it leads to overuse, often by long-term or all-day parkers who occupy valuable spaces at the expense of short-term parkers, limiting access to retail businesses and service industries catering to short-term users.

Cost based parking strategies that link parking rates directly to demand are very effective in reducing total parking demand, shifting travel to other modes, and reducing vehicle kilometer traveled (VKT). To implement this strategy, parking meters may be installed along Dewdney Avenue with variable parking rates that fluctuate with parking demand.

Time limits also help to efficiently allocate the parking among the land uses and the types of user e.g. commercial space visitors/customers often only need a parking stall for a few hours or less.

7.7 EDUCATION

This would include providing information on-site and within tenant agreements about alternative modes of transportation such as the cycle network, transit routes, and what is within walking distance.

A public education component identifying the available mode choices can also alter peoples travel mode choice. The education and communication piece was a pivotal component for the success at the new Mosaic Stadium.

8 CONCULSIONS AND RECOMMENDATIONS

This study has examined the traffic impacts associated with the updated land use plan for the Railyard Renewal Project, which is one of the primary components of the Regina Revitalization Initiative (RRI). The updated land use plan included a large footprint facility assumed to be a 10,000-seat arena. This study has concluded the following:

REVISED LAND USE WITH LARGE FOOTPRINT FACILITY

- The updated RRP development plan includes residential, retail, office, community, cultural, and a large footprint facility such as a 10,000-seat arena.
- The updated land use plan for the RRP development is estimated to generate 342 trips (187 entering and155 exiting) during the weekday morning peak hour, and 408 trips (184 entering and 184 exiting) during the afternoon peak hour. The updated land use plan generates approximately 100 fewer total trips during the morning peak hour and approximately 120 fewer total trips during afternoon peak hour, when compared to the original land use plan.

CONCEPTUAL CROSS SECTIONS ON DEWDNEY AVENUE

- The proposed Dewdney Avenue cross sections, illustrated in **Figure 5-1** and **Figure 5-2**, were used to analyze the network with the updated land use plan for the proposed RRP development site.
- The proposed cross sections included four through lanes (two-way) on Dewdney Avenue to carry traffic during the morning and afternoon peak hours and a reduction to operate with two through lanes during the off-peak hours.
- The network analysis indicates that the proposed Dewdney Avenue cross sections are expected to accommodate the 2040 post development forecast traffic volumes.
- In addition, it was found that the study intersections operated well overall with the proposed Dewdney Avenue cross sections during the weekday evening post-event peak hour. Note that, if it is found that the delay or congestion reaches unacceptable levels pre- or post-event, parking can be restricted, allowing four through lanes on Dewdney Avenue during an event to accommodate the traffic pre- and post-event.

DEWDNEY AVENUE INTERSECTION FINDINGS

- The Albert Street / Dewdney Avenue intersection is near its limit of available capacity and several movements are expected to experience delay and congestion during the 2040 afternoon peak hour.
- The McIntyre Street / Dewdney Avenue intersection is expected to operate well overall, but the northbound and southbound left-through movements are expected to experience considerable delay during the morning, afternoon, and off-peak hours.
- The existing lane configuration at the Broad Street / Dewdney Avenue intersection is not expected to be capable of accommodating the forecasted 2040 peak hour traffic volumes.
- All other study intersections are anticipated to operate well during the morning, afternoon, and off-peak hours.
- All study intersections are anticipated to operate well during the weekday evening post-event peak hour scenario.

RECOMMENDATIONS

- The original proposed cross sections for Dewdney Avenue are recommended based on the updated land use plan.
- On-street parking is recommended to be restricted during peak hours between Lorne Street and Rose Street. Two through lanes (per direction) will be available on Dewdney Avenue in the morning and afternoon peak hours and one through lane per direction will be provided in the off-peak hours since on-street parking will be permitted in the curb lanes.
- The **Albert Street / Dewdney Avenue** intersection is near its limit of available capacity and there is limited right-of-way available due to existing built developments to add additional lanes. Transportation demand management strategies and active transportation programs should be considered by the City to reduce future traffic demand at this intersection.
- The **McIntyre Street / Dewdney** Avenue intersection is recommended to maintain its current configuration with stop control on McIntyre Street. This includes two eastbound through lanes, two westbound through lanes, and eastbound and westbound left-turn lanes on Dewdney Avenue. Since the traffic volumes of the northbound and southbound left/through movements will be low, it is deemed that the existing intersection treatment and control type at this intersection will be adequate to accommodate the forecasted future traffic.
- The **Lorne Street / Dewdney Avenue** intersection is recommended to be a three-leg intersection with stop control on Lorne Street. Full movements are recommended at this intersection to allow traffic to divert from Lorne Street in the event that there is a train to the west.
- The **Cornwall Street / Dewdney Avenue** intersection will be the first intersection accessing the RRP site from the west. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements on Dewdney Avenue.
- The **Scarth Street / Dewdney Avenue** intersection is recommended to be controlled by stop signs on Scarth Street with free flow conditions on Dewdney Avenue. Traffic movements from/to Scarth Street are recommended to be restricted to right-in and right-out movements.
- The **Hamilton Street / Dewdney Avenue** intersection will be the first intersection accessing the RRP site from the east. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements on Dewdney Avenue.
- The **Rose Street / Dewdney Avenue** intersection is a three-legged intersection and is recommended to be controlled by a stop sign on Rose Street. Traffic movements from/to Rose Street are recommended to be restricted to right-in and right-out movements.
- The **Broad Street / Dewdney Avenue** intersection is near its limit of available capacity and there is limited right-of-way available to add additional lanes due to constraints and the railway overpass bridge on Broad Street to the south. Transportation demand management strategies and active transportation programs should be considered by the City to reduce future traffic demand at this intersection.
- Implement **Transportation and Parking Demand Strategies** to minimize infrastructure needs by reducing the number of auto trips, and by shifting vehicle trips away from Dewdney Avenue:
  - **Alternative Routes:** If alternate routes with suitable traffic operation performance (less congestion, shorter delay, and fewer stops) are available, commuters may use alternative routes to reach their destinations instead of using Dewdney Avenue.
  - **Public Transit**: The City may consider increasing the transit service frequency to meet the future transit patron demand. Transit tickets or transit passes for tenants/residents/visitors could be subsidized to encourage transit use from the RRP Development.
  - **Pedestrian and Bicycle Facilities**: To encourage walking and cycling within the City centre, in addition to improving the existing pedestrian and bicycle facility conditions, more pedestrian and bicycle facilities such as sidewalks, crosswalks, shared pathways, and bike lanes should be developed. Secure bike parking, end of trip facilities and bike share programs should also be explored.
  - **Ridesharing Strategies**: Carpooling, Car-sharing, Ride-Sharing are all forms of ridesharing that can reduce traffic congestion. It is recommended that the City support these ridesharing strategies.

- **Parking Management**: Managing parking helps to reduce the undesirable impacts of parking demand on local and regional traffic levels and the resulting impacts on community livability and design. Consider implementing a shared-use parking strategy, unbundling floor space and parking supply, and installing parking meters along Dewdney Avenue with variable parking rates that fluctuate with parking demand.

- An **Event Traffic and Parking Management Plan** is recommended to address the pre- and post-event traffic and parking needs to ensure all modes are safely and efficiently accommodated.

APPENDIX

A INTERNAL CAPTURE SUMMARY

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Regina Railyard Renewal Project	**Organization:**	WSP
Project Location:	City of Regina	**Performed By:**	Destiny Piper
Scenario Description:	w/ Large Footprint Facility	**Date:**	01/04/2019
Analysis Year:	2040	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				108	95	13
Retail				42	26	16
Restaurant				0		
Cinema/Entertainment				0		
Residential				196	55	141
Hotel				0		
All Other Land Uses[2]				0		
				346	176	170

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00	20%		1.00	20%	
Retail	1.00	20%		1.00	20%	
Restaurant						
Cinema/Entertainment						
Residential	1.00	20%		1.00	20%	
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	0	0
Retail	4		0	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	346	176	170
Internal Capture Percentage	8%	7%	8%
External Vehicle-Trips[5]	256	130	126
External Transit-Trips[6]	64	33	31
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	7%	31%
Retail	19%	31%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	3%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.
[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).
[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.
[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.
[6]Person-Trips
*Indicates computation that has been rounded to he nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Regina Railyard Renewal Project
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	95	95	1.00	13	13
Retail	1.00	26	26	1.00	16	16
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	55	55	1.00	141	141
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	8	0	0	0
Retail	5		2	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	1	28	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		8	0	0	0	0
Retail	4		0	0	1	0
Restaurant	13	2		0	3	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	4	0	0		0
Hotel	3	1	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	7	88	95	70	18	0
Retail	5	21	26	17	4	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	54	55	43	11	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	4	9	13	7	2	0
Retail	5	11	16	9	2	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	4	137	141	110	27	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A
[2]Person-Trips
[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to he nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Regina Railyard Renewal Project	Organization:	WSP
Project Location:	City of Regina	Performed By:	Destiny Piper
Scenario Description:	w/ Large Footprint Facility	Date:	01/04/2019
Analysis Year:	2040	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				102	17	85
Retail				116	51	65
Restaurant				0		
Cinema/Entertainment				0		
Residential				241	143	98
Hotel				0		
All Other Land Uses[2]				0		
				459	211	248

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00	20%		1.00	20%	
Retail	1.00	20%		1.00	20%	
Restaurant						
Cinema/Entertainment						
Residential	1.00	20%		1.00	20%	
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		420			1120	
Retail					1420	
Restaurant						
Cinema/Entertainment						
Residential		1420				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	2	0
Retail	1		0	0	14	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	3	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	459	211	248
Internal Capture Percentage	12%	13%	11%
External Vehicle-Trips[5]	323	147	176
External Transit-Trips[6]	80	36	44
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	29%	7%
Retail	14%	23%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	11%	7%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.
[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).
[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
[6]Person-Trips
*Indicates computation that has been rounded to he nearest whole number.

Estimation Tool Developed by the Texas A&M Transporta ion Institute - Version 2013.1

Project Name:	Regina Railyard Renewal Project
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends							
Land Use	Table 7-P (D): Entering Trips				Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*		Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	17	17		1.00	85	85
Retail	1.00	51	51		1.00	65	65
Restaurant	1.00	0	0		1.00	0	0
Cinema/Entertainment	1.00	0	0		1.00	0	0
Residential	1.00	143	143		1.00	98	98
Hotel	1.00	0	0		1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Des ination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		16	3	0	2	0
Retail	1		19	3	14	3
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	26	21	0		3
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Des ination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	6	0
Retail	5		0	0	66	0
Restaurant	5	26		0	23	0
Cinema/Entertainment	1	2	0		6	0
Residential	10	3	0	0		0
Hotel	0	1	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)							
Destina ion Land Use	Person-Trip Estimates				External Trips by Mode*		
	Internal	External	Total		Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	5	12	17		10	2	0
Retail	7	44	51		35	9	0
Restaurant	0	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0	0
Residential	16	127	143		102	25	0
Hotel	0	0	0		0	0	0
All Other Land Uses[3]	0	0	0		0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)							
Origin Land Use	Person-Trip Estimates				External Trips by Mode*		
	Internal	External	Total		Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	6	79	85		63	16	0
Retail	15	50	65		40	10	0
Restaurant	0	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0	0
Residential	7	91	98		73	18	0
Hotel	0	0	0		0	0	0
All Other Land Uses[3]	0	0	0		0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P
[2]Person-Trips
[3]Total es imate for all other land uses at mixed-use development site is not subject to internal trip capture computations in his estimator
*Indicates computation that has been rounded to he nearest whole number.

APPENDIX

B SYNCHRO REPORTS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	144	928	225	183	674	67	122	588	189	198	1381	112
Future Volume (vph)	144	928	225	183	674	67	122	588	189	198	1381	112
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.97	1.00		0.97	1.00	0.99		0.99	1.00	
Frt			0.850			0.850		0.964			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4654	0	1695	4799	0
Flt Permitted	0.204			0.104			0.098			0.207		
Satd. Flow (perm)	363	3390	1478	185	3390	1477	174	4654	0	367	4799	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			154			123		69			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	157	1009	245	199	733	73	133	639	205	215	1501	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	1009	245	199	733	73	133	844	0	215	1623	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.7			3.7			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		8.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	16.0	43.0	43.0	15.0	42.0	42.0	11.0	40.0		22.0	51.0	
Total Split (%)	13.3%	35.8%	35.8%	12.5%	35.0%	35.0%	9.2%	33.3%		18.3%	42.5%	
Maximum Green (s)	12.0	38.5	38.5	11.0	37.5	37.5	7.0	35.5		18.0	46.5	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	48.8	37.9	37.9	50.0	38.5	38.5	48.3	40.7		58.0	46.9	
Actuated g/C Ratio	0.41	0.32	0.32	0.42	0.32	0.32	0.40	0.34		0.48	0.39	
v/c Ratio	0.60	0.94	0.43	0.93	0.67	0.13	0.83	0.52		0.66	0.86	
Control Delay	30.2	57.0	14.4	74.9	39.2	1.3	63.5	31.1		28.6	39.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	30.2	57.0	14.4	74.9	39.2	1.3	63.5	31.1		28.6	39.1	
LOS	C	E	B	E	D	A	E	C		C	D	
Approach Delay		46.7			43.5			35.5			37.9	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	21.9	120.5	15.5	31.9	78.7	0.0	17.1	53.8		29.1	126.9	
Queue Length 95th (m)	36.0	#160.4	37.7	#77.0	100.8	2.0	#54.7	71.0		45.2	147.4	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	285	1087	578	215	1087	557	160	1623		378	1885	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.55	0.93	0.42	0.93	0.67	0.13	0.83	0.52		0.57	0.86	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

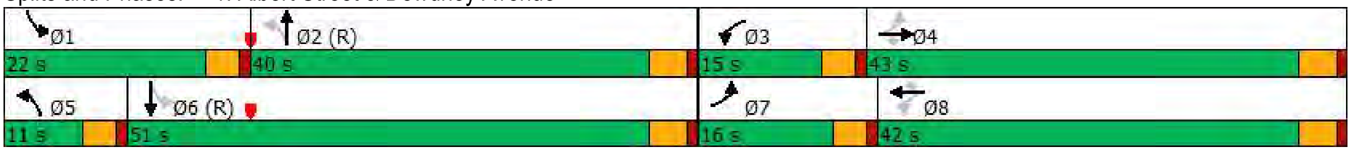
Intersection Signal Delay: 40.9 Intersection LOS: D

Intersection Capacity Utilization 90.1% ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1205	35	23	914	8	52	0	7	4	0	13
Future Volume (vph)	15	1205	35	23	914	8	52	0	7	4	0	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.999			0.983			0.895	
Flt Protected	0.950			0.950				0.958			0.989	
Satd. Flow (prot)	1679	3093	0	1679	3102	0	0	1664	0	0	1329	0
Flt Permitted	0.267			0.171				0.739			0.939	
Satd. Flow (perm)	472	3093	0	302	3102	0	0	1284	0	0	1262	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			2			25			25	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.1			103.2			145.5			205.8	
Travel Time (s)		8.2			7.4			10.5			14.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		10			10						10	
Adj. Flow (vph)	16	1310	38	25	993	9	57	0	8	4	0	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	1348	0	25	1002	0	0	65	0	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.17	1.06	1.06	1.17	1.06	1.06	1.06	1.06	1.06	1.30	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			3			8	

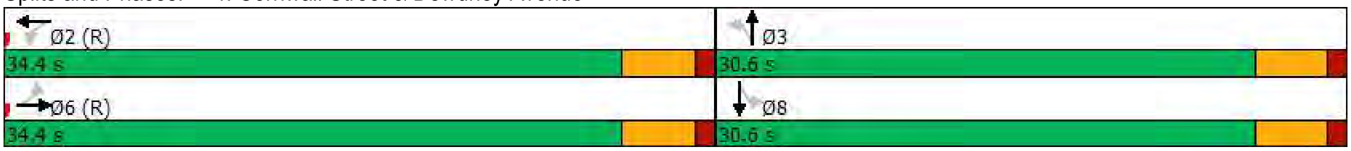
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			3			8		
Detector Phase	6	6		2	2		3	3		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	25.5	25.5		25.5	25.5		30.5	30.5		30.5	30.5	
Total Split (s)	34.4	34.4		34.4	34.4		30.6	30.6		30.6	30.6	
Total Split (%)	52.9%	52.9%		52.9%	52.9%		47.1%	47.1%		47.1%	47.1%	
Maximum Green (s)	29.9	29.9		29.9	29.9		26.1	26.1		26.1	26.1	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	20	20		20	20		20	20		20	20	
Act Effct Green (s)	50.4	50.4		50.4	50.4			13.2			13.2	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.20			0.20	
v/c Ratio	0.04	0.56		0.11	0.42			0.23			0.07	
Control Delay	7.3	9.2		8.6	6.5			15.1			6.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	7.3	9.2		8.6	6.5			15.1			6.1	
LOS	A	A		A	A			B			A	
Approach Delay		9.2			6.6			15.1			6.1	
Approach LOS		A			A			B			A	
Queue Length 50th (m)	0.5	34.4		0.8	21.4			4.3			0.0	
Queue Length 95th (m)	4.2	#122.8		6.3	67.5			9.5			2.7	
Internal Link Dist (m)		90.1			79.2			121.5			181.8	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	366	2399		234	2405			530			521	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.04	0.56		0.11	0.42			0.12			0.03	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 8.2 Intersection LOS: A
Intersection Capacity Utilization 54.0% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Cornwall Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	1103	20	51	873	5	27	0	59	4	0	31
Future Volume (vph)	53	1103	20	51	873	5	27	0	59	4	0	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.999			0.907			0.879	
Flt Protected	0.950			0.950				0.985			0.995	
Satd. Flow (prot)	1679	3096	0	1679	3102	0	0	1579	0	0	1545	0
Flt Permitted	0.252			0.168				0.906			0.975	
Satd. Flow (perm)	445	3096	0	297	3102	0	0	1452	0	0	1514	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			1			75			75	
Link Speed (k/h)		50			50			48			50	
Link Distance (m)		102.4			103.2			139.3			228.4	
Travel Time (s)		7.4			7.4			10.4			16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		10			10					10		
Adj. Flow (vph)	58	1199	22	55	949	5	29	0	64	4	0	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	1221	0	55	954	0	0	93	0	0	38	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.17	1.06	1.06	1.17	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			3			8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			3			8		
Detector Phase	1	6		5	2		3	3		8	8	
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.5	25.5		11.5	25.5		30.5	30.5		30.5	30.5	
Total Split (s)	11.6	37.8		11.6	37.8		30.6	30.6		30.6	30.6	
Total Split (%)	14.5%	47.3%		14.5%	47.3%		38.3%	38.3%		38.3%	38.3%	
Maximum Green (s)	7.6	33.3		7.6	33.3		26.1	26.1		26.1	26.1	
Yellow Time (s)	3.0	3.5		3.0	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.0	4.5		4.0	4.5			4.5			4.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Max		None	C-Min		None	None		None	None	
Walk Time (s)		10.0			10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		8.0			8.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)		20			20		20	20		20	20	
Act Effct Green (s)	55.6	51.8		55.6	51.8			16.4			16.4	
Actuated g/C Ratio	0.70	0.65		0.70	0.65			0.20			0.20	
v/c Ratio	0.14	0.61		0.17	0.48			0.26			0.10	
Control Delay	7.0	16.1		7.5	13.1			9.3			2.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	7.0	16.1		7.5	13.1			9.3			2.0	
LOS	A	B		A	B			A			A	
Approach Delay		15.7			12.8			9.3			2.0	
Approach LOS		B			B			A			A	
Queue Length 50th (m)	1.6	53.5		1.5	36.7			2.5			0.0	
Queue Length 95th (m)	8.3	#133.7		8.0	83.4			11.4			2.1	
Internal Link Dist (m)		78.4			79.2			115.3			204.4	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	428	2005		338	2007			524			544	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.14	0.61		0.16	0.48			0.18			0.07	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 14.0 Intersection LOS: B
Intersection Capacity Utilization 61.0% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 6: Dewdney Avenue & Hamilton Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	327	85	754	7	52	4	602	791	21	13	1169	280
Future Volume (vph)	327	85	754	7	52	4	602	791	21	13	1169	280
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.990			0.996				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1745	0	1695	3377	0	1695	3390	1517
Flt Permitted	0.627			0.697			0.103			0.322		
Satd. Flow (perm)	1114	1784	1517	1244	1745	0	184	3377	0	575	3390	1394
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			504		3			4				219
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	355	92	820	8	57	4	654	860	23	14	1271	304
Shared Lane Traffic (%)												
Lane Group Flow (vph)	355	92	820	8	61	0	654	883	0	14	1271	304
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			4.7			4.7	
Link Offset(m)		0.0			1.8			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		30.0	72.5		42.5	42.5	42.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		25.0%	60.4%		35.4%	35.4%	35.4%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		26.0	68.0		38.0	38.0	38.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	42.7	40.8	40.8	33.0	27.6		68.5	68.0		38.0	38.0	38.0
Actuated g/C Ratio	0.36	0.34	0.34	0.28	0.23		0.57	0.57		0.32	0.32	0.32
v/c Ratio	0.76	0.15	0.97	0.02	0.15		1.51	0.46		0.08	1.18	0.51
Control Delay	46.3	29.8	39.8	24.9	33.2		271.2	16.2		30.4	129.8	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	46.3	29.8	39.8	24.9	33.2		271.2	16.2		30.4	129.8	13.0
LOS	D	C	D	C	C		F	B		C	F	B
Approach Delay		40.9			32.2			124.7			106.6	
Approach LOS		D			C			F			F	
Queue Length 50th (m)	66.8	14.5	89.4	1.2	10.4		~199.9	60.8		2.3	~189.3	14.5
Queue Length 95th (m)	#121.1	30.4	#193.6	4.5	21.3		#270.6	76.1		7.5	#231.1	40.9
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	465	606	848	368	467		432	1915		182	1073	591
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.76	0.15	0.97	0.02	0.13		1.51	0.46		0.08	1.18	0.51

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.51

Intersection Signal Delay: 93.0 Intersection LOS: F

Intersection Capacity Utilization 105.9% ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	1256	32	59	902	15	1	2	26	4	2	21
Future Vol, veh/h	27	1256	32	59	902	15	1	2	26	4	2	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	200	-	-	200
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	29	1365	35	64	980	16	1	2	28	4	2	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	996	0	0	1400	0	0	2060	2565	700	1858	2574	498
Stage 1	-	-	-	-	-	-	1441	1441	-	1116	1116	-
Stage 2	-	-	-	-	-	-	619	1124	-	742	1458	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	684	-	-	479	-	-	31	25	379	45	25	515
Stage 1	-	-	-	-	-	-	138	194	-	220	279	-
Stage 2	-	-	-	-	-	-	440	277	-	371	191	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	684	-	-	479	-	-	24	21	379	33	21	515
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	21	-	33	21	-
Stage 1	-	-	-	-	-	-	132	186	-	211	242	-
Stage 2	-	-	-	-	-	-	361	240	-	325	183	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.8	33.9	47.1
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	22	379	684	-	-	479	-	-	28	515
HCM Lane V/C Ratio	0.148	0.075	0.043	-	-	0.134	-	-	0.233	0.044
HCM Control Delay (s)	195.3	15.3	10.5	-	-	13.7	-	-	169	12.3
HCM Lane LOS	F	C	B	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	0.4	0.2	0.1	-	-	0.5	-	-	0.7	0.1

Intersection						
Int Delay, s/veh	1.1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	1256	963	16	8	13
Future Vol, veh/h	30	1256	963	16	8	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	33	1365	1047	17	9	14

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1064	0	-	0	1805	532
Stage 1	-	-	-	-	1056	-
Stage 2	-	-	-	-	749	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	645	-	-	-	70	489
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	425	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	645	-	-	-	55	489
Mov Cap-2 Maneuver	-	-	-	-	55	-
Stage 1	-	-	-	-	232	-
Stage 2	-	-	-	-	425	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	41.2
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	645	-	-	-	122
HCM Lane V/C Ratio	0.051	-	-	-	0.187
HCM Control Delay (s)	10.9	1.1	-	-	41.2
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0.2	-	-	-	0.7

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1166	50	0	924	7	0	0	10	0	0	21
Future Vol, veh/h	0	1166	50	0	924	7	0	0	10	0	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	1267	54	0	1004	8	0	0	11	0	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	661	-	-	506
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.96	-	-	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.33	-	-	3.33
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	403	0	0	509
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	403	-	-	509
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	14.2	12.4
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	403	-	-	-	-	509
HCM Lane V/C Ratio	0.027	-	-	-	-	0.045
HCM Control Delay (s)	14.2	-	-	-	-	12.4
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↱			↱
Traffic Vol, veh/h	0	1166	911	23	0	18
Future Vol, veh/h	0	1166	911	23	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	1267	990	25	0	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	508
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.33
Pot Cap-1 Maneuver	0	-	-	-	0	507
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	507
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	507
HCM Lane V/C Ratio	-	-	-	0.039
HCM Control Delay (s)	-	-	-	12.4
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	776	165	351	900	174	265	1338	252	151	1047	158
Future Volume (vph)	164	776	165	351	900	174	265	1338	252	151	1047	158
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.97	1.00		0.97		0.99		1.00	0.99	
Frt			0.850			0.850		0.976			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4727	0	1695	4742	0
Flt Permitted	0.166			0.113			0.108			0.122		
Satd. Flow (perm)	295	3390	1478	201	3390	1477	193	4727	0	217	4742	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159			123		34			23	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	173	817	174	369	947	183	279	1408	265	159	1102	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	173	817	174	369	947	183	279	1673	0	159	1268	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.7			3.7			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		7.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	17.2	36.8	36.8	26.2	45.8	45.8	20.0	45.0		12.0	37.0	
Total Split (%)	14.3%	30.7%	30.7%	21.8%	38.2%	38.2%	16.7%	37.5%		10.0%	30.8%	
Maximum Green (s)	13.2	32.3	32.3	22.2	41.3	41.3	16.0	40.5		8.0	32.5	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	43.1	31.4	31.4	58.1	42.5	42.5	53.9	40.9		41.9	33.0	
Actuated g/C Ratio	0.36	0.26	0.26	0.48	0.35	0.35	0.45	0.34		0.35	0.28	
v/c Ratio	0.73	0.92	0.35	0.99	0.79	0.30	0.96	1.02		0.89	0.96	
Control Delay	40.4	59.4	8.8	78.0	40.7	11.5	75.6	67.1		71.1	59.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	40.4	59.4	8.8	78.0	40.7	11.5	75.6	67.1		71.1	59.5	
LOS	D	E	A	E	D	B	E	E		E	E	
Approach Delay		49.0			46.3			68.3			60.8	
Approach LOS		D			D			E			E	
Queue Length 50th (m)	22.4	97.7	2.6	71.5	103.7	9.4	51.0	~153.1		22.6	106.9	
Queue Length 95th (m)	41.5	#132.0	19.6	#132.5	132.0	26.8	#105.0	#183.2		#63.7	#138.7	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	265	912	514	374	1199	602	291	1634		179	1319	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.65	0.90	0.34	0.99	0.79	0.30	0.96	1.02		0.89	0.96	

Intersection Summary

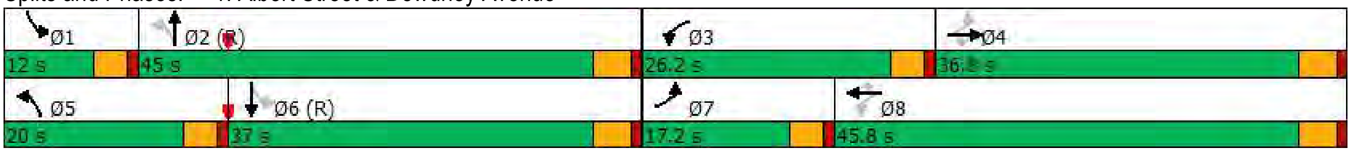
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 115
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 57.4 Intersection LOS: E
Intersection Capacity Utilization 101.0% ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	1122	10	8	1143	23	103	0	23	5	0	65
Future Volume (vph)	31	1122	10	8	1143	23	103	0	23	5	0	65
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		0.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.997			0.975			0.874	
Flt Protected	0.950			0.950				0.961			0.997	
Satd. Flow (prot)	1679	3102	0	1679	3096	0	0	1656	0	0	1309	0
Flt Permitted	0.193			0.202				0.776			0.981	
Satd. Flow (perm)	341	3102	0	357	3096	0	0	1337	0	0	1288	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			4			20			60	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.1			103.2			203.1			205.8	
Travel Time (s)		8.2			7.4			14.6			14.8	
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
Parking (#/hr)		10			10						10	
Adj. Flow (vph)	33	1181	11	8	1203	24	108	0	24	5	0	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	1192	0	8	1227	0	0	132	0	0	73	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.17	1.06	1.06	1.17	1.06	1.06	1.06	1.06	1.06	1.30	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			3			8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			3			8		
Detector Phase	6	6		2	2		3	3		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	25.5	25.5		25.5	25.5		30.5	30.5		30.5	30.5	
Total Split (s)	49.0	49.0		49.0	49.0		31.0	31.0		31.0	31.0	
Total Split (%)	61.3%	61.3%		61.3%	61.3%		38.8%	38.8%		38.8%	38.8%	
Maximum Green (s)	44.5	44.5		44.5	44.5		26.5	26.5		26.5	26.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	20	20		20	20		20	20		20	20	
Act Effct Green (s)	58.1	58.1		58.1	58.1			16.7			16.7	
Actuated g/C Ratio	0.73	0.73		0.73	0.73			0.21			0.21	
v/c Ratio	0.13	0.53		0.03	0.55			0.45			0.23	
Control Delay	9.0	9.0		7.8	9.2			26.1			9.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	9.0	9.0		7.8	9.2			26.1			9.6	
LOS	A	A		A	A			C			A	
Approach Delay		9.0			9.2			26.1			9.6	
Approach LOS		A			A			C			A	
Queue Length 50th (m)	1.2	31.5		0.3	33.1			16.1			1.7	
Queue Length 95th (m)	7.1	83.8		2.4	88.0			25.9			9.8	
Internal Link Dist (m)		90.1			79.2			179.1			181.8	
Turn Bay Length (m)	30.0			30.0								
Base Capacity (vph)	247	2251		259	2248			456			466	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.13	0.53		0.03	0.55			0.29			0.16	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

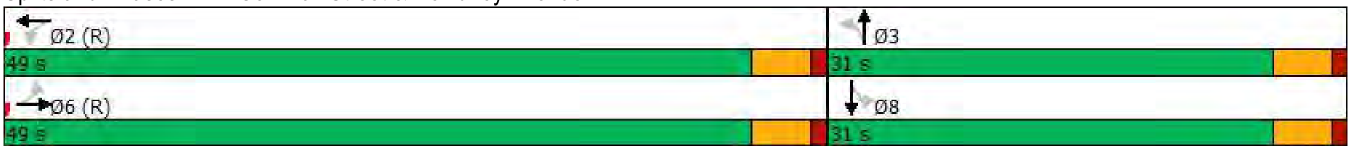
Maximum v/c Ratio: 0.55

Intersection Signal Delay: 9.9 Intersection LOS: A

Intersection Capacity Utilization 55.8% ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: Cornwall Street & Dewdney Avenue

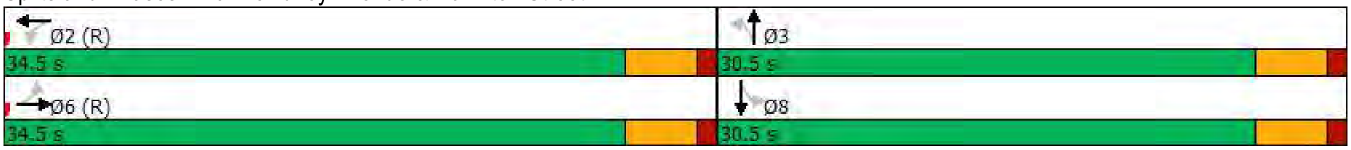


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	1031	32	81	1048	15	33	0	56	18	0	49
Future Volume (vph)	47	1031	32	81	1048	15	33	0	56	18	0	49
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.998			0.915			0.901	
Flt Protected	0.950			0.950				0.982			0.987	
Satd. Flow (prot)	1679	3090	0	1679	3099	0	0	1588	0	0	1571	0
Flt Permitted	0.224			0.224				0.866			0.908	
Satd. Flow (perm)	396	3090	0	396	3099	0	0	1400	0	0	1446	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			3			46			44	
Link Speed (k/h)		50			50			48			50	
Link Distance (m)		102.4			103.2			190.7			228.4	
Travel Time (s)		7.4			7.4			14.3			16.4	
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
Parking (#/hr)		10			10					10		
Adj. Flow (vph)	49	1085	34	85	1103	16	35	0	59	19	0	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	1119	0	85	1119	0	0	94	0	0	71	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.17	1.06	1.06	1.17	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			3			8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			3			8		
Detector Phase	6	6		2	2		3	3		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.5	24.5		24.5	24.5		30.5	30.5		30.5	30.5	
Total Split (s)	34.5	34.5		34.5	34.5		30.5	30.5		30.5	30.5	
Total Split (%)	53.1%	53.1%		53.1%	53.1%		46.9%	46.9%		46.9%	46.9%	
Maximum Green (s)	30.0	30.0		30.0	30.0		26.0	26.0		26.0	26.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	20	20		20	20		20	20		20	20	
Act Effct Green (s)	46.6	46.6		46.6	46.6			13.2			13.2	
Actuated g/C Ratio	0.72	0.72		0.72	0.72			0.20			0.20	
v/c Ratio	0.17	0.50		0.30	0.50			0.29			0.22	
Control Delay	9.0	8.0		11.6	8.0			13.7			11.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	9.0	8.0		11.6	8.0			13.7			11.0	
LOS	A	A		B	A			B			B	
Approach Delay		8.0			8.2			13.7			11.0	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	1.5	25.1		3.0	25.2			5.1			2.9	
Queue Length 95th (m)	10.8	79.4		19.8	79.6			11.4			8.6	
Internal Link Dist (m)		78.4			79.2			166.7			204.4	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	284	2217		284	2222			587			604	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.17	0.50		0.30	0.50			0.16			0.12	

Intersection Summary	
Area Type: Other	
Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 8.4	Intersection LOS: A
Intersection Capacity Utilization 59.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 6: Dewdney Avenue & Hamilton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	392	115	598	26	111	22	678	1567	21	16	1084	314
Future Volume (vph)	392	115	598	26	111	22	678	1567	21	16	1084	314
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.975			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1713	0	1695	3383	0	1695	3390	1517
Flt Permitted	0.478			0.679			0.107			0.146		
Satd. Flow (perm)	850	1784	1517	1212	1713	0	191	3383	0	261	3390	1394
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			541		8			2				257
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
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
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	413	121	629	27	117	23	714	1649	22	17	1141	331
Shared Lane Traffic (%)												
Lane Group Flow (vph)	413	121	629	27	140	0	714	1671	0	17	1141	331
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			4.7			4.7	
Link Offset(m)		0.0			1.8			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		33.0	72.5		39.5	39.5	39.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		27.5%	60.4%		32.9%	32.9%	32.9%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		29.0	68.0		35.0	35.0	35.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	28.2	23.5	23.5	26.6	19.1		81.4	80.9		35.0	35.0	35.0
Actuated g/C Ratio	0.24	0.20	0.20	0.22	0.16		0.68	0.67		0.29	0.29	0.29
v/c Ratio	1.66	0.35	0.86	0.09	0.50		1.09	0.73		0.22	1.15	0.56
Control Delay	343.8	43.5	20.1	30.3	47.4		94.5	17.0		41.4	120.2	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	343.8	43.5	20.1	30.3	47.4		94.5	17.0		41.4	120.2	12.8
LOS	F	D	C	C	D		F	B		D	F	B
Approach Delay		137.5			44.6			40.2			95.4	
Approach LOS		F			D			D			F	
Queue Length 50th (m)	~148.8	26.8	19.3	5.0	29.5		~164.4	111.4		3.1	~166.7	13.1
Queue Length 95th (m)	#182.0	38.6	66.7	10.4	42.5		#293.0	204.8		10.1	#208.0	41.6
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	249	475	801	297	462		654	2280		76	988	588
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.66	0.25	0.79	0.09	0.30		1.09	0.73		0.22	1.15	0.56

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.66

Intersection Signal Delay: 77.9 Intersection LOS: E

Intersection Capacity Utilization 119.0% ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue

Intersection												
Int Delay, s/veh	3.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	1098	29	22	1298	23	8	2	77	6	1	118
Future Vol, veh/h	52	1098	29	22	1298	23	8	2	77	6	1	118
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	200	-	-	200
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	55	1156	31	23	1366	24	8	2	81	6	1	124

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1390	0	0	1187	0	0	2012	2718	594	2113	2721	695
Stage 1	-	-	-	-	-	-	1282	1282	-	1424	1424	-
Stage 2	-	-	-	-	-	-	730	1436	-	689	1297	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	483	-	-	578	-	-	34	20	446	29	20	382
Stage 1	-	-	-	-	-	-	173	232	-	141	198	-
Stage 2	-	-	-	-	-	-	378	195	-	400	228	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	483	-	-	578	-	-	19	17	446	19	17	382
Mov Cap-2 Maneuver	-	-	-	-	-	-	19	17	-	19	17	-
Stage 1	-	-	-	-	-	-	153	206	-	125	190	-
Stage 2	-	-	-	-	-	-	244	187	-	287	202	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.2	51.5	33.8
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	19	446	483	-	-	578	-	-	19	382
HCM Lane V/C Ratio	0.554	0.182	0.113	-	-	0.04	-	-	0.388	0.325
HCM Control Delay (s)	$ 333.5	14.9	13.4	-	-	11.5	-	-	284.9	18.9
HCM Lane LOS	F	B	B	-	-	B	-	-	F	C
HCM 95th %tile Q(veh)	1.5	0.7	0.4	-	-	0.1	-	-	1.1	1.4

Intersection						
Int Delay, s/veh	1.1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	1162	1293	17	6	50
Future Vol, veh/h	19	1162	1293	17	6	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	20	1223	1361	18	6	53

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1379	0	-	0	2022	690
Stage 1	-	-	-	-	1370	-
Stage 2	-	-	-	-	652	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	488	-	-	-	50	385
Stage 1	-	-	-	-	199	-
Stage 2	-	-	-	-	478	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	488	-	-	-	44	385
Mov Cap-2 Maneuver	-	-	-	-	44	-
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	478	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	28.7
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	488	-	-	-	210
HCM Lane V/C Ratio	0.041	-	-	-	0.281
HCM Control Delay (s)	12.7	0.8	-	-	28.7
HCM Lane LOS	B	A	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	-	1.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↱			↑↱				↱			↱
Traffic Vol, veh/h	0	1088	62	0	1116	14	0	0	22	0	0	58
Future Vol, veh/h	0	1088	62	0	1116	14	0	0	22	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	1145	65	0	1175	15	0	0	23	0	0	61

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	605	-	-	595
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.96	-	-	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.33	-	-	3.33
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	438	0	0	445
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	438	-	-	445
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.7	14.4
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	438	-	-	-	-	445
HCM Lane V/C Ratio	0.053	-	-	-	-	0.137
HCM Control Delay (s)	13.7	-	-	-	-	14.4
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1105	1081	22	0	63
Future Vol, veh/h	0	1105	1081	22	0	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	1163	1138	23	0	66

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	581
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.33
Pot Cap-1 Maneuver	0	-	-	-	0	454
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	454
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.3
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	454
HCM Lane V/C Ratio	-	-	-	0.146
HCM Control Delay (s)	-	-	-	14.3
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	628	134	284	728	141	215	1084	204	122	848	128
Future Volume (vph)	133	628	134	284	728	141	215	1084	204	122	848	128
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.97	1.00		0.97	0.99	0.99		1.00	0.99	
Frt			0.850			0.850		0.976			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4727	0	1695	4742	0
Flt Permitted	0.228			0.124			0.133			0.099		
Satd. Flow (perm)	405	3390	1478	220	3390	1477	236	4727	0	176	4742	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159			123		35			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	145	683	146	309	791	153	234	1178	222	133	922	139
Shared Lane Traffic (%)												
Lane Group Flow (vph)	145	683	146	309	791	153	234	1400	0	133	1061	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.7			3.7			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

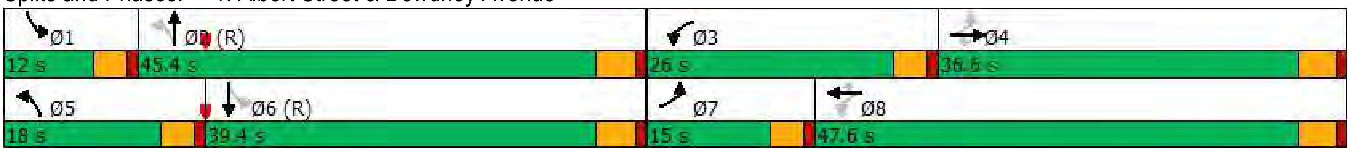
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		7.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	15.0	36.6	36.6	26.0	47.6	47.6	18.0	45.4		12.0	39.4	
Total Split (%)	12.5%	30.5%	30.5%	21.7%	39.7%	39.7%	15.0%	37.8%		10.0%	32.8%	
Maximum Green (s)	11.0	32.1	32.1	22.0	43.1	43.1	14.0	40.9		8.0	34.9	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	38.9	28.6	28.6	52.8	38.5	38.5	59.2	46.2		49.4	40.4	
Actuated g/C Ratio	0.32	0.24	0.24	0.44	0.32	0.32	0.49	0.38		0.41	0.34	
v/c Ratio	0.61	0.85	0.31	0.91	0.73	0.27	0.81	0.76		0.74	0.66	
Control Delay	32.3	54.0	6.0	62.7	40.0	8.6	44.5	35.7		49.4	36.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	32.3	54.0	6.0	62.7	40.0	8.6	44.5	35.7		49.4	36.8	
LOS	C	D	A	E	D	A	D	D		D	D	
Approach Delay		43.6			41.8			37.0			38.2	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	19.7	79.8	0.0	54.9	84.5	4.8	32.8	108.3		17.4	81.5	
Queue Length 95th (m)	30.8	99.4	12.9	#96.6	102.5	18.7	#77.6	128.8		#51.2	98.2	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	253	906	511	367	1217	609	297	1840		183	1611	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.57	0.75	0.29	0.84	0.65	0.25	0.79	0.76		0.73	0.66	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 39.7	Intersection LOS: D
Intersection Capacity Utilization 88.6%	ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱		✥			✥	
Traffic Volume (vph)	25	909	8	6	926	19	83	0	19	4	0	53
Future Volume (vph)	25	909	8	6	926	19	83	0	19	4	0	53
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		20.0	30.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.974			0.874	
Flt Protected	0.950			0.950				0.961			0.997	
Satd. Flow (prot)	1679	1502	1502	1679	1502	1502	0	1654	0	0	1309	0
Flt Permitted	0.185			0.194				0.767			0.984	
Satd. Flow (perm)	327	1502	1502	343	1502	1502	0	1320	0	0	1292	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			16			16		16			58	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.1			103.2			145.5			205.8	
Travel Time (s)		8.2			7.4			10.5			14.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		10			10						10	
Adj. Flow (vph)	27	988	9	7	1007	21	90	0	21	4	0	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	988	9	7	1007	21	0	111	0	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.30	1.06	1.06	1.30	1.06	1.06	1.06	1.06	1.06	1.30	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		6			2			3			8	

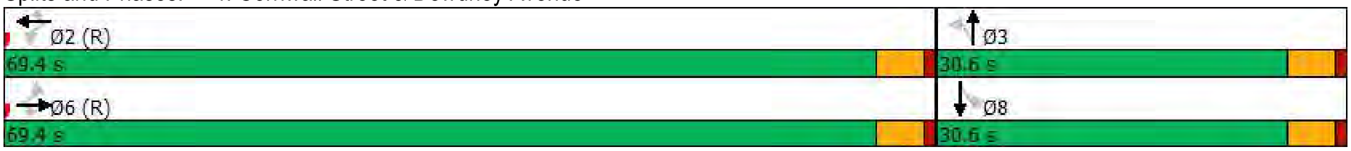
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6		6	2		2	3			8		
Detector Phase	6	6	6	2	2	2	3	3		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	25.5	25.5	25.5	25.5	25.5	25.5	30.5	30.5		30.5	30.5	
Total Split (s)	69.4	69.4	69.4	69.4	69.4	69.4	30.6	30.6		30.6	30.6	
Total Split (%)	69.4%	69.4%	69.4%	69.4%	69.4%	69.4%	30.6%	30.6%		30.6%	30.6%	
Maximum Green (s)	64.9	64.9	64.9	64.9	64.9	64.9	26.1	26.1		26.1	26.1	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	C-Min	None	None		None	None	
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0	16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	20	20	20	20	20	20	20	20		20	20	
Act Effct Green (s)	74.2	74.2	74.2	74.2	74.2	74.2		16.8			16.8	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74	0.74		0.17			0.17	
v/c Ratio	0.11	0.89	0.01	0.03	0.90	0.02		0.47			0.23	
Control Delay	7.0	24.5	1.9	6.2	26.2	3.2		36.6			11.2	
Queue Delay	0.0	0.0	0.0	0.0	7.3	0.0		0.0			0.0	
Total Delay	7.0	24.5	1.9	6.2	33.6	3.2		36.6			11.2	
LOS	A	C	A	A	C	A		D			B	
Approach Delay		23.8			32.8			36.6			11.2	
Approach LOS		C			C			D			B	
Queue Length 50th (m)	0.9	91.9	0.0	0.2	97.3	0.2		17.8			0.7	
Queue Length 95th (m)	5.5	#275.7	1.2	2.0	#283.8	2.7		29.7			10.3	
Internal Link Dist (m)		90.1			79.2			121.5			181.8	
Turn Bay Length (m)	30.0		20.0	30.0		20.0						
Base Capacity (vph)	242	1114	1118	254	1114	1118		356			380	
Starvation Cap Reductn	0	0	0	0	87	0		0			0	
Spillback Cap Reductn	0	0	0	0	0	0		0			0	
Storage Cap Reductn	0	0	0	0	0	0		0			0	
Reduced v/c Ratio	0.11	0.89	0.01	0.03	0.98	0.02		0.31			0.16	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 28.2 — Intersection LOS: C
Intersection Capacity Utilization 71.7% — 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: 4: Cornwall Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	836	26	66	848	12	27	0	45	15	0	40
Future Volume (vph)	38	836	26	66	848	12	27	0	45	15	0	40
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		20.0	40.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.915			0.902	
Flt Protected	0.950			0.950				0.982			0.987	
Satd. Flow (prot)	1679	1502	1502	1679	1502	1502	0	1588	0	0	1573	0
Flt Permitted	0.226			0.233				0.880			0.918	
Satd. Flow (perm)	399	1502	1502	412	1502	1502	0	1423	0	0	1463	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			18			18		49			43	
Link Speed (k/h)		50			50			48			50	
Link Distance (m)		102.4			103.2			139.3			228.4	
Travel Time (s)		7.4			7.4			10.4			16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		10			10					10		
Adj. Flow (vph)	41	909	28	72	922	13	29	0	49	16	0	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	909	28	72	922	13	0	78	0	0	59	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.30	1.06	1.06	1.30	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		6			2			3			8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6		6	2		2	3			8		
Detector Phase	6	6	6	2	2	2	3	3		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	24.5	30.5	30.5		30.5	30.5	
Total Split (s)	59.5	59.5	59.5	59.5	59.5	59.5	30.5	30.5		30.5	30.5	
Total Split (%)	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	33.9%	33.9%		33.9%	33.9%	
Maximum Green (s)	55.0	55.0	55.0	55.0	55.0	55.0	26.0	26.0		26.0	26.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	C-Min	None	None		None	None	
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0	16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	20	20	20	20	20	20	20	20		20	20	
Act Effct Green (s)	68.4	68.4	68.4	68.4	68.4	68.4		16.4			16.4	
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.76	0.76		0.18			0.18	
v/c Ratio	0.14	0.80	0.02	0.23	0.81	0.01		0.26			0.20	
Control Delay	7.7	19.0	3.8	9.0	19.6	2.7		14.7			13.0	
Queue Delay	0.0	0.9	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	7.7	19.9	3.8	9.0	19.6	2.7		14.7			13.0	
LOS	A	B	A	A	B	A		B			B	
Approach Delay		18.9			18.6			14.7			13.0	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	1.3	63.4	0.3	2.4	65.7	0.0		4.6			2.5	
Queue Length 95th (m)	7.9	#233.3	3.6	13.6	#238.0	1.8		13.7			10.7	
Internal Link Dist (m)		78.4			79.2			115.3			204.4	
Turn Bay Length (m)	40.0		20.0	40.0		20.0						
Base Capacity (vph)	303	1141	1145	313	1141	1145		445			453	
Starvation Cap Reductn	0	70	0	0	0	0		0			0	
Spillback Cap Reductn	0	0	0	0	0	0		0			0	
Storage Cap Reductn	0	0	0	0	0	0		0			0	
Reduced v/c Ratio	0.14	0.85	0.02	0.23	0.81	0.01		0.18			0.13	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 18.5 Intersection LOS: B

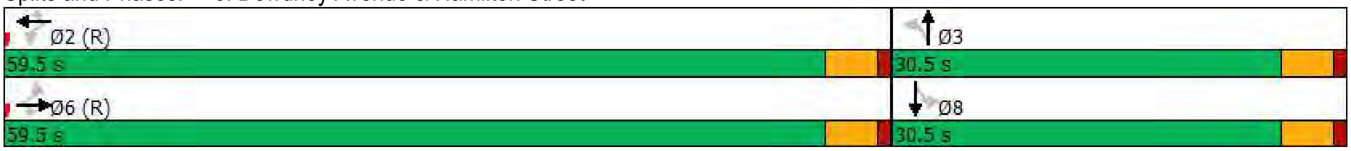
Intersection Capacity Utilization 73.7% ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Dewdney Avenue & Hamilton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	318	93	485	21	90	18	549	1269	17	13	878	254
Future Volume (vph)	318	93	485	21	90	18	549	1269	17	13	878	254
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.975			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1712	0	1695	3383	0	1695	3390	1517
Flt Permitted	0.495			0.692			0.107			0.192		
Satd. Flow (perm)	880	1784	1517	1235	1712	0	191	3383	0	343	3390	1394
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			527		8			2				256
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	346	101	527	23	98	20	597	1379	18	14	954	276
Shared Lane Traffic (%)												
Lane Group Flow (vph)	346	101	527	23	118	0	597	1397	0	14	954	276
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			4.7			4.7	
Link Offset(m)		0.0			1.8			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		33.0	72.5		39.5	39.5	39.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		27.5%	60.4%		32.9%	32.9%	32.9%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		29.0	68.0		35.0	35.0	35.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	24.8	20.1	20.1	23.2	15.7		84.8	84.3		35.0	35.0	35.0
Actuated g/C Ratio	0.21	0.17	0.17	0.19	0.13		0.71	0.70		0.29	0.29	0.29
v/c Ratio	1.51	0.34	0.76	0.09	0.51		0.85	0.59		0.14	0.97	0.47
Control Delay	282.7	46.9	11.3	33.2	51.1		40.3	11.7		35.8	63.7	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	282.7	46.9	11.3	33.2	51.1		40.3	11.7		35.8	63.7	8.1
LOS	F	D	B	C	D		D	B		D	E	A
Approach Delay		111.4			48.1			20.3			51.0	
Approach LOS		F			D			C			D	
Queue Length 50th (m)	~99.1	23.0	0.0	4.5	25.3		102.4	69.2		2.4	116.5	3.4
Queue Length 95th (m)	#135.3	33.2	29.3	9.1	36.2		#230.6	147.9		8.2	#158.5	24.8
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	229	475	791	265	462		702	2376		100	988	587
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.51	0.21	0.67	0.09	0.26		0.85	0.59		0.14	0.97	0.47

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.51
Intersection Signal Delay: 50.4 Intersection LOS: D
Intersection Capacity Utilization 93.8% ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	889	23	18	1051	19	6	2	62	5	1	96
Future Vol, veh/h	42	889	23	18	1051	19	6	2	62	5	1	96
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	200	-	-	200
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	46	966	25	20	1142	21	7	2	67	5	1	104

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1163	0	0	991	0	0	1683	2274	496	1769	2276	582
Stage 1	-	-	-	-	-	-	1071	1071	-	1193	1193	-
Stage 2	-	-	-	-	-	-	612	1203	-	576	1083	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	591	-	-	687	-	-	61	39	517	52	39	454
Stage 1	-	-	-	-	-	-	234	293	-	197	256	-
Stage 2	-	-	-	-	-	-	445	254	-	467	289	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	591	-	-	687	-	-	42	35	517	40	35	454
Mov Cap-2 Maneuver	-	-	-	-	-	-	42	35	-	40	35	-
Stage 1	-	-	-	-	-	-	216	270	-	182	249	-
Stage 2	-	-	-	-	-	-	331	247	-	372	266	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.2	25	21.2
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	40	517	591	-	-	687	-	-	39	454
HCM Lane V/C Ratio	0.217	0.13	0.077	-	-	0.028	-	-	0.167	0.23
HCM Control Delay (s)	118.4	13	11.6	-	-	10.4	-	-	115	15.3
HCM Lane LOS	F	B	B	-	-	B	-	-	F	C
HCM 95th %tile Q(veh)	0.7	0.4	0.2	-	-	0.1	-	-	0.5	0.9

Intersection						
Int Delay, s/veh	0.9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	941	1047	14	5	41
Future Vol, veh/h	15	941	1047	14	5	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	16	1023	1138	15	5	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1153	0	-	0	2193	1138
Stage 1	-	-	-	-	1138	-
Stage 2	-	-	-	-	1055	-
Critical Hdwy	4.13	-	-	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.227	-	-	-	3.527	3.327
Pot Cap-1 Maneuver	602	-	-	-	49	244
Stage 1	-	-	-	-	304	-
Stage 2	-	-	-	-	333	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	602	-	-	-	46	244
Mov Cap-2 Maneuver	-	-	-	-	46	-
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	333	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	35.8
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	602	-	-	-	166
HCM Lane V/C Ratio	0.027	-	-	-	0.301
HCM Control Delay (s)	11.1	0	-	-	35.8
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	1.2

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	882	50	0	904	11	0	0	18	0	0	47
Future Vol, veh/h	0	882	50	0	904	11	0	0	18	0	0	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	200	-	-	200	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	959	54	0	983	12	0	0	20	0	0	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	959	-	-	983
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.23	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.327	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	310	0	0	301
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	310	-	-	301
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.4	19.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	310	-	-	-	-	301
HCM Lane V/C Ratio	0.063	-	-	-	-	0.17
HCM Control Delay (s)	17.4	-	-	-	-	19.4
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	896	875	18	0	51
Future Vol, veh/h	0	896	875	18	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	974	951	20	0	55

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	486
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.945
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3285
Pot Cap-1 Maneuver	0	-	-	-	0	526
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	526
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	526
HCM Lane V/C Ratio	-	-	-	0.105
HCM Control Delay (s)	-	-	-	12.6
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	76	264	90	256	553	141	296	764	86	51	528	54
Future Volume (vph)	76	264	90	256	553	141	296	764	86	51	528	54
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	0.99		0.97	0.99		0.97	0.99	1.00		0.99	1.00	
Frt			0.850			0.850		0.985			0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4781	0	1695	4780	0
Flt Permitted	0.329			0.369			0.330			0.297		
Satd. Flow (perm)	584	3390	1478	653	3390	1477	581	4781	0	526	4780	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159			123		19			14	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	83	287	98	278	601	153	322	830	93	55	574	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	287	98	278	601	153	322	923	0	55	633	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.7			3.7			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		7.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	11.0	36.6	36.6	20.0	45.6	45.6	28.0	51.4		12.0	35.4	
Total Split (%)	9.2%	30.5%	30.5%	16.7%	38.0%	38.0%	23.3%	42.8%		10.0%	29.5%	
Maximum Green (s)	7.0	32.1	32.1	16.0	41.1	41.1	24.0	46.9		8.0	30.9	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	26.8	19.3	19.3	39.5	30.2	30.2	72.5	63.0		59.7	52.0	
Actuated g/C Ratio	0.22	0.16	0.16	0.33	0.25	0.25	0.60	0.52		0.50	0.43	
v/c Ratio	0.43	0.53	0.26	0.79	0.70	0.33	0.65	0.37		0.17	0.30	
Control Delay	33.7	48.3	2.3	48.3	45.3	10.8	19.7	18.8		14.6	24.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	33.7	48.3	2.3	48.3	45.3	10.8	19.7	18.8		14.6	24.8	
LOS	C	D	A	D	D	B	B	B		B	C	
Approach Delay		36.1			41.0			19.0			24.0	
Approach LOS		D			D			B			C	
Queue Length 50th (m)	14.0	33.4	0.0	53.2	70.6	5.6	33.9	44.8		4.9	33.1	
Queue Length 95th (m)	21.2	40.8	1.6	64.7	76.8	19.3	67.5	70.7		13.5	58.2	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	195	906	511	353	1161	586	574	2518		343	2079	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.43	0.32	0.19	0.79	0.52	0.26	0.56	0.37		0.16	0.30	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection

Natural Cycle: 95

Control Type: Actuated-Coordinated

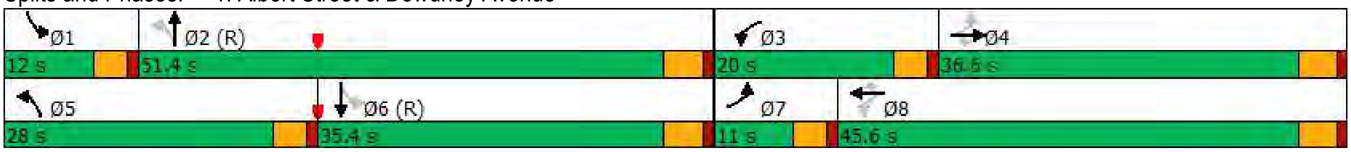
Maximum v/c Ratio: 0.79

Intersection Signal Delay: 29.0 | Intersection LOS: C

Intersection Capacity Utilization 85.0% | ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	440	21	20	539	8	138	6	37	58	0	92
Future Volume (vph)	11	440	21	20	539	8	138	6	37	58	0	92
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		20.0	30.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.973			0.917	
Flt Protected	0.950			0.950				0.963			0.981	
Satd. Flow (prot)	1679	1502	1502	1679	1502	1502	0	1656	0	0	1351	0
Flt Permitted	0.363			0.437				0.678			0.842	
Satd. Flow (perm)	641	1502	1502	772	1502	1502	0	1166	0	0	1160	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			25			25		24			100	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.1			103.2			288.6			205.8	
Travel Time (s)		8.2			7.4			20.8			14.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		10			10						10	
Adj. Flow (vph)	12	478	23	22	586	9	150	7	40	63	0	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	478	23	22	586	9	0	197	0	0	163	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.30	1.06	1.06	1.30	1.06	1.06	1.06	1.06	1.06	1.30	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		6			2			3			8	

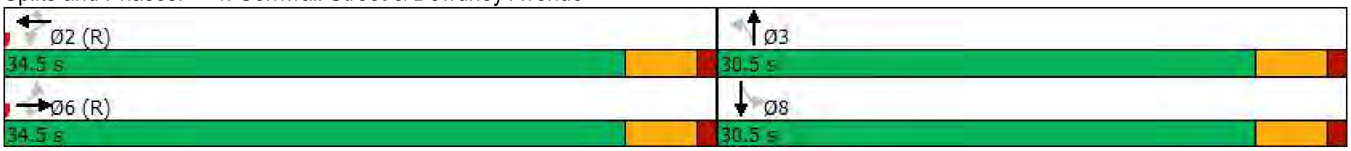
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6		6	2		2	3			8		
Detector Phase	6	6	6	2	2	2	3	3		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	25.5	25.5	25.5	25.5	25.5	25.5	30.5	30.5		30.5	30.5	
Total Split (s)	34.5	34.5	34.5	34.5	34.5	34.5	30.5	30.5		30.5	30.5	
Total Split (%)	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	46.9%	46.9%		46.9%	46.9%	
Maximum Green (s)	30.0	30.0	30.0	30.0	30.0	30.0	26.0	26.0		26.0	26.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	C-Min	None	None		None	None	
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0	16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	20	20	20	20	20	20	20	20		20	20	
Act Effct Green (s)	40.5	40.5	40.5	40.5	40.5	40.5		15.5			15.5	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62		0.24			0.24	
v/c Ratio	0.03	0.51	0.02	0.05	0.63	0.01		0.67			0.46	
Control Delay	7.9	11.2	3.8	7.8	14.5	1.9		29.6			12.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	7.9	11.2	3.8	7.8	14.5	1.9		29.6			12.3	
LOS	A	B	A	A	B	A		C			B	
Approach Delay		10.7			14.1			29.6			12.3	
Approach LOS		B			B			C			B	
Queue Length 50th (m)	0.4	25.1	0.0	0.8	34.3	0.0		19.5			6.4	
Queue Length 95th (m)	3.3	74.3	3.1	4.8	#115.3	1.0		29.6			15.7	
Internal Link Dist (m)		90.1			79.2			264.6			181.8	
Turn Bay Length (m)	30.0		20.0	30.0		20.0						
Base Capacity (vph)	399	935	945	481	935	945		480			524	
Starvation Cap Reductn	0	0	0	0	0	0		0			0	
Spillback Cap Reductn	0	0	0	0	0	0		0			0	
Storage Cap Reductn	0	0	0	0	0	0		0			0	
Reduced v/c Ratio	0.03	0.51	0.02	0.05	0.63	0.01		0.41			0.31	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 14.8 Intersection LOS: B
Intersection Capacity Utilization 54.9% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Cornwall Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱		✣			✣	
Traffic Volume (vph)	16	494	11	28	386	5	57	11	55	51	0	63
Future Volume (vph)	16	494	11	28	386	5	57	11	55	51	0	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		20.0	40.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.940			0.925	
Flt Protected	0.950			0.950				0.977			0.978	
Satd. Flow (prot)	1679	1502	1502	1679	1502	1502	0	1623	0	0	1599	0
Flt Permitted	0.495			0.416				0.829			0.834	
Satd. Flow (perm)	875	1502	1502	735	1502	1502	0	1377	0	0	1363	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			27			27		60			68	
Link Speed (k/h)		50			50			48			50	
Link Distance (m)		102.4			103.2			268.0			228.4	
Travel Time (s)		7.4			7.4			20.1			16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		10			10					10		
Adj. Flow (vph)	17	537	12	30	420	5	62	12	60	55	0	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	537	12	30	420	5	0	134	0	0	123	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.30	1.06	1.06	1.30	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		6			2			3			8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6		6	2		2	3			8		
Detector Phase	6	6	6	2	2	2	3	3		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	24.5	30.5	30.5		30.5	30.5	
Total Split (s)	29.4	29.4	29.4	29.4	29.4	29.4	30.6	30.6		30.6	30.6	
Total Split (%)	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%		51.0%	51.0%	
Maximum Green (s)	24.9	24.9	24.9	24.9	24.9	24.9	26.1	26.1		26.1	26.1	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	C-Min	None	None		None	None	
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0	16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	20	20	20	20	20	20	20	20		20	20	
Act Effct Green (s)	41.6	41.6	41.6	41.6	41.6	41.6		13.2			13.2	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69		0.22			0.22	
v/c Ratio	0.03	0.52	0.01	0.06	0.40	0.00		0.38			0.35	
Control Delay	7.3	11.9	2.4	6.6	10.1	0.6		13.8			11.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	7.3	11.9	2.4	6.6	10.1	0.6		13.8			11.6	
LOS	A	B	A	A	B	A		B			B	
Approach Delay		11.6			9.7			13.8			11.6	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	0.5	23.0	0.0	1.7	31.7	0.0		7.3			5.3	
Queue Length 95th (m)	4.2	#103.2	1.4	4.9	84.0	m0.3		13.3			11.5	
Internal Link Dist (m)		78.4			79.2			244.0			204.4	
Turn Bay Length (m)	40.0		20.0	40.0		20.0						
Base Capacity (vph)	606	1041	1049	509	1041	1049		632			631	
Starvation Cap Reductn	0	0	0	0	0	0		0			0	
Spillback Cap Reductn	0	0	0	0	0	0		0			0	
Storage Cap Reductn	0	0	0	0	0	0		0			0	
Reduced v/c Ratio	0.03	0.52	0.01	0.06	0.40	0.00		0.21			0.19	

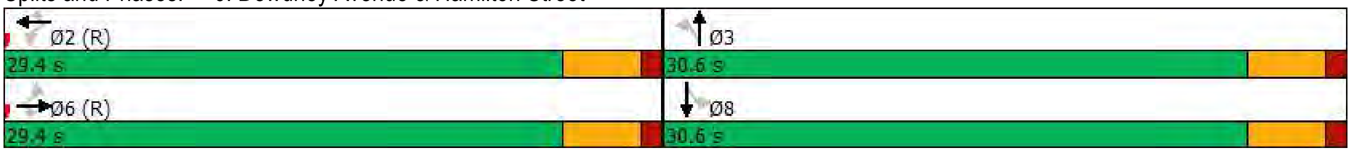
Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 44.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 6: Dewdney Avenue & Hamilton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰	↑↑↱		↰	↑↑	↱
Traffic Volume (vph)	174	50	376	28	38	21	231	739	7	5	561	107
Future Volume (vph)	174	50	376	28	38	21	231	739	7	5	561	107
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				0.99		0.97					0.86
Frt			0.850		0.946			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1650	0	1695	3387	0	1695	3390	1517
Flt Permitted	0.548			0.722			0.359			0.346		
Satd. Flow (perm)	974	1784	1517	1288	1650	0	619	3387	0	617	3390	1311
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			409		23			1				116
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	189	54	409	30	41	23	251	803	8	5	610	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	189	54	409	30	64	0	251	811	0	5	610	116
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			4.7			4.7	
Link Offset(m)		0.0			1.8			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

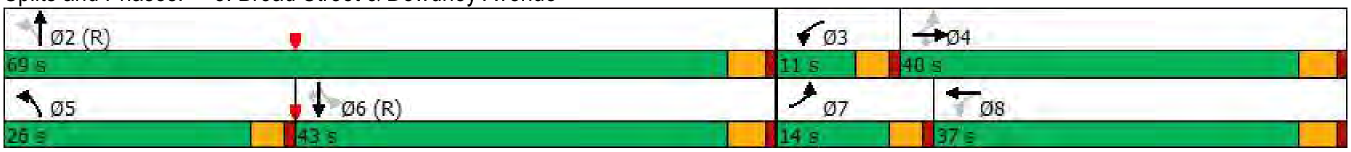
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	14.0	40.0	40.0	11.0	37.0		26.0	69.0		43.0	43.0	43.0
Total Split (%)	11.7%	33.3%	33.3%	9.2%	30.8%		21.7%	57.5%		35.8%	35.8%	35.8%
Maximum Green (s)	10.0	35.5	35.5	7.0	32.5		22.0	64.5		38.5	38.5	38.5
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	25.5	19.0	19.0	19.8	14.4		85.9	85.4		70.1	70.1	70.1
Actuated g/C Ratio	0.21	0.16	0.16	0.16	0.12		0.72	0.71		0.58	0.58	0.58
v/c Ratio	0.71	0.19	0.70	0.13	0.29		0.46	0.34		0.01	0.31	0.14
Control Delay	51.7	42.2	12.6	33.5	33.8		10.6	8.7		19.2	16.4	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	51.7	42.2	12.6	33.5	33.8		10.6	8.7		19.2	16.4	4.5
LOS	D	D	B	C	C		B	A		B	B	A
Approach Delay		26.4			33.7			9.2			14.5	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	36.4	10.6	8.8	5.8	9.2		16.5	32.0		0.5	34.0	0.0
Queue Length 95th (m)	51.8	m19.6	36.6	10.6	18.3		46.0	72.9		3.7	77.3	12.3
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	267	527	736	236	463		640	2410		360	1979	813
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.71	0.10	0.56	0.13	0.14		0.39	0.34		0.01	0.31	0.14

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 16.0	Intersection LOS: B
Intersection Capacity Utilization 62.9%	ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 8: Broad Street & Dewdney Avenue



Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	373	10	7	838	8	49	1	26	51	0	63
Future Vol, veh/h	18	373	10	7	838	8	49	1	26	51	0	63
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	200	-	-	200
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	20	405	11	8	911	9	53	1	28	55	0	68

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	920	0	0	416	0	0	923	1387	208	1175	1388	460
Stage 1	-	-	-	-	-	-	451	451	-	932	932	-
Stage 2	-	-	-	-	-	-	472	936	-	243	456	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	731	-	-	1132	-	-	223	141	795	146	140	545
Stage 1	-	-	-	-	-	-	555	567	-	285	341	-
Stage 2	-	-	-	-	-	-	539	340	-	736	564	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	731	-	-	1132	-	-	190	136	795	136	135	545
Mov Cap-2 Maneuver	-	-	-	-	-	-	190	136	-	136	135	-
Stage 1	-	-	-	-	-	-	540	552	-	277	339	-
Stage 2	-	-	-	-	-	-	468	338	-	689	549	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	24.1	28.7
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	189	795	731	-	-	1132	-	-	136	545
HCM Lane V/C Ratio	0.288	0.036	0.027	-	-	0.007	-	-	0.408	0.126
HCM Control Delay (s)	31.6	9.7	10.1	-	-	8.2	-	-	48.6	12.6
HCM Lane LOS	D	A	B	-	-	A	-	-	E	B
HCM 95th %tile Q(veh)	1.1	0.1	0.1	-	-	0	-	-	1.8	0.4

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	470	763	6	2	64
Future Vol, veh/h	6	470	763	6	2	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	7	511	829	7	2	70

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	836	0	-	0	1354	829
Stage 1	-	-	-	-	829	-
Stage 2	-	-	-	-	525	-
Critical Hdwy	4.13	-	-	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.227	-	-	-	3.527	3.327
Pot Cap-1 Maneuver	793	-	-	-	164	369
Stage 1	-	-	-	-	427	-
Stage 2	-	-	-	-	591	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	793	-	-	-	162	369
Mov Cap-2 Maneuver	-	-	-	-	162	-
Stage 1	-	-	-	-	422	-
Stage 2	-	-	-	-	591	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	793	-	-	-	355
HCM Lane V/C Ratio	0.008	-	-	-	0.202
HCM Control Delay (s)	9.6	0	-	-	17.7
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.7

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	514	21	0	501	5	0	0	7	0	0	66
Future Vol, veh/h	0	514	21	0	501	5	0	0	7	0	0	66
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	200	-	-	200	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	559	23	0	545	5	0	0	8	0	0	72

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	559	-	-	545
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.23	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.327	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	527	0	0	536
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	527	-	-	536
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	11.9	12.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	527	-	-	-	-	536
HCM Lane V/C Ratio	0.014	-	-	-	-	0.134
HCM Control Delay (s)	11.9	-	-	-	-	12.8
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↱		↱
Traffic Vol, veh/h	0	600	369	7	0	50
Future Vol, veh/h	0	600	369	7	0	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	652	401	8	0	54

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	401
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	647
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	647
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	647
HCM Lane V/C Ratio	-	-	-	0.084
HCM Control Delay (s)	-	-	-	11.1
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.3

CITY OF REGINA

REGINA REVITALIZATION INITIATIVE RAILYARD RENEWAL PROJECT

TRANSPORTATION IMPACT ANALYSIS

MARCH 02, 2018

REGINA REVITALIZATION INITIATIVE
RAILYARD RENEWAL PROJECT
TRANSPORTATION IMPACT ANALYSIS

CITY OF REGINA

PROJECT NO.: 151-09273-00
DATE: MARCH 2018

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REVISION HISTORY

VERSION	DATE	DESCRIPTION
1	July 28, 2017	Draft For Review
2	March 2, 2018	Final Report
3		

SIGNATURES

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Number C0868
Permission to Consult held by:

Discipline	Sk. Reg. No.	Signature
TRANSPORTATION	15556	Janis Fong

This report was prepared by WSP Canada Inc. for the account of the **City of Regina**, in accordance with the professional services agreement. The disclosure of any information contained in this report is the sole responsibility of the intended recipient. The material in it reflects WSP's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This limitations statement is considered part of this report.

EXECUTIVE SUMMARY

WSP Canada Inc. was retained by the City of Regina to complete a transportation impact analysis for the Railyard Renewal Project (RRP) which is the second phase of the Regina Revitalization Initiative (RRI). The RRP will transform 17.5 acres land on Dewdney Avenue into a vibrant urban neighborhood that will connect the Warehouse District to the Downtown core. The Railyard Renewal Project is located on the old CP Intermodal Land site, north of the City's downtown area and is bounded by the CP rail main line to the south, Dewdney Avenue to the north, Albert Street to the west, and Broad Street to the east.

The Regina Revitalization Initiative is the largest urban revitalization project ever undertaken in the City of Regina and consists of three (3) primary components: the Stadium Project; Railyard Renewal Project; and, the redevelopment of Taylor Field Neighbourhood. The Railyard Renewal Project will be a major infill development site in the heart of Regina and will have significant impacts on the surrounding road networks, pedestrian facilities and parking facilities. The existing CP rail mainline is currently a barrier between the Downtown area and the railyard site. A future pedestrian connection over the CP rail mainline is a key feature linking the RRP site to the downtown core.

The Railyard Renewal Project will revitalize a strategically and centrally located former industrial railyard site, comprising of approximately 17.5 acres, into a new mixed-use neighbourhood. In 2012, City Council authorized the acquisition of the railyard site from Canadian Pacific Railway. The land acquired included a former intermodal facility; however, other railway activities remain in operation adjacent to the site (i.e. an interchange line, servicing area, wye interchange, and national main rail lines). The Railyard Renewal Project provides an unparalleled opportunity for the City of Regina to guide the redevelopment of the railyard site and to continue to pursue urban revitalization through the RRI by removing and/or mitigating long-existing barriers between the Warehouse District and Downtown

The purpose of this study is to identify and assess the potential traffic impacts on the study intersections associated with the proposed development, and to suggest required mitigation measures (if any) to allow that the adjacent roadways safely accommodate traffic generated by the proposed development.

Primary vehicular access to the CP Railyard site will be obtained via Dewdney Avenue, Albert Street, and Broad Street. Due to the CP rail mainline to the south, adjacent commercial development and CP spur line to the west, and the Broad Street underpass to the east, the main accesses in to the railyard site will be from Dewdney Avenue to the north.

In the vicinity of the CP Railyard site, Dewdney Avenue is a four-lane undivided arterial road with on-street parking on both sides. There are six intersections and twelve property accesses along the 800 m stretch long Dewdney Avenue between Albert Street and Broad Street. Dewdney Avenue currently provides direct access to the commercial and industrial properties north of it. The current Average Annual Daily Traffic (AADT) on Dewdney Avenue between Albert Street and Broad Street ranges from 15,700 to 17,000 vehicles per day.

Sidewalks exist along Albert Street and Broad Street on both sides that are in relatively sound condition except for the Broad Street underpass section where only west side sidewalk is provided. There is no sidewalk on the east side. The section of Dewdney Avenue north of the CP Railyard, between Albert Street and Broad Street, currently has sidewalks on the north side of Dewdney Avenue, but no pedestrian infrastructure on the south side.

Trails or lanes dedicated to cyclist are not provided in the Railyard surrounding area. Cyclists currently have to share sidewalks with pedestrians or share roadways with automobiles.

The identified existing constraints on the RRP site are listed below:

- CP Rail mainline on south side and CP Rail spur line on west side of the site.
- Broad Street underpass structure on the east side.
- The lands surrounding Dewdney Avenue are well developed and there is limited space for road widening.

— Closely spaced intersections and property accesses along Dewdney Avenue may have operational and safety issues and may adversely impact the capacity on the Dewdney Avenue corridor during the peak hours in the future with increased traffic volumes on Dewdney Avenue.
— Capacity constraints during peak hours at the Albert Street and Broad Street intersections.
— On-street parking on both sides of Dewdney Avenue may decrease the capacity of the intersections on Dewdney Avenue.

The proposed concept plan shows that the major land uses on the RRP site will be residential with a portion of retail, office, and community entertainment uses. Table E-1 summarizes the proposed development in the railyard. The proposed concept plan and breakdown development details of each building are attached in Appendix B

Table E.1 Proposed Development Summary

DEVELOPMENT	GROSS FLOOR AREA (m^2)	UNITS
Residential	107,100	1,071
Retail	10,000	-
Office	8,800	-
Community	3,200	-
Cultural	4,100	-
Total	**133,200**	**1,071**

The Institute of Transportation Engineers (ITE) *Trip Generation Manual (9th Edition)* was used in this study to estimate the traffic generated by the proposed development.

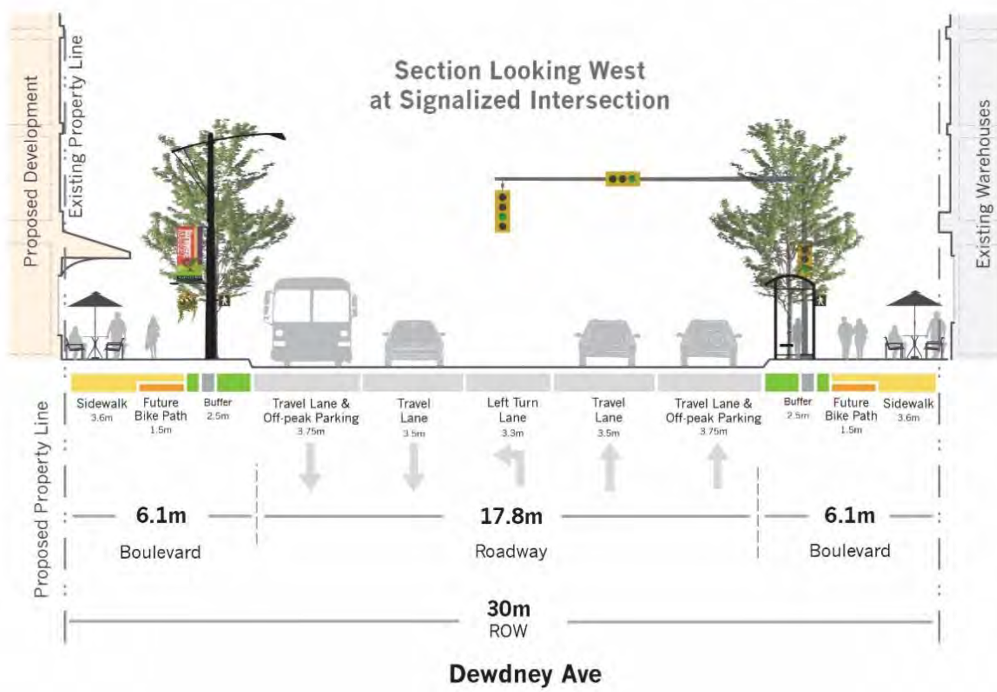
To accommodate the forecasted future post-development traffic and develop a Complete Street framework for the Dewdney Avenue corridor, the following recommendations were reached:

CONCEPTUAL CROSS SECTIONS ON DEWDNEY AVENUE

Complete Street principles were applied in the process of developing cross sections for Dewdney Avenue adjacent to the RRP site. One of the challenging aspects of designing Complete Streets is the balancing act required in finding space for all of the desired uses within a limited ROW resource. The proposed concept for the mid-block road cross section is illustrated in Figure E-1 and the road cross section at signalized intersections is shown in Figure E-2.

The conceptual cross sections will accommodate public transit buses, future bike lanes on both sides, wide sidewalks, and on-street parking during off-peak periods. Four through lanes (two-way) are proposed to carry traffic during the AM and PM peak hours, while two through lanes are deemed to be adequate to accommodate the off-peak traffic volumes. The curb lanes can be used for parking during off-peak hours. Dedicated left turn lanes will be provided at the proposed signalized intersections.

Figure E-1 Proposed Mid-Block Cross Section



Source: WSP and Urban Strategies Inc.

Figure E-2 Proposed Cross Section at Signalized Intersection

DEWDNEY AVENUE INTERSECTION ASSESSMENT FINDINGS

ALBERT STREET / DEWDNEY AVENUE

- The existing lane configurations at the Albert Street / Dewdney Avenue intersection are not expected to be capable of accommodating the forecasted 2040 PM peak hour post-development traffic. However, this intersection is expected to operate at acceptable levels of service in the AM peak hours and off-peak hours.
- Adding lanes to the intersection to improve traffic operational performance will be difficult due to the right-of-way constraints and the existing built developments. Transportation demand management strategies and active transportation programs should be considered by the City to reduce future traffic demand.
- The proposed two future site access points at the 9th Avenue and 10th Avenue intersections on Albert Street are anticipated to reduce the traffic burden at the Albert Street / Dewdney Avenue intersection. The proposed pedestrian bridge linking the railyard with downtown is anticipated to reduce the automobile traffic demand from the railyard.

MCINTYRE STREET / DEWDNEY AVENUE

- The McIntyre Street / Dewdney Avenue intersection is currently controlled by stop signs on McIntyre Street. Left turn lanes are provided for the eastbound and westbound traffic. Two eastbound through lanes and two westbound through lanes are anticipated to be maintained during both peak and off-peak hours at this intersection.
- All traffic movements at this intersection are expected to operate at an acceptable level of service (LOS) E or better during the AM and PM peak hours except for the northbound and southbound left/through movements which are expected to experience longer delay during the AM peak hours. Since the traffic volumes of the northbound and southbound left/through movements will be low, it is deemed that the existing intersection treatment and control type at this intersection will be adequate to accommodate the forecasted future traffic.

LORNE STREET / DEWDNEY AVENUE

- The Lorne Street / Dewdney Avenue intersection will be the first intersection accessing the RRP site from the west. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements. On-street parking is recommended to be restricted during peak hours. Two through lanes (one way) will be available on Dewdney Avenue in the AM and PM peak hours. One through lane will be provided in the off-peak hours since on-street parking will be permitted in the curb lanes.
- All traffic movements at the Lorne Street / Dewdney Avenue intersection are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and will operate at LOS D or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configurations with signal control will be capable of accommodating the forecasted future traffic.

CORNWALL STREET / DEWDNEY AVENUE

- The Cornwall Street / Dewdney Avenue intersection is recommended to be controlled by stop signs on Cornwall Street with free flow conditions on Dewdney Avenue. To maintain smooth flows on Dewdney Avenue and minimize collision risks, traffic movements from/to Cornwall Street are recommended to be restricted to right-in and right-out movements.
- All traffic movements at the Cornwall Street / Dewdney Avenue are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions.

SCARTH STREET / DEWDNEY AVENUE

- The Scarth Street / Dewdney Avenue intersection is recommended to be controlled by stop signs on Scarth Street with free flow conditions on Dewdney Avenue. Traffic movements from/to Scarth Street are recommended to be restricted to right-in and right-out movements.
- All traffic movements at the Scarth Street / Dewdney Avenue are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions.

HAMILTON STREET / DEWDNEY AVENUE

- The Hamilton Street / Dewdney Avenue intersection will be the first intersection accessing the RRP site from the east. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements on Dewdney Avenue.
- All traffic movements at the Hamilton Street / Dewdney Avenue intersection are expected to operate at an acceptable LOS B or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions.

ROSE STREET / DEWDNEY AVENUE

- The Rose Street / Dewdney Avenue intersection is a three-legged intersection and is recommended to be controlled by a stop sign on Rose Street. Traffic movements from/to Rose Street are recommended to be restricted to right-in and right-out movements.
- All traffic movements at the Rose Street / Dewdney Avenue are expected to operate at an acceptable LOS B or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and operate at LOS C or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions.

BROAD STREET / DEWDNEY AVENUE

- The existing lane configurations at the Broad Street / Dewdney Avenue intersection are not expected to be capable of accommodating the forecasted 2040 peak hour traffic volumes. The eastbound left turn movement is expected to operate at LOS F in the off-peak hours.
- Adding lanes to the intersection to improve traffic operational performance will be difficult due to the right-of-way constraints and the railway overpass bridge on Broad Street to the south. Transportation management strategies and active transportation programs to reduce future traffic demand should be considered by the City.

Table E.2 Intersection Improvement Summary

INTERSECTION	RECOMMENDED INTERSECTION CONTROL	2040 OVERALL LOS	
		AM PEAK	PM PEAK
Albert Street	Signal (Existing)	D	E
McIntyre Street	Two-way Stop (Existing)	A	A
Lorne Street	Signal	C	B
Cornwall Street	Two-Way Stop (Right-In / Right-Out)	A	A
Scarth Street	Two-Way Stop (Right-In / Right-Out)	A	A
Hamilton Street	Signal	B	B
Rose Street	Two-Way Stop (Right-In / Right-Out)	A	A
Broad Street	Signal (Existing)	F	F

* LOS A represents very short delays and the best operating conditions, and LOS F represents very long delays and failure of a movement. LOS E is acceptable during peak hours in urban areas.

SIGNALIZED INTERSECTION SPACING

- The signalized intersection spacing along Dewdney Avenue between Albert Street and Lorne Street, Lorne Street and Hamilton Street, Hamilton Street and Broad Street is approximately 300 m, 300 m, and 200 m respectively. Although the spacing is not ideal signalized intersection spacing (400 m) for signal progression for a speed of 50 km/h, signal coordination for the Lorne Street and Hamilton Street intersections is recommended to progress traffic flow along the Dewdney Avenue corridor and to reduce overall delays.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

The forecasted future traffic volumes are expected to exceed the existing intersection capacity at the Dewdney Avenue intersections at Albert Street and at Broad Street. The following TDM strategies should be considered to minimize infrastructure needs by reducing the number and length of auto trips, and by shifting vehicle trips away from Dewdney Avenue:

- **Alternative Routes:** If alternate routes with suitable traffic operation performance (less congestion, shorter delay, and fewer stops) are available, commuters may use alternative routes to reach their destinations instead of using Dewdney Avenue.
- **Public Transit**: The City may consider increasing the transit service frequency to meet the future transit patron demand as a result of the Railyard Renewal Project.
- **Pedestrian and Bicycle Facilities**: To encourage walking and cycling within the City centre, in addition to improving the existing pedestrian and bicycle facility conditions, more pedestrian and bicycle facilities such as sidewalks, crosswalks, shared pathways, and bike lanes should be developed.
- **Carpooling**: Carpooling is a form of ridesharing and can reduce traffic congestion. It is recommended that the City develop a website to support carpooling.
- **Parking Management**: Managing parking helps to reduce the undesirable impacts of parking demand on local and regional traffic levels and the resulting impacts on community livability and design. Parking meters may be installed along Dewdney Avenue with variable parking rates that fluctuate with parking demand.

INTERNAL ROADWAY NETWORK

The internal roadway network within the Railyard site is based on a grid system with the extension of existing north-south local streets and walkways (Lorne Street, Cornwall Street, Scarth Street and Hamilton Street) south across Dewdney Avenue into the site. The north-south local streets will be linked by an east-west local street, extending from Lorne Street to Rose Street, to facilitate movement throughout the site for pedestrians, cyclists and drivers. These internal streets will be contained within a 22-meter right-of-way with 11 meters assigned to the street for two vehicle travel lanes and parking on both sides and 5.5-meters on each side for pedestrian amenities. The pedestrian boulevards will accommodate 2.5 meter sidewalks and zones for street trees, furnishings, utility boxes and streetlights. Pedestrian crossings and traffic control (signage and pavement markings) should be designed to enhance pedestrian safety to create safe interfaces between different modes of travel and a comfortable environment for circulation. The internal streets and intersections should be designed to accommodate the movement of emergency vehicles (e.g., fire truck) and garbage trucks.

SECONDARY PLAN AREA

It should be noted that when individual developments in the Secondary Plan area are proposed, a traffic impact study should be carried out for each particular development.

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APPENDICES

1 INTRODUCTION

WSP Canada Inc. was retained by the City of Regina to complete a transportation impact analysis for the Railyard Renewal Project (RRP) which is one of the primary components of the Regina Revitalization Initiative (RRI). The Railyard Renewal Project is located at the old CP Intermodal Land site, north of the City's downtown area and is bounded by CP rail main line to the south, Dewdney Avenue to the north, Albert Street to the west, and Broad Street to the east.. The subject site location is shown in Figure 1.1.

1.1 STUDY PURPOSE AND OBJECTIVES

The purpose of this study is to identify and assess the potential transportation impacts on the study intersections associated with the proposed RRP site development, and to suggest required mitigation measures (if any) to allow that the adjacent roadways safely accommodate traffic generated by the proposed development. The objectives of this study are to:

— Assess the existing geometric layout and traffic operations on Dewdney Avenue and at each study intersection; and
— Identify required infrastructure improvements including road network, intersection lane configuration, signals, pedestrian and transit access to facilitate traffic and pedestrian flow, and to improve safety and operational performance along Dewdney Avenue.

1.2 BACKGROUND

The Regina Revitalization Initiative is the largest urban revitalization project ever undertaken in the City of Regina and consists of three (3) primary components: the Stadium Project; Railyard Renewal Project; and, the redevelopment of Taylor Field Neighbourhood.

The Railyard Renewal Project will revitalize a strategically and centrally located former industrial railyard site, comprising approximately 17.5 acres, into a new mixed-use neighbourhood. In 2012, Regina's City Council authorized the acquisition of the railyard site from Canadian Pacific Railway. The land acquired included a former intermodal facility; however, other railway activities remain in operation adjacent to the site (i.e. an interchange line, servicing area, wye interchange, and national main rail lines). The Railyard Renewal Project provides an unparalleled opportunity for the City of Regina to guide the redevelopment of the railyard site and to continue to pursue urban revitalization through the RRI by removing and/or mitigating long-existing barriers between the Warehouse District and Downtown.

The Railyard Renewal Project will be a major infill development site in the heart of Regina and will have significant impacts on the surrounding road networks, pedestrian facilities and parking facilities.

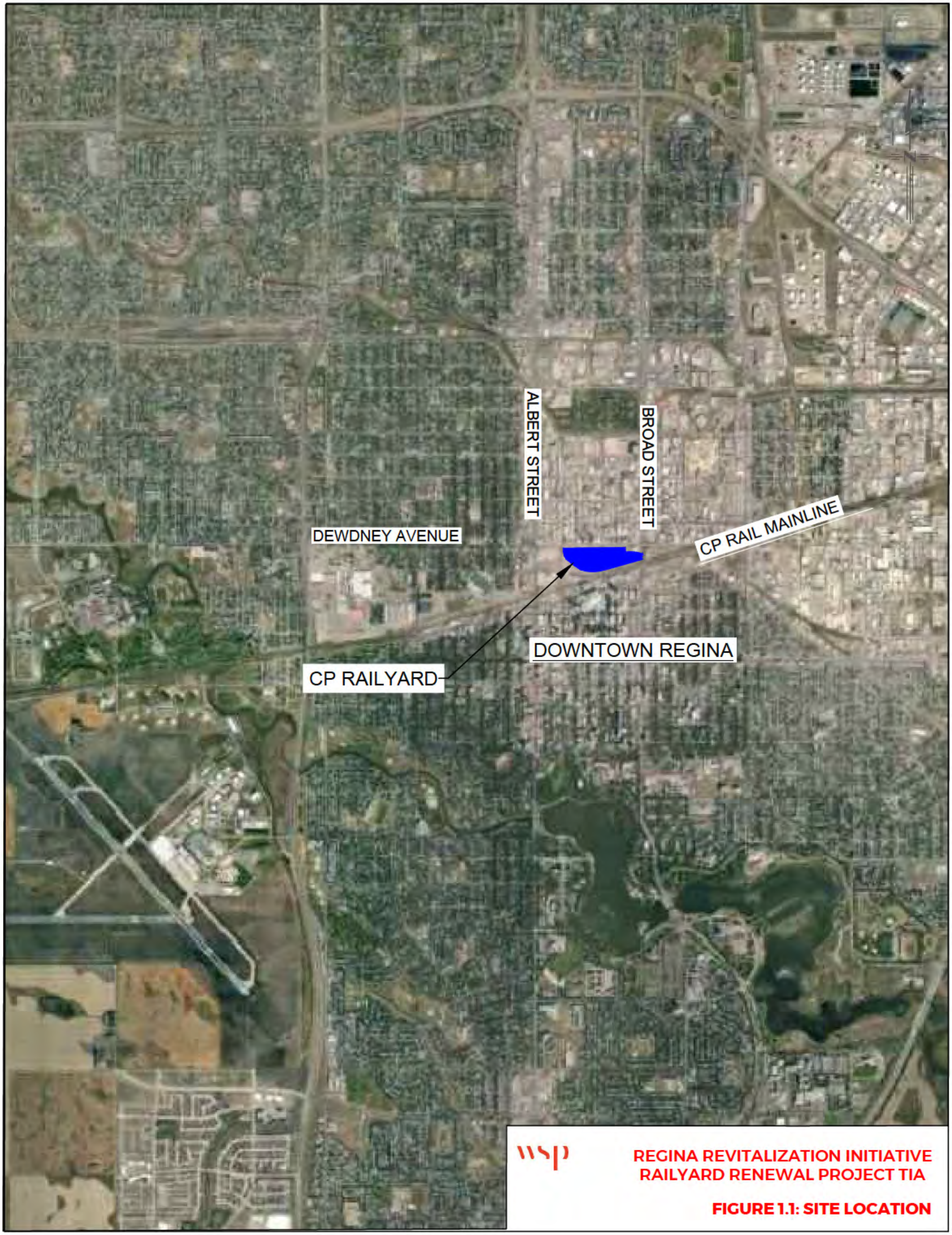
The existing CP rail mainline is currently a barrier between the Downtown area and the railyard site. A future pedestrian connection over the CP rail mainline is a key feature linking the RRP site to the downtown core.

1.3 METHODOLOGY

In order to meet the study objectives, the following methodology was used:

- Review available relevant studies and reports for the RRI project and the City's Transportation Master Plan (Draft), Development Standards Manual, and Regina Revitalization Initiative Guiding Principles.
- Obtain existing transportation network characteristics including traffic volumes, geometry, and information on public transit services, parking facilities, and pedestrian facilities.
- Conduct AM, Noon, and PM peak hour traffic counts at the study intersections.
- Obtain the future traffic volumes on surrounding roadways and study intersections from the City's EMME traffic demand forecasting model.
- Estimate the trips generated by the proposed development based on ITE's *Trip Generation Manual (9^{th} Edition).*
- Analyze the delay, LOS and queue lengths of the study intersections at weekday AM and PM peak periods for the analysis horizon traffic using Synchro Studio 9 (Synchro).

Identify any improvements necessary for the intersections and pedestrian facilities to accommodate the forecasted traffic and pedestrian volumes.



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RAILYARD RENEWAL PROJECT TIA

FIGURE 1.1: SITE LOCATION

2 EXISTING CONDITIONS

The existing conditions of the surrounding roadways and study intersections were reviewed in terms of the following:

— Roadway characteristics.
— Study intersection characteristics.
— Traffic operational performance.
— Pedestrian and cyclist facilities and transit service.
— Constraints.

2.1 EXISTING ROADWAY CHARACTERISTICS

Primary vehicular access to the CP Railyard site will be obtained via Dewdney Avenue, Albert Street, and Broad Street. Due to the CP rail mainline to the south, adjacent commercial development and CP spur line to the west, and the Broad Street underpass to the east, the only accesses to the railyard site will be from Dewdney Avenue to the north.

In the vicinity of the CP Railyard site, Dewdney Avenue is a four-lane undivided arterial road with on-street parking on both sides. There are six intersections and twelve property accesses along the 800 m long Dewdney Avenue corridor between Albert Street and Broad Street. Dewdney Avenue is designated as a truck route and provides accesses to the commercial and industrial properties in the Warehouse District. Several bus routes run through Dewdney Avenue as well. The current Average Annual Daily Traffic (AADT) on Dewdney Avenue between Albert Street and Broad Street ranges from 15,700 to 17,000 vehicles per day.

Albert Street is a major arterial road that runs north-south through the City of Regina. In the vicinity of the Dewdney Avenue intersection, Albert Street presents a divided six-lane cross section with raised concrete median. The current AADT on Albert Street is estimated to be approximately 38,500 vehicles per day.

Broad Street is a major arterial road that runs north-south parallel to Albert Street. South of Dewdney Avenue, Broad Street is a four-lane divided road that underpasses the CP Rail mainline. Broad Street presents a six-lane cross section with raised median north of Dewdney Avenue. The current AADT on Broad Street is estimated to be approximately 37,500 vehicles per day.

McIntyre Street, Lorne Street, Cornwall Street, Scarth Street, Hamilton Street, and Rose Street are local roads that intersect with Dewdney Avenue and provide access to the commercial and industrial developments in the Warehouse District north of Dewdney Avenue.

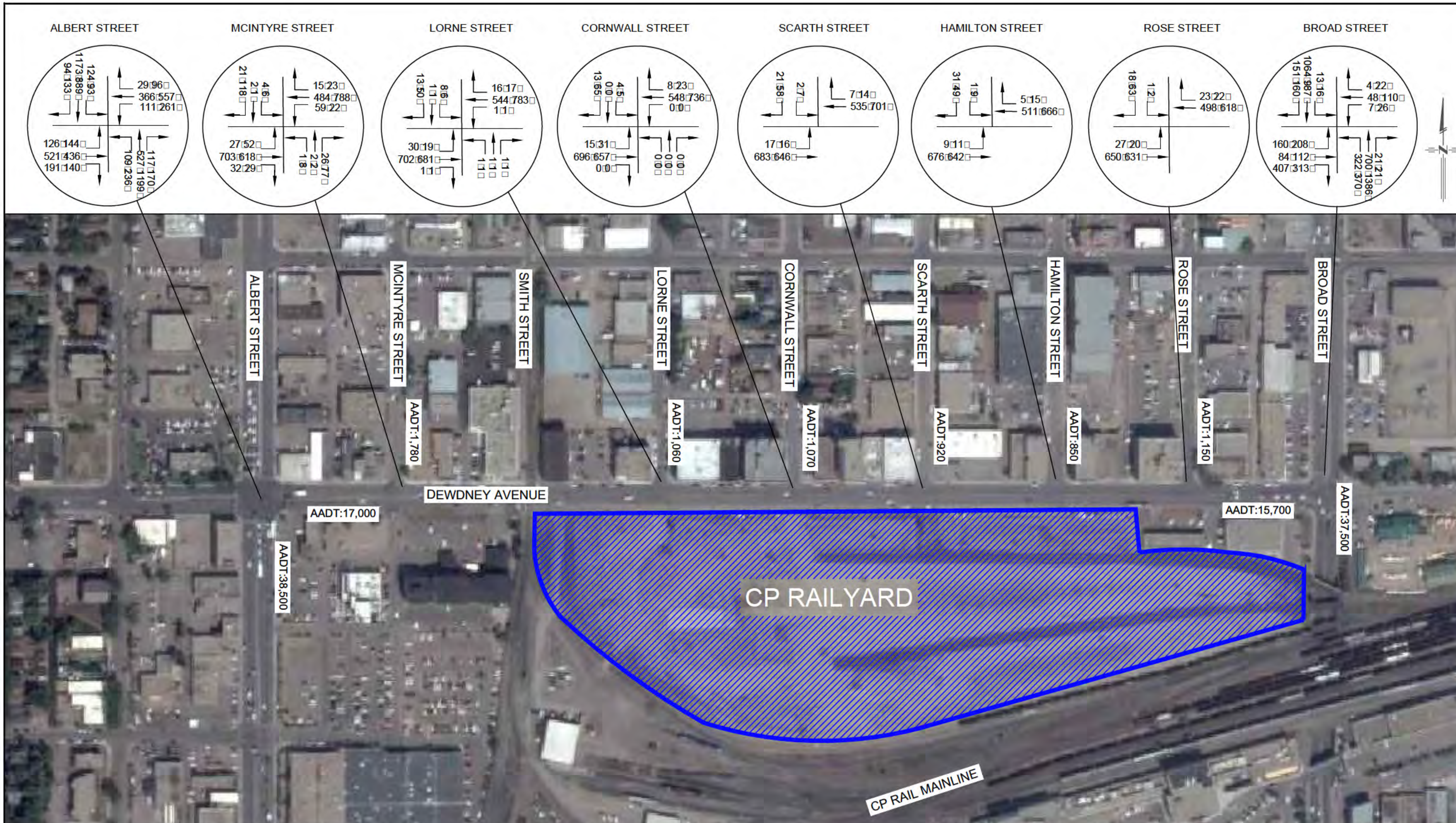
2.2 EXISTING INTERSECTION CHARACTERISTICS

The Albert Street / Dewdney Avenue intersection is currently controlled by traffic signals. Left turn lanes are provided on all four approaches. Exclusive right turn lanes are provided on the east and west approaches and through / right sharing lanes are provides on the north and south approaches. Actuated pedestrian signals and crosswalks are provided on all four legs.

The Broad Street / Dewdney Avenue intersection is currently controlled by traffic signals. Left turn lanes are provided on the north, south, and west approaches. Exclusive right turn lanes are provided on the north and west approaches and a through / right sharing lane is provides on the south approach. There are no lane designation pavement markings present on the east leg. The east leg road width is capable of accommodating two vehicles maneuvering the intersection (a through vehicle passes a left turning vehicle or a right turning vehicle passes a through vehicle). Actuated pedestrian signals and crosswalks are provided on the north and west legs.

There are no left and right turn lanes provided for the local road intersections at Dewdney Avenue except for the McIntyre Street intersection at which left turn lanes are provided for the east and westbound traffic. Pedestrian crosswalks are not provided at the local road intersections along Dewdney Avenue.

The existing traffic turning movements at the study intersections were estimated based on the AM and PM peak hour traffic counts provided by the City of Regina. Figure 2.1 illustrates the current AM and PM peak hour traffic volumes of each turning movement at the study intersections.



X(Y) TRAFFIC VOLUME AM PEAK (PM PEAK)

NOT TO SCALE

wsp

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FIGURE 2.1: EXISTING TRAFFIC

2.3 EXISTING TRAFFIC OPERATIONAL PERFORMANCE

To determine the operating conditions of an intersection or roadway, the concept of level of service (LOS) is generally used. The LOS of an intersection is a qualitative measure of capacity and operating conditions and is directly related to vehicle delay. LOS is given a letter designation from A to F, with LOS A representing very short delays and the best operating conditions, and LOS F representing very long delays and failure of a movement. LOS D is typically considered the limit of acceptable operation because excessive delays tend to occur beyond this threshold. LOS E is also acceptable during peak hours in urban area by some agencies.

For this study, WSP developed Synchro Studio 9 (Synchro) intersection simulation models for the study intersections. Synchro 9 implements the methods of the Highway Capacity Manual, 2010 (HCM 2010) and follows the LOS criteria that is listed in Table 2.1. For two-way stop controlled intersections, the delay is typically calculated for the movements at the minor approaches only, since the major roads are considered to be operating at free flow conditions.

Table 2.1 Level of Service Criteria for Intersections (HCM 2010)

SIGNALIZED CONTROL DELAY (S)	UNSIGNALIZED CONTROL DELAY (S)	LOS BY VOLUME-TO-CAPACITY RATIO	
		v/c ≤ 1.0	*v/c* > 1.0
≤ 10	≤ 10	A	F
> 10 and ≤ 20	> 10 and ≤ 15	B	F
> 20 and ≤ 35	> 15 and ≤ 25	C	F
> 35 and ≤ 55	> 25 and ≤ 35	D	F
> 55 and ≤ 80	> 35 and ≤ 50	E	F
> 80	> 50	F	F

Source: Highway Capacity Manual 2010 (Transportation Research Board)

Based on the existing intersection lane configurations and traffic volumes, the current traffic operational performance was analyzed for each study intersection. Tables 2.2 to 2.9 summarize the capacity analysis results.

Table 2.2 Capacity Analysis: Existing Traffic – Albert Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	21.1	C	0.39	25.6	30.0	C	0.60	29.6
EBT,T	35.5	D	0.65	62.0	36.3	D	0.58	51.6
EBR	5.5	A	0.39	12.6	6.3	A	0.32	13.3
WBL	22.6	C	0.45	23.0	53.9	D	0.88	59.6
WBT,T	31.6	C	0.46	43.2	40.5	D	0.73	66.8
WBR	0.3	A	0.07	0.0	8.5	A	0.24	12.8
NBL	22.9	C	0.52	25.2	27.6	C	0.72	66.5
NBT,T,TR	23.0	C	0.40	47.8	24.7	C	0.65	118.5
SBL	16.3	B	0.37	25.9	18.7	B	0.43	19.8
SBT,T,TR	31.8	C	0.78	110.9	26.8	C	0.58	84.6
INT Summary	27.5	C	0.78	-	29.4	C	0.88	-

Table 2.3 Capacity Analysis: Existing Traffic - McIntyre Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	8.9	A	0.04	0.8	10.1	B	0.08	1.9
WBL	10.4	B	0.10	2.1	9.2	A	0.03	0.6
NBLTR	16.8	C	0.11	1.6	18.3	C	0.26	6.2
SBLTR	19.4	C	0.12	2.4	17.5	C	0.32	10.1
INT Summary	1.3	A	0.12	-	2.6	A	0.32	-

Table 2.4 Capacity Analysis: Existing Traffic - Lorne Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	9.2	A	0.04	1.0	9.7	A	0.03	0.6
WBL	9.7	A	0.00	0.0	8.8	A	0.00	0.0
NBLTR	23.4	C	0.02	0.3	24.0	C	0.01	0.2
SBLTR	19.6	C	0.10	2.0	15.4	C	0.15	3.9
INT Summary	0.8	A	0.10	-	0.9	A	0.15	-

Table 2.5 Capacity Analysis: Existing Traffic - Cornwall Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	9.1	A	0.02	0.5	9.7	A	0.04	1.0
SBLTR	15.6	B	0.06	1.4	14.3	B	0.16	4.3
INT Summary	0.4	A	0.06	-	1.0	A	0.16	-

Table 2.6 Capacity Analysis: Existing Traffic - Scarth Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	9.1	A	0.02	0.5	9.4	A	0.02	0.5
SBLTR	12.0	B	0.05	1.2	13.7	B	0.15	3.9
INT Summary	0.4	A	0.05	-	0.8	A	0.15	-

Table 2.7 Capacity Analysis: Existing Traffic – Hamilton Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	8.9	A	0.01	0.3	9.3	A	0.01	0.3
SBLTR	11.1	B	0.06	1.5	13.9	B	0.14	3.5
INT Summary	0.4	A	0.06	-	0.7	A	0.14	-

Table 2.8 Capacity Analysis: Existing Traffic – Rose Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	9.0	A	0.04	0.8	9.2	A	0.02	0.6
SBLTR	11.3	B	0.04	0.9	11.7	B	0.12	2.9
INT Summary	0.5	A	0.04	-	0.8	A	0.12	-

Table 2.9 Capacity Analysis: Existing Traffic – Broad Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	49.1	D	0.66	42.4	45.9	D	0.72	51.3
EBT	41.2	D	0.30	29.9	40.8	D	0.34	35.4
EBR	16.1	B	0.77	16.5	8.1	A	0.58	20.8
WBL	29.3	C	0.03	4.2	26.8	C	0.08	9.2
WBTR	43.3	D	0.27	19.4	47.8	D	0.55	40.2
NBL	37.6	D	0.74	126.0	41.9	D	0.83	136.2
NBT,TR	8.3	A	0.34	58.3	15.2	B	0.66	169.0
SBL	22.4	C	0.06	4.6	28.8	C	0.14	8.7
SBT,T	35.4	D	0.82	165.7	34.8	C	0.77	160.6
SBR	6.5	A	0.24	16.3	6.2	A	0.26	16.8
INT Summary	25.9	C	0.82	-	25.8	C	0.83	-

The above capacity analyses reveal that all traffic movements at the signal controlled major intersections of Albert Street and Dewdney Avenue, and Broad Street and Dewdney Avenue operate at an acceptable LOS D or better during the AM and PM peak hours under the existing traffic conditions. However, the westbound left turn bay at the Albert Street / Dewdney Avenue intersection does not provide adequate storage length for the left turn movements during the PM peak hours and the westbound left turning queue may block the adjacent westbound through lane. At the Broad Street / Dewdney Avenue intersection, the northbound left turn movement queue may spill on to the adjacent northbound through lane during both the AM and PM peak hours and adversely impact the northbound through movement capacity.

All traffic movements at the local road intersections on Dewdney Avenue operate at an acceptable LOS C or better during the AM and PM peak hours under the existing traffic conditions. No traffic operational issues were found at these local road intersections

2.4 EXISTING PEDESTRIAN AND CYCLIST FACILITIES AND TRANSIT SERVICE

Sidewalks are provided along Albert Street and Broad Street on both sides except for the Broad Street underpass section where only the west side sidewalk is provided. There is no sidewalk on the east side. The section of Dewdney Avenue, between Albert Street and Broad Street, is currently lacking in pedestrian infrastructure. Sidewalks are provided only on the north side of Dewdney Avenue.

Trails or lanes dedicated to cyclists are not provided in the RRP surrounding area. Cyclists will have to either share sidewalks with pedestrians or share roadways with automobiles.

The CP railyard area is currently well served by the City's transit system. Several bus routes are offered for this area including Route #1, #2, #4, #5, #10, and #30.

2.5 EXISTING CONSTRAINTS

The identified existing constraints on the RRP site are listed below:

— CP rail mainline on south side and CP rail spur line on west side of the site.

— Broad Street underpass structure on the east side.

— The site surrounding area is well developed. Limited space for road widening.

— Closely spaced intersections and property accesses along Dewdney Avenue may have operational and safety issues and adversely impacts the capacity on the Dewdney Avenue corridor during the peak hours in the future with increased traffic volumes on Dewdney Avenue.

— Capacity constraints during peak hours at the Albert Street and Broad Street intersections.

— On-street parking allowed on both sides of Dewdney Avenue which may decrease the capacity of the intersections on Dewdney Avenue.

3 TRAFFIC FORECAST

This section presents the forecasted future traffic volumes for the subject roadways and study intersections.

3.1 BACKGROUND TRAFFIC GROWTH

Background traffic (non-site traffic) is the traffic that exists without the addition of the trips generated by the proposed development.

The background traffic growth on Dewdney Avenue, Albert Street and Broad Street was estimated based on the City's 2012 and 2040 traffic forecast model (EMME) outputs. The City's EMME model produced the PM peak hour traffic volume forecast for the subject roadway links. The traffic volume differences between the 2012 and 2040 PM peak hours were imposed onto the existing PM peak hour traffic volumes of each roadway link to represent the anticipated future background traffic growth. The traffic turning movement volume growths were estimated based on the existing traffic turning proportions at each study intersection. Traffic growth rates were not applied onto the local roads since the area north of Dewdney Avenue is fully developed.

The City's EMME model did not provide the AM peak hour traffic forecast. For the purpose of this study, the PM peak hour traffic growth rates were used to estimate the future AM peak hour volumes. The forecasted future 2040 background traffic turning movements at each study intersection are illustrated in Figure 3.1.

3.2 TRIP GENERATION

The proposed concept plan shows that the major land uses in the RRP site will be residential with a small portion of retail, office, and community entertainment uses. Table 3.1 summarizes the proposed development in the RRP site. The proposed concept plan and development detail breakdown of each building are attached in Appendix B

Table 3.1 Proposed Development Summary

DEVELOPMENT	GROSS FLOOR AREA (m^2)	UNITS
Residential	107,100	1,071
Retail	10,000	-
Office	8,800	-
Community	3,200	-
Cultural	4,100	-
Total	**133,200**	**1,071**

The Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition) was used in this study to estimate the traffic generated by the proposed development.

The corresponding land uses in the ITE Trip Generation Manual that were used to estimate the traffic generated by the proposed developments are summarized in Table 3.2.

Table 3.2 Corresponding ITE Land uses

PROPOSED DEVELOPMENT	ITE LAND USE (CODE)
Residential Buildings (3 to 10 Levels)	Mid-Rise Apartment (223)
Residential Buildings (More Than 10 Levels)	High-Rise Apartment (222)
Retail	Specialty Retail Center (826)
Office	General Office (710)
Community	Recreational Community Center (495)
Cultural	No Corresponding ITE Land Use

It is anticipated that most of the traffic generated by the proposed cultural development would be internal trips and travelling on weekends when events typically are occurring. Therefore, the cultural development generated trips would be negligible and were not included in this study.

Tables 3.3 to 3.7 summarize the estimated trips that would be generated by the proposed RRP development. The trip generation tables for each building are attached in Appendix C.

Table 3.3 Trip Generation – Residential Building (3 to 10 Levels)

UNITS: 496	WEEKDAY			AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	50%	50%	100%	31%	69%	100%	58%	42%
Rates (Trips / Unit)	4.46	2.23	2.23	0.30	0.09	0.21	0.39	0.23	0.16
Total Trips	2212	1106	1106	149	46	103	193	112	81

Table 3.4 Trip Generation – Residential Building (More Than 10 Levels)

UNITS: 575	WEEKDAY			AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	50%	50%	100%	25%	75%	100%	61%	39%
Rates (Trips / Unit)	4.20	2.10	2.10	0.30	0.08	0.23	0.35	0.21	0.14
Total Trips	2415	1208	1208	173	43	129	201	123	78

Table 3.5 Trip Generation – Retail

TOTAL GFA: 107,640 ft^2	WEEKDAY			AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	50%	50%	100%	62%	38%	100%	44%	56%
Rates (Trips / 1000 ft^2)	44.32	22.16	22.16	0.96	0.60	0.36	2.71	1.19	1.52
Total Trips	4771	2385	2385	103	64	39	292	128	163

Table 3.6 Trip Generation - Office

TOTAL GFA: 94,720 ft²	WEEKDAY			AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	50%	50%	100%	88%	12%	100%	17%	83%
Rates (Trips / 1000 ft²)	11.03	5.52	5.52	1.56	1.37	0.19	1.49	0.25	1.24
Total Trips	1045	522	522	148	130	18	141	24	117

Table 3.7 Trip Generation - Community

TOTAL GFA: 34,450 ft²	WEEKDAY			AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT
Directional Distribution	100%	50%	50%	100%	66%	34%	100%	49%	51%
Rates (Trips / 1000 ft²)	33.82	16.91	16.91	2.05	1.35	0.70	2.74	1.34	1.40
Total Trips	1165	583	583	71	47	24	94	46	48

3.2.1 INTERNAL AND PASS-BY TRIPS

Internal trips should be considered for a multi-use development. According to the ITE *Trip Generation Handbook*, a multi-use development is typically a single real-estate project that consists of two or more ITE land use classifications between which trips can be made without using the off-site road system. The internal trips can be made either by walking or by vehicles using internal roadways. In this study, the proposed development is deemed to be a multi-use development (residential, office, and retail), thus to estimate the trips made on the external streets, the internal trips that are not made on the major street system should be deducted from the total trips. To account for the internal trips, ITE NCHRP 684 Internal Trip Capture Estimation Tool was used in this study. Table 3.8 summaries the estimated internal trip capture percentages by land uses and the detailed analysis results were attached in Appendix C. ITE doesn't provide the internal trip capture rate for community land use, the average internal capture rate for residential, retail, and office was applied to the community development.

Table 3.8 Internal Trip Capture Rates

LAND USE	AM PEAK HOUR		PM PEAK HOUR	
	IN	OUT	IN	OUT
Residential	2%	3%	19%	10%
Retail	12%	20%	14%	23%
Office	7%	28%	30%	8%
Community	7%	8%	18%	14%

According to the ITE Trip Generation Handbook, pass-by trips are defined as the trips that are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the generator. Pass-by trips will not add new traffic to the adjacent street system. In this study, the proposed shopper centre and highway commercial developments will attract pass-by trips. In accordance with the ITE Trip Generation Handbook, an average 34% of the trips generated by a shopping center are pass-by trips. In this study, it is assumed that 35% of the total trips generated by the retail development will be pass-by trips

3.2.2 COMMUTE TRIPS

The RRP site is located close to the downtown core which is currently served by Regina public transit. A pedestrian connection over the CP rail tracks is proposed to link the railyard site to the downtown core.

In consultation with the City, it is anticipated that approximately 20% of commute trips would be made by public transit, walking, and bicycle.

3.2.3 TRIP GENERATION SUMMARY

Table 3.9 summarizes the estimated new vehicle trips that will be generated by the proposed railyard development at full build out.

Table 3.9 Trip Generation Summary

DEVELOPMENT	WEEKDAY			AM PEAK HOUR			PM PEAK HOUR		
	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT
Residential	4627	2314	2314	321	89	232	395	235	160
Retail	4771	2386	2386	103	64	39	292	128	163
Office	1045	522	522	148	130	18	141	24	117
Community	1165	583	583	71	47	24	94	46	48
Total Trips	11609	5805	5805	643	330	313	922	434	488
Internal Trips	1790	895	895	60	30	30	182	91	91
External Trips	9819	4910	4910	583	300	283	740	343	397
Public Transit Trips	1964	982	982	117	60	57	148	69	79
External Vehicle Trips	7856	3928	3928	466	240	226	592	274	318
Pass-by Trips (Retail)	1000	500	500	25	16	9	66	31	35
Non-Pass-by Trips	6855	3428	3428	442	224	218	526	243	283

3.3 TRIP DISTRIBUTION AND ASSIGNMENT

Since the proposed RRP development will include a mix of residential, retail, and office land uses; trip distributions for the proposed development were estimated based on the population and employment distributions within Regina and the road network in the vicinity of the RRP site. Population distribution was estimated based on the current main residential areas in the City, while employment distribution was estimated based on the size and location of major employment centers in Regina. The population and employment distribution estimates are shown in Table 3.10.

Table 3.10 Population and Employment Distribution

DIRECTIONS FROM THE SITE	POPULATION DISTRIBUTION	EMPLOYMENT DISTRIBUTION
North	25%	45%
West	20%	10%
South	40%	25%
East	15%	20%

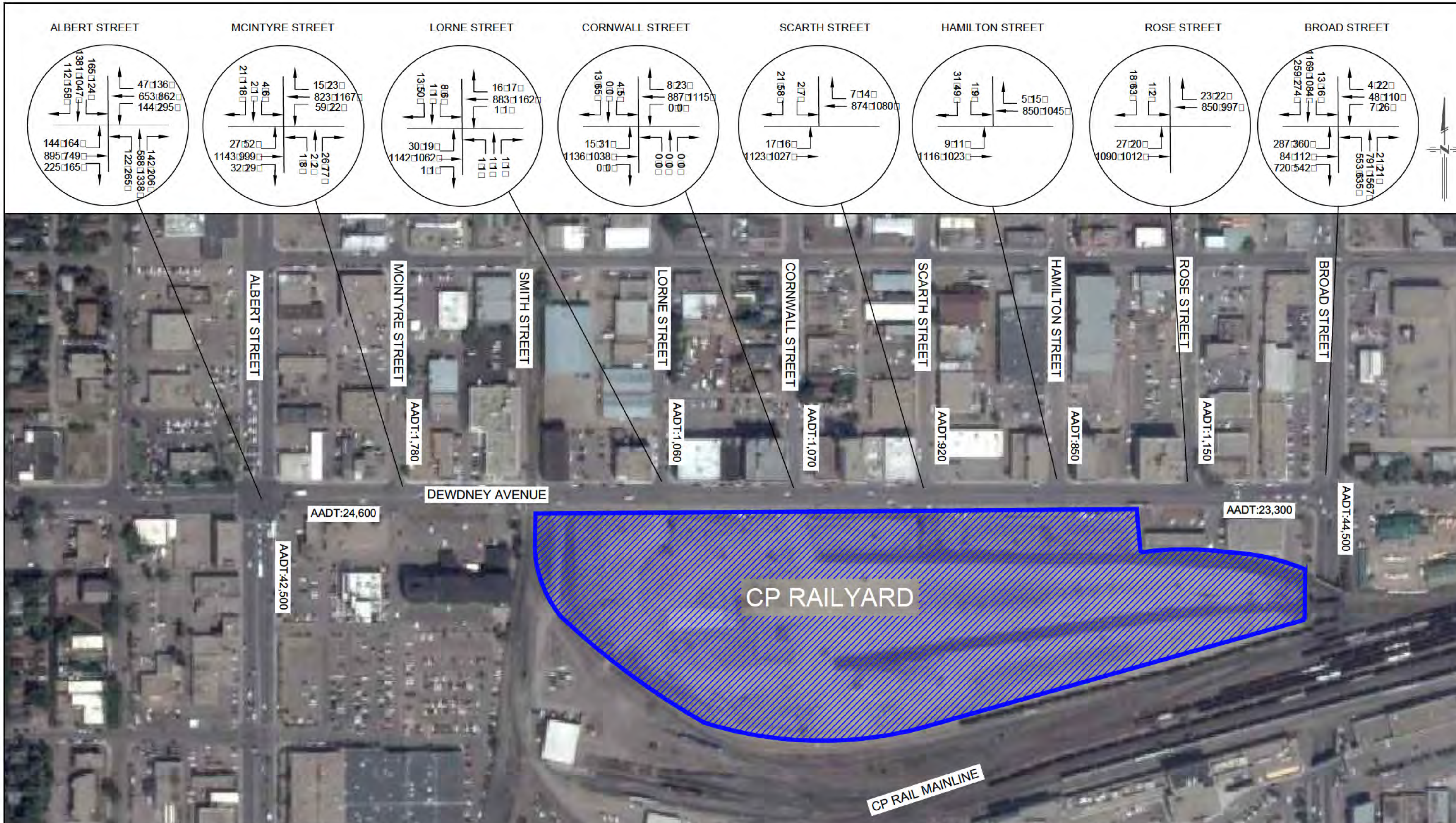
The proposed office and retail development will attract trips from residential areas, so these trips were distributed to the road network using population distribute splits. The trips generated by the proposed residential development were distributed to the road network using employment distribution splits. The trip distribution for pass-by trips generated by the proposed retail development was estimated based on the existing eastbound and westbound traffic volumes on Dewdney Avenue.

Trip distributions for the proposed residential, retail, and office development are illustrated in Figures 3.2 to 3.4. Figures 3.5 to 3.7 illustrate the estimated trip assignment at the study intersections during both the AM and PM peak hours

3.4 COMBINED TRAFFIC

Combined traffic volumes (post-development traffic) include both background traffic and the traffic generated by the proposed development. Combined traffic volumes were calculated by superimposing the trips generated by the proposed development onto the future background traffic volumes. The forecasted 2040 AM and PM peak hour post-development traffic volumes are shown in Figure 3.8.

Figure 3.9 shows the traffic turning movements at the study intersections with the proposed right-in / right-out intersection treatment at the Cornwall Street, Scarth Street, and Rose Street intersections as recommended in Section 5.



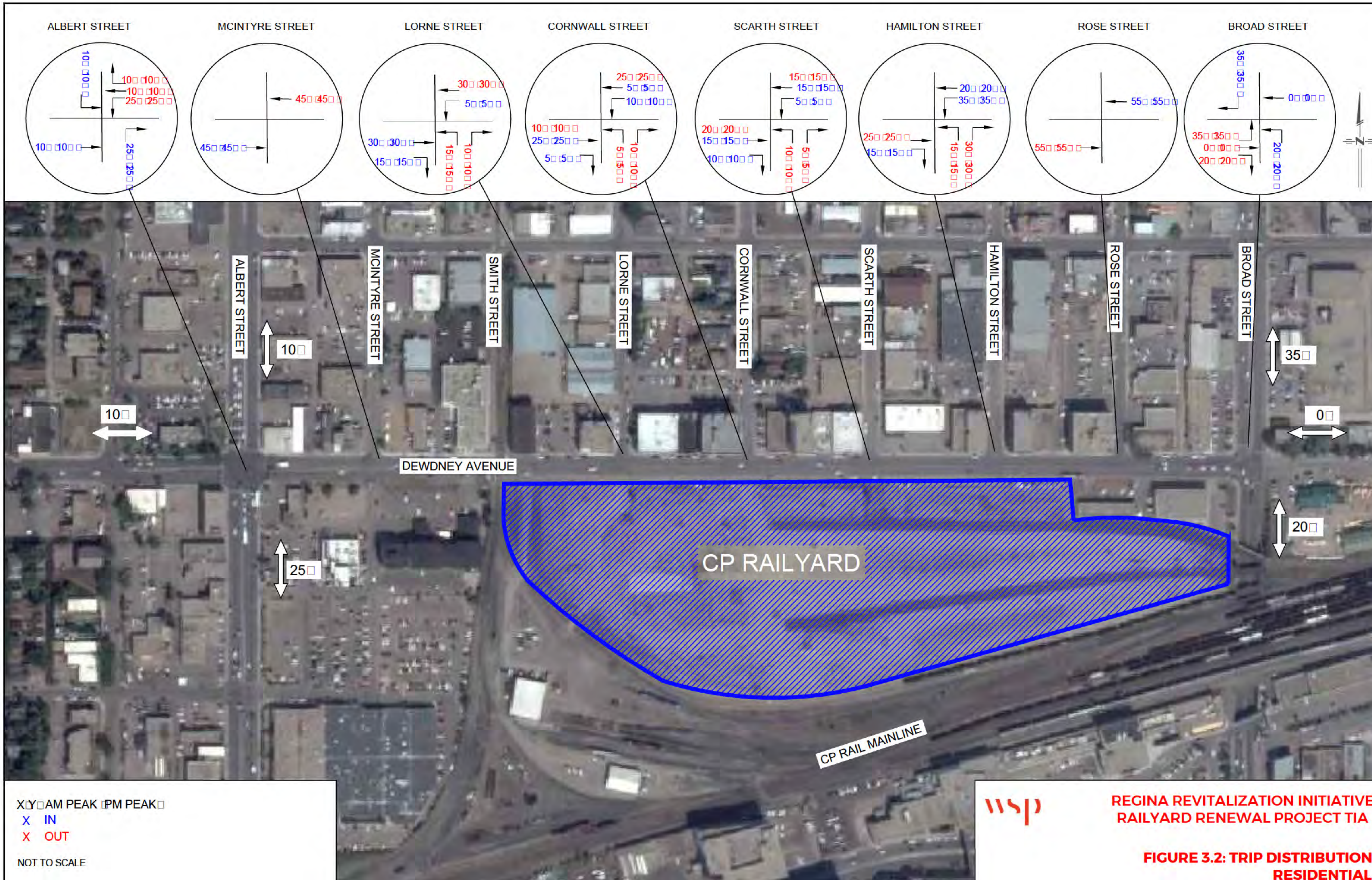
X(Y) TRAFFIC VOLUME AM PEAK (PM PEAK)

NOT TO SCALE

wsp

REGINA REVITALIZATION INITIATIVE
RAILYARD RENEWAL PROJECT TIA

FIGURE 3.1: 2040 BACKGROUND TRAFFIC



REGINA REVITALIZATION INITIATIVE
RAILYARD RENEWAL PROJECT TIA

FIGURE 3.2: TRIP DISTRIBUTION RESIDENTIAL

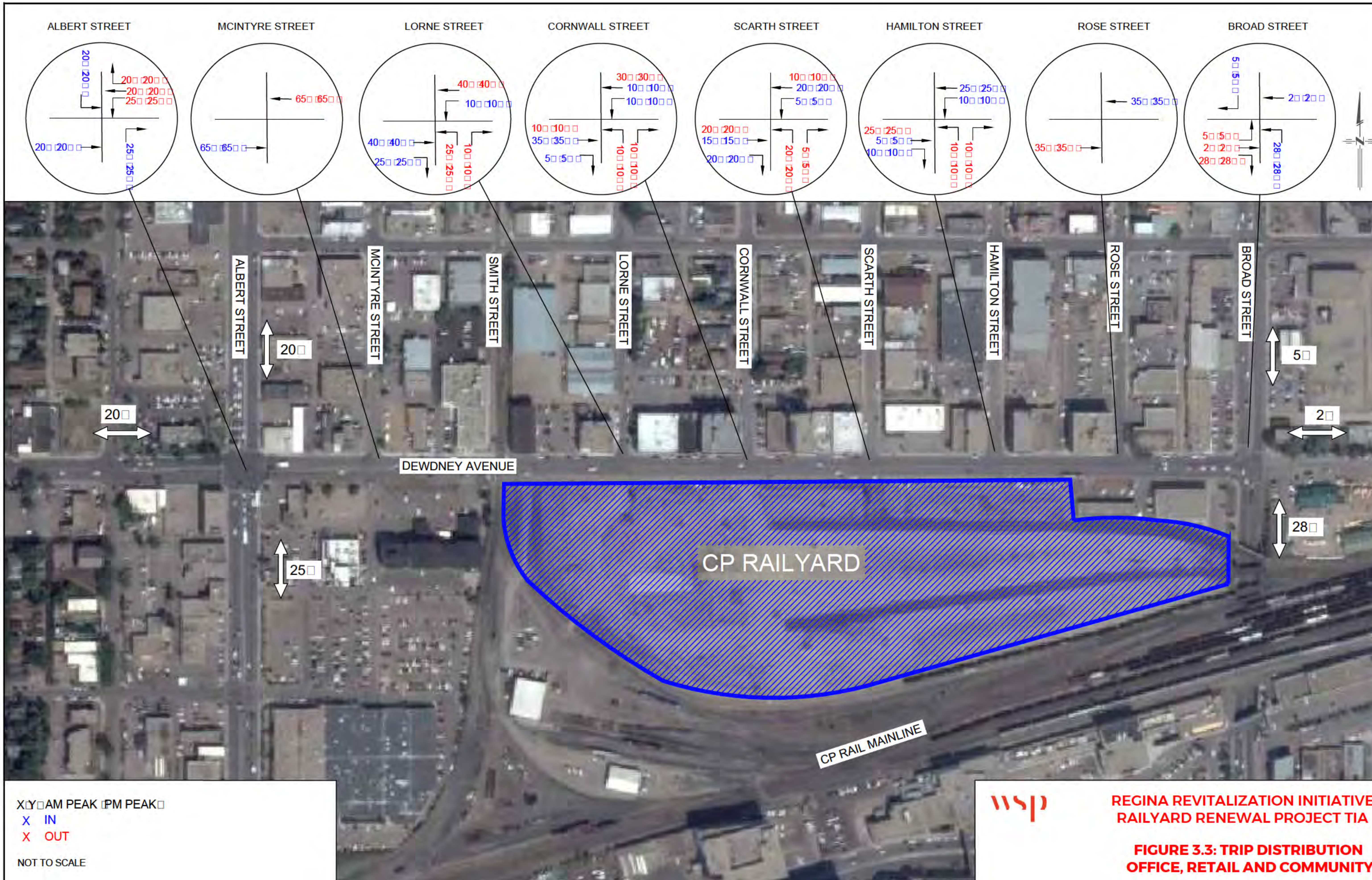
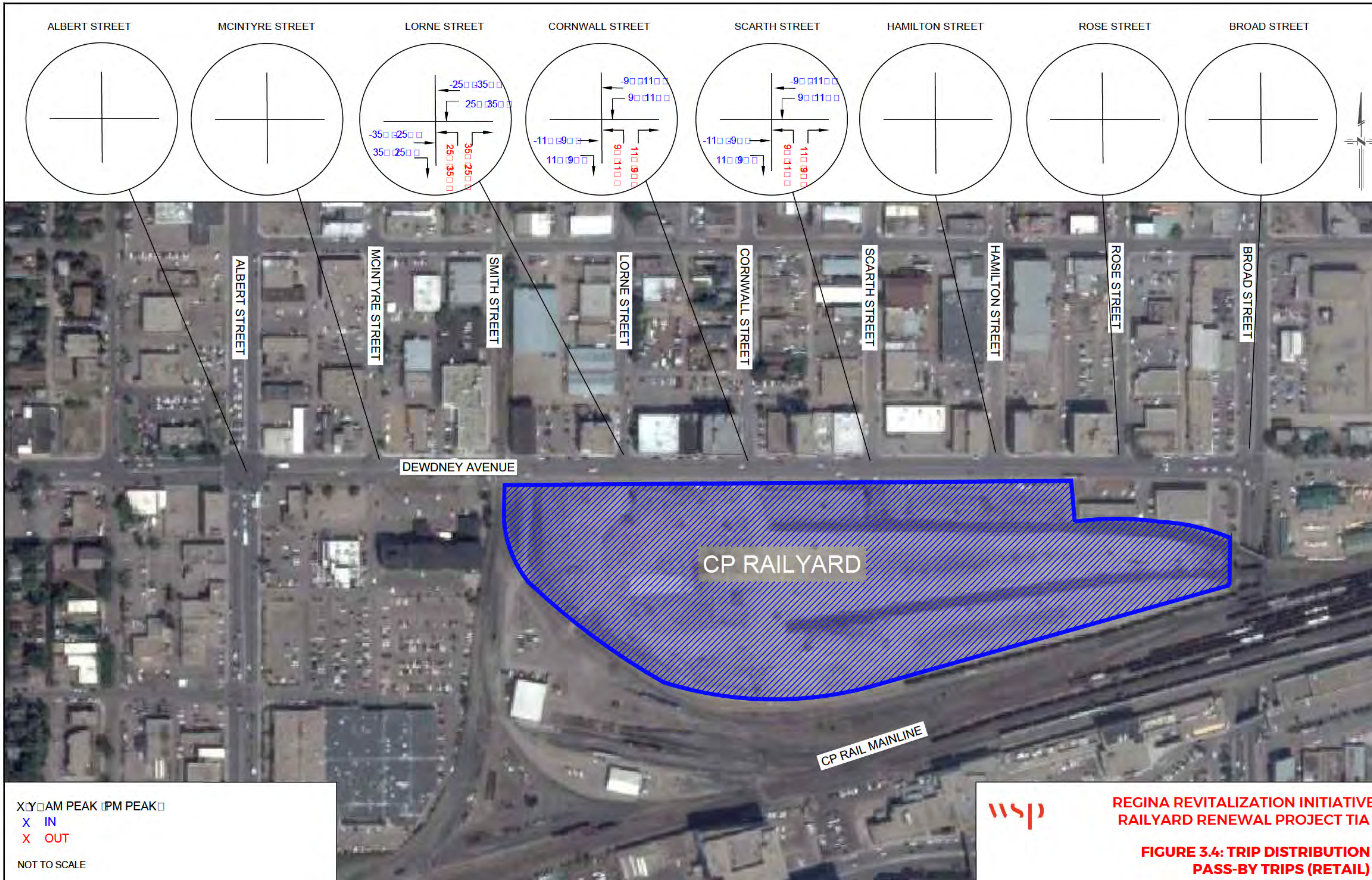


FIGURE 3.3: TRIP DISTRIBUTION OFFICE, RETAIL AND COMMUNITY



REGINA REVITALIZATION INITIATIVE
RAILYARD RENEWAL PROJECT TIA

FIGURE 3.4: TRIP DISTRIBUTION PASS-BY TRIPS (RETAIL)

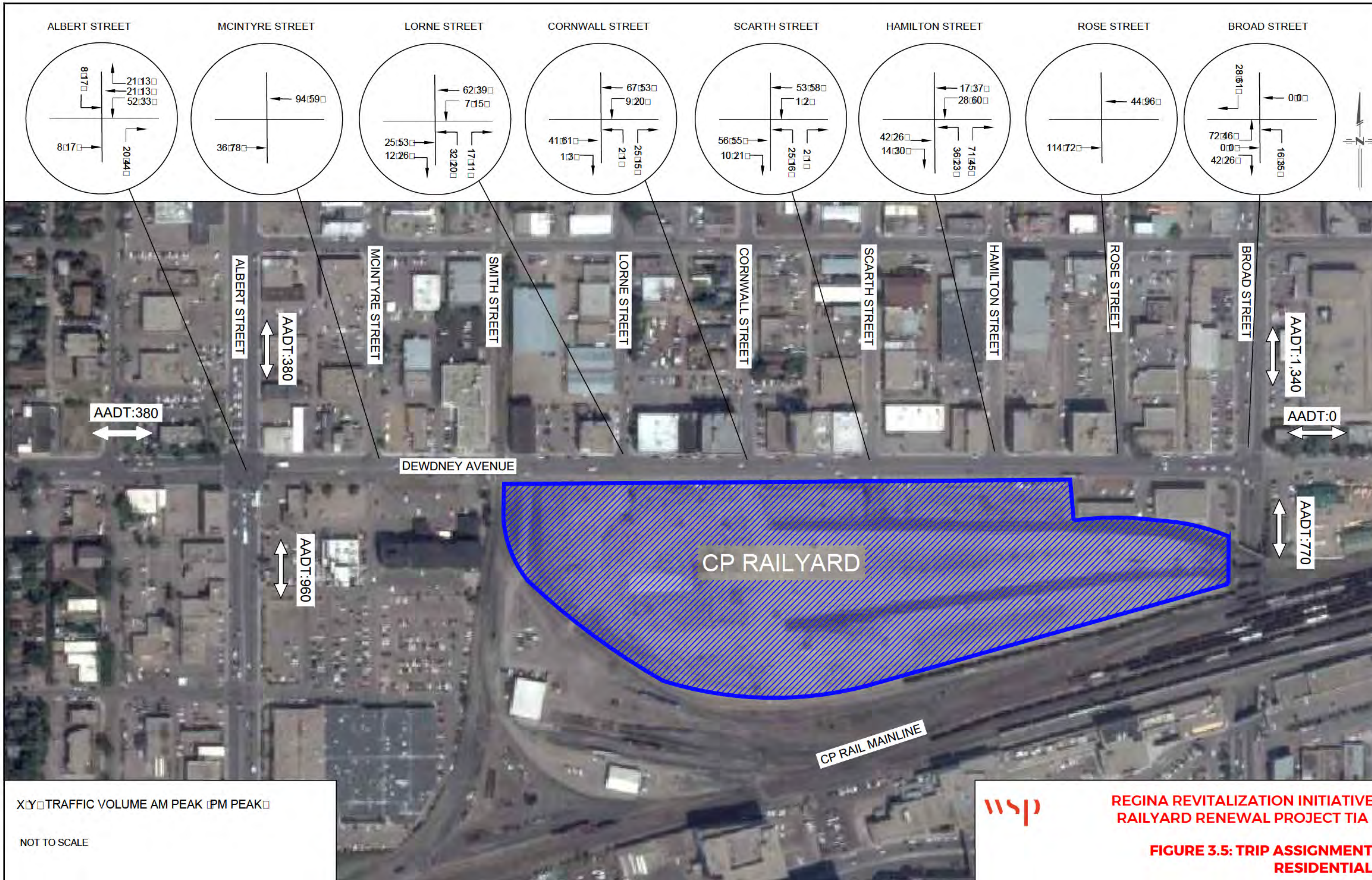
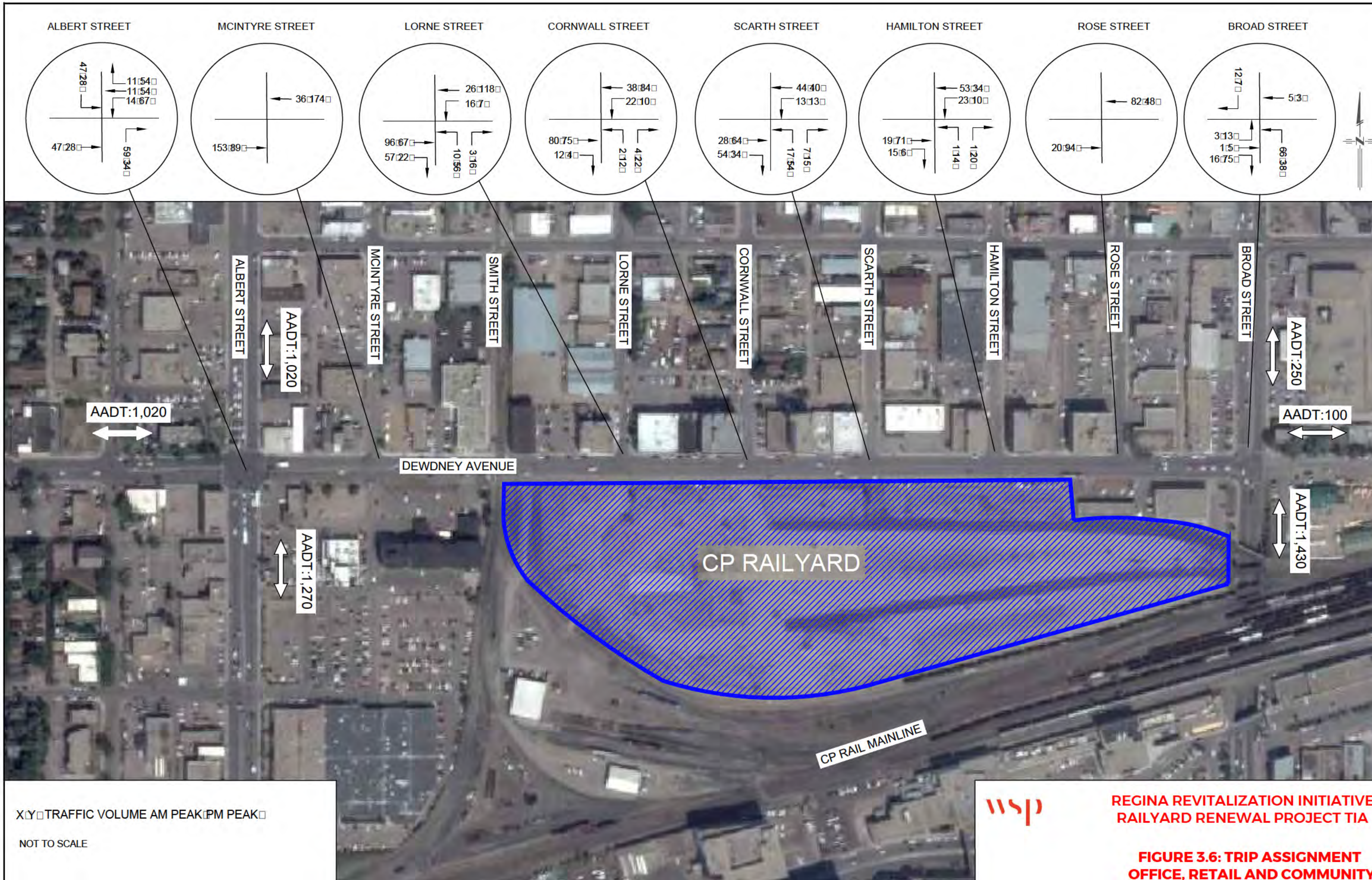


FIGURE 3.5: TRIP ASSIGNMENT RESIDENTIAL


ALBERT STREET
MCINTYRE STREET
LORNE STREET
CORNWALL STREET
SCARTH STREET
HAMILTON STREET
ROSE STREET
BROAD STREET
SMITH STREET
DEWDNEY AVENUE
AADT:1,020
AADT:1,020
AADT:1,270
AADT:250
AADT:100
AADT:1,430
CP RAILYARD
CP RAIL MAINLINE
X(Y) TRAFFIC VOLUME AM PEAK(PM PEAK)
NOT TO SCALE
wsp
REGINA REVITALIZATION INITIATIVE
RAILYARD RENEWAL PROJECT TIA
FIGURE 3.6: TRIP ASSIGNMENT
OFFICE, RETAIL AND COMMUNITY

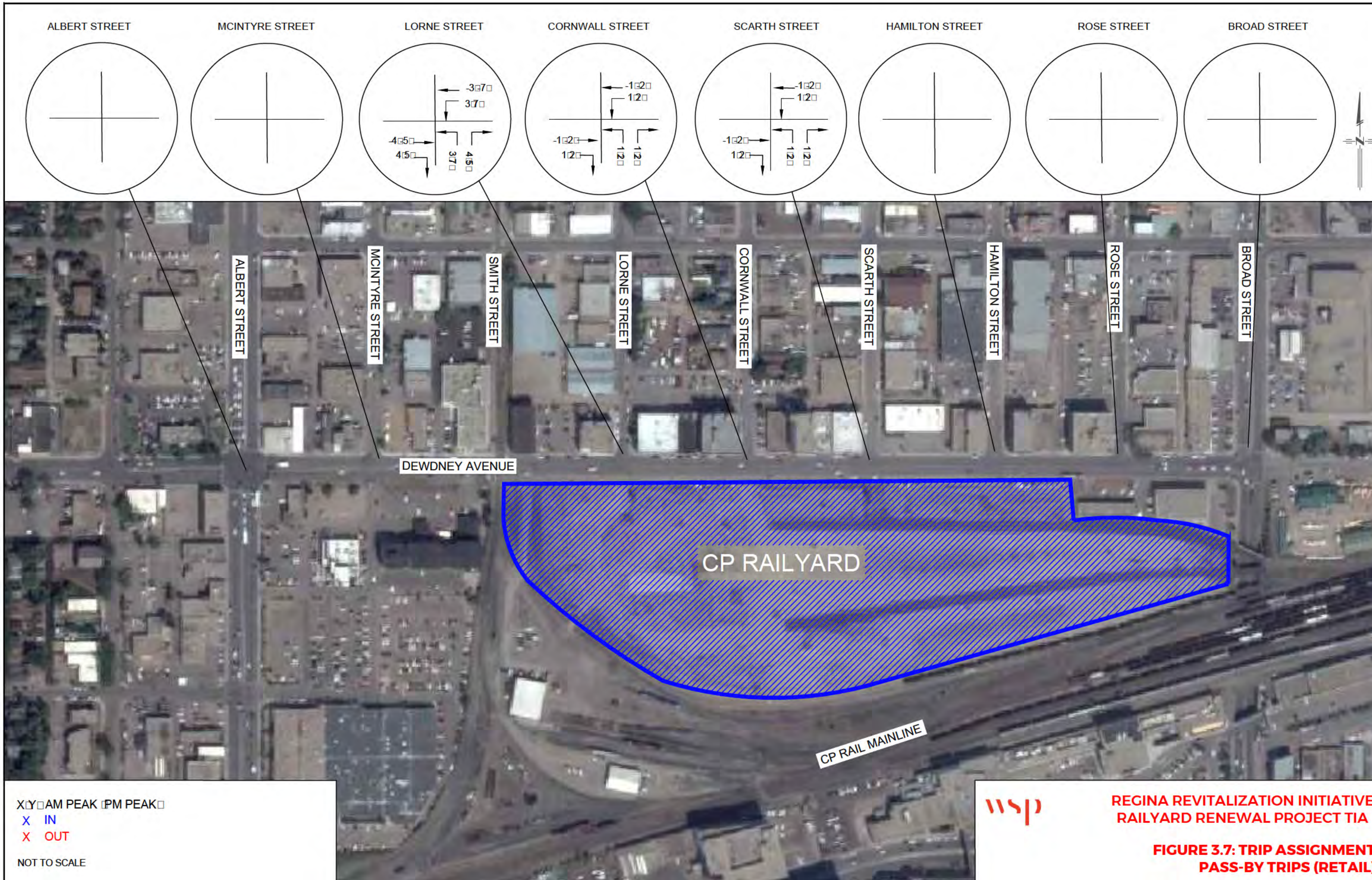


FIGURE 3.7: TRIP ASSIGNMENT PASS-BY TRIPS (RETAIL)

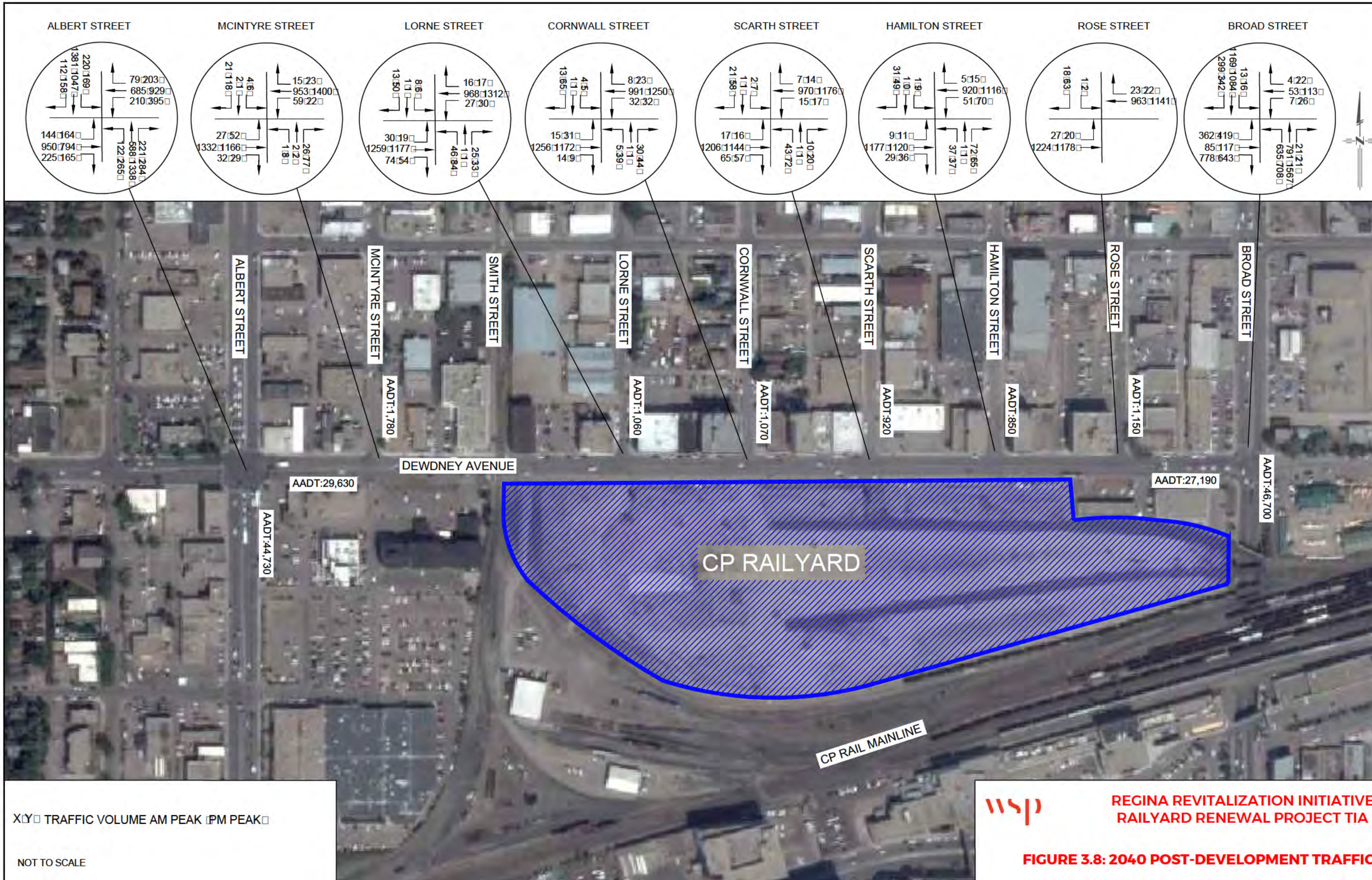
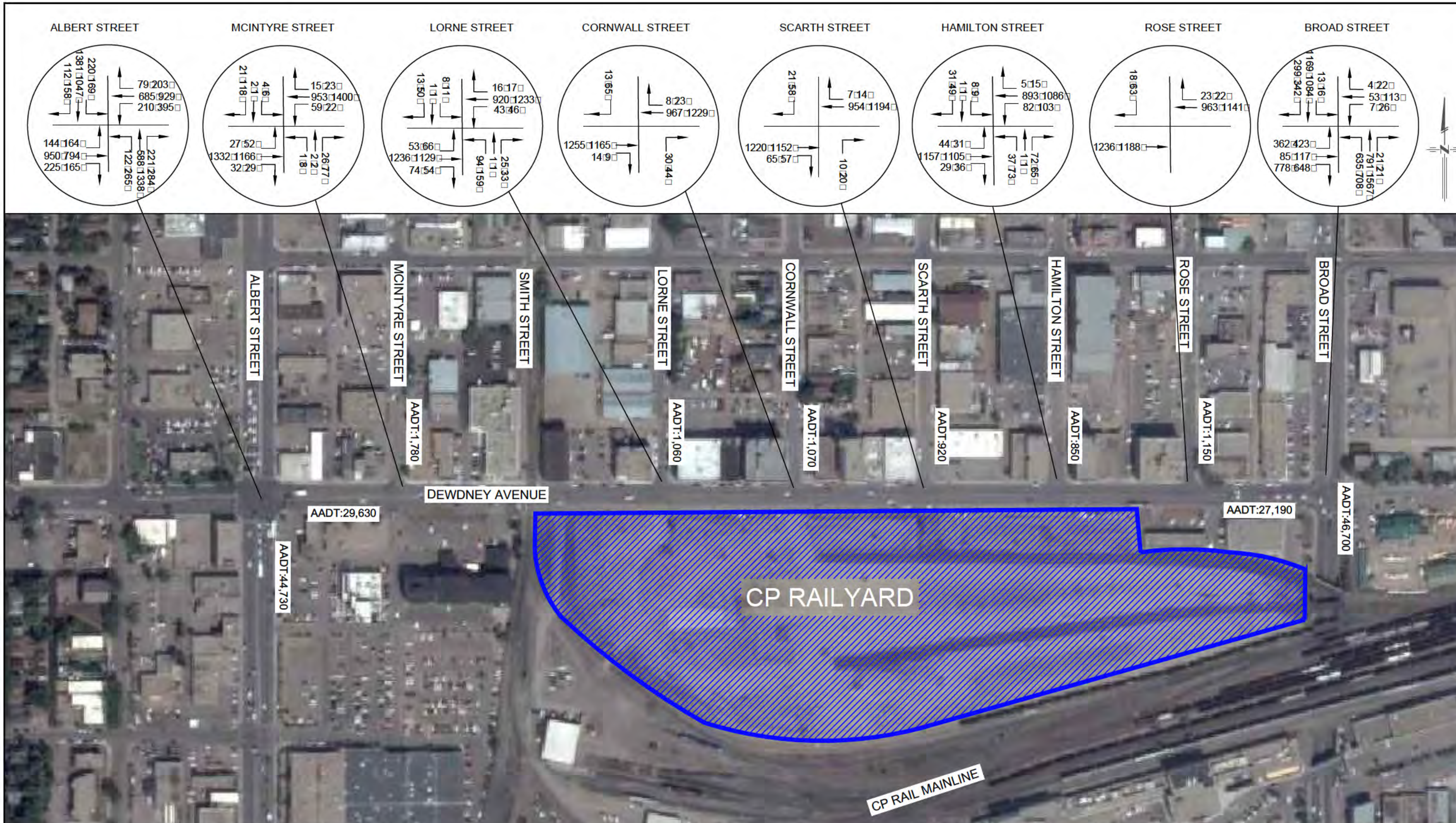


FIGURE 3.8: 2040 POST-DEVELOPMENT TRAFFIC



X□Y□ TRAFFIC VOLUME AM PEAK □PM PEAK□

NOT TO SCALE

wsp

REGINA REVITALIZATION INITIATIVE
RAILYARD RENEWAL PROJECT TIA

FIGURE 3.9: 2040 POST-DEVELOPMENT TRAFFIC (RIGHT-IN / RIGHT-OUT)

4 CROSS SECTIONS AND INTERNAL ROADWAYS

4.1 DEWDNEY AVENUE CROSS SECTIONS

The City of Regina seeks to develop a sustainable transportation system to provide reliable, safe and affordable travel choices for all citizens, regardless of age, income, disability, or location. The City's Design Regina – Official Community Plan recommends that a Complete Street framework should be adopted for new road construction as well as the renewal of existing streets where feasible.

A Complete Street is a road that is designed to be safe for drivers; bicyclists; transit vehicles and users; and pedestrians of all ages and abilities.

Complete Streets help to balance the use of cars, bicycles, pedestrians and public transit vehicles on a right-of-way and are designed to function at a slower speed than automobile oriented streets. Complete Streets offer wide ranging benefits. They are cost effective, sustainable and safe.

The Complete Street principles were considered in the process of developing the cross section of the Dewdney Avenue corridor in front of the RRP site. One of the most challenging aspects of designing Complete Streets is the balancing act required in finding the space for all of the desired uses. The proposed mid-block road cross section is illustrated in Figure 4.1 and the road cross section at signalized intersections is shown in Figure 4.2.

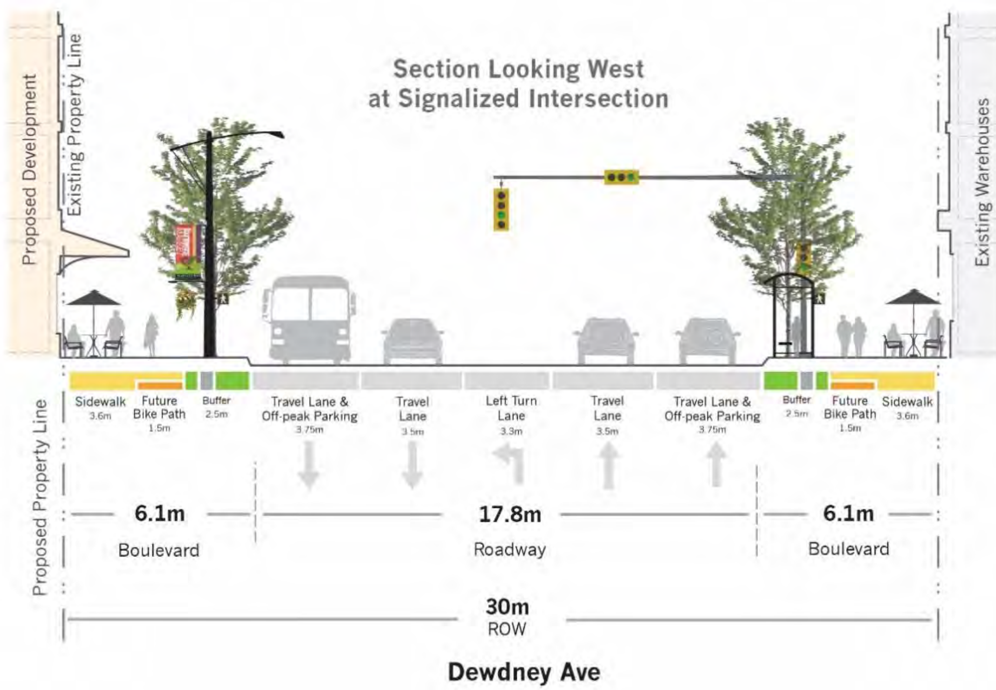
The proposed cross sections will accommodate public transit buses, future bike lanes on both sides, wide sidewalks, and on-street parking during off-peak periods. Four through lanes (two-way) were proposed to carry traffic during the AM and PM peak hours, while two through lanes are deemed to be adequate to accommodate the off-peak traffic volumes. The curb lanes can be use as parking lane during off-peak hours.

Complete Streets can be considered tools for building vibrant and sustainable communities. One issue that can arise when implementing Complete Streets is insufficient integration with other transportation and land development policies. Adding bicycle lanes on one roadway by itself will do little to increase cycling activity; it must be part of an integrated bicycle program that includes a network of trails and bicycle lanes, bicycle parking and changing facilities, and appropriate education and encouragement programs. Similarly, public transit facilities will provide little benefit unless implemented with other efforts to improve public transit service and encourage transit ridership.

4.2 INTERNAL ROADWAY NETWORK

The internal roadway network within the Railyard site is based on a grid system with the extension of existing north-south local streets and walkways (Lorne Street, Cornwall Street, Scarth Street and Hamilton Street) south across Dewdney Avenue into the site. The north-south local streets will be linked by an east-west local street, extending from Lorne Street to Rose Street, to facilitate movement throughout the site for pedestrians, cyclists and drivers. These internal streets will be contained within a 22-meter right-of-way with 11 meters assigned to the street for two vehicle travel lanes and parking on both sides and 5.5-meters on each side for pedestrian amenities. The pedestrian boulevards will accommodate 2.5 meter sidewalks and zones for street trees, furnishings, utility boxes and streetlights. Pedestrian crossings and traffic control (signage and pavement markings) should be designed to enhance pedestrian safety to create safe interfaces between different modes of travel and a comfortable environment for circulation. The internal streets and intersections should be designed to accommodate the movement of emergency vehicles (e.g., fire truck) and garbage trucks.

Figure 4.1 Proposed Mid-Block Cross Section



Source: WSP and Urban Strategies Inc.

Figure 4.2 Proposed Cross Section at Signalized Intersection

5 INTERSECTION ASSESSMENT

This section presents the intersection assessment results for each study intersection and the proposed intersection control type (i.e., stop or signal control) and required lane configurations to meet the future traffic demand. To evaluate the off-peak traffic operational performance, it was assumed that the off-peak hour volume is 70% of the PM peak hour post-development volumes.

5.1 ALBERT STREET / DEWDNEY AVENUE

The Albert Street / Dewdney Avenue intersection is currently controlled by signals. Table 5-1 summarizes the traffic operational performance at this intersection during the AM and PM peak hours under the 2040 post-development traffic conditions. The off-peak traffic operational performance is shown in Table 5.2.

Table 5.1 Capacity Analysis: 2040 Post-Development Traffic (Peak Hour) - Albert Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	26.3	C	0.57	32.5	48.1	D	0.78	52.5
EBT,T	57.6	E	0.96	156.8	62.2	E	0.94	137.6
EBR	12.7	B	0.42	33.8	8.8	A	0.34	19.7
WBL	70.4	E	0.93	81.2	112.1	F	1.12	156.8
WBT,T	35.2	D	0.66	94.5	41.5	D	0.80	144.8
WBR	1.4	A	0.15	2.5	14.6	B	0.35	37.3
NBL	49.8	D	0.77	44.4	100.6	F	1.05	111.7
NBT,T,TR	31.1	C	0.60	67.0	72.8	E	1.04	187.2
SBL	40.1	D	0.80	61.6	92.1	F	0.98	74.3
SBT,T,TR	47.3	D	0.95	154.8	50.7	D	0.91	129.8
INT Summary	42.8	D	0.96	-	61.9	E	1.12	-

Table 5.2 Capacity Analysis: 2040 Post-Development Traffic (Off Peak) – Albert Street / Dewdney Avenue

TRAFFIC MOVEMENTS	OFF PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	30.5	C	0.53	27.4
EBT,T	53.2	D	0.81	86.5
EBR	4.0	A	0.28	8.0
WBL	51.6	D	0.89	87.4
WBT,T	35.2	D	0.68	96.3
WBR	9.7	A	0.29	14.4
NBL	27.1	C	0.64	45.3
NBT,T,TR	31.4	C	0.64	111.5
SBL	29.3	C	0.58	31.4
SBT,T,TR	31.1	C	0.51	83.7
INT Summary	34.4	C	0.89	-

The above capacity analysis reveals that the existing lane configurations at the Albert Street / Dewdney Avenue intersection are not expected to be capable of accommodating the forecasted 2040 PM peak hour post-development traffic. This intersection is expected to operate at acceptable levels of service in the AM peak hours and off-peak hours.

Adding lanes to the intersection to improve traffic operational performance will be difficult due to the right-of-way constraints and the existing nearby developments. Transportation demand management strategies and active transportation programs to reduce future traffic demand should be considered by the City.

The future east extensions of 9th Avenue and 10th Avenue were proposed in the Railyard Renewal Secondary Plan area. These roadway extensions will provide two more access points on Albert Street for the Railyard site. These two future access points are anticipated to reduce the traffic burden at the Albert Street / Dewdney Avenue intersection. Additional traffic analysis will be required if further developments are proposed and when the two roadway extensions are constructed in the Secondary Plan area.

5.2 MCINTYRE STREET / DEWDNEY AVENUE

The McIntyre Street / Dewdney Avenue intersection is currently controlled by stop signs on McIntyre Street. Left turn lanes are provided for the east and westbound traffic. Two eastbound through lanes and two westbound through lanes are anticipated to be maintained during off-peak hours at this intersection. The traffic operational performance under the 2040 post-development traffic conditions for this intersection under the 2040 post-development traffic conditions is summarized in Tables 5.3 and 5.4.

Table 5.3 Capacity Analysis: 2040 Post-Development Traffic (Peak Hour) - McIntyre Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	10.3	B	0.04	1.0	12.8	B	0.11	2.7
EBT,T	12.4	B	0.12	3.0	10.6	B	0.03	0.8
EBR	100.2	F	0.07	1.7	36.8	E	0.08	2.0
WBL	9.9	A	0.04	0.9	9.8	A	0.10	2.5
WBT,T	70.0	F	0.10	2.4	36.8	E	0.06	1.4
WBR	10.7	B	0.04	0.8	10.3	B	0.16	4.2
INT Summary	0.9	A	0.10	-	1.2	A	0.16	-

Table 5.4 Capacity Analysis: 2040 Post-Development Traffic (Off Peak) - McIntyre Street / Dewdney Avenue

TRAFFIC MOVEMENTS	OFF PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	10.6	B	0.06	1.4
WBL	9.2	A	0.02	0.4
NBLT	30.9	D	0.04	1.0
NBR	10.5	B	0.09	2.1
SBLT	31.5	D	0.04	0.8
SBR	12.0	B	0.19	4.0
INT Summary	1.2	A	0.15	-

Tables 5.3 and 5.4 reveal that all traffic movements at the McIntyre Street / Dewdney Avenue intersection are expected to operate at an acceptable LOS E or better during the AM and PM peak hours except for the northbound and southbound left/through movements which are expected to experience longer delay during the AM peak hours. Considering the traffic volumes of the north and southbound left/through movements will be low, it is deemed that the existing intersection treatment and control type at this intersection will be adequate to accommodate the forecasted future traffic.

5.3 LORNE STREET / DEWDNEY AVENUE

The Lorne Street / Dewdney Avenue intersection will be the first intersection accessing the RRP site from the west. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements. On-street parking is recommended to be restricted during peak hours. Thus, two through lanes (one way) will be available on Dewdney Avenue in the AM and PM peak hours. One through lane will be provided in the off-peak hours since on-street parking will be permitted on the curb lanes. The curb lanes in the vicinity of the intersection will function as right turn lanes. Tables 5.5 and 5.6 summarize the traffic operational performance at this intersection in the AM and PM peak hours and off-peak hours under the 2040 post-development traffic conditions.

Table 5.5 Capacity Analysis: 2040 Post-Development Traffic (Peak Hour) - Lorne Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	6.2	A	0.14	7.2	7.8	A	0.24	8.7
EBT,TR	16.4	B	0.70	145.7	16.1	B	0.70	109.0
WBL	6.5	A	0.15	6.2	6.8	A	0.16	6.6
WBT,TR	13.1	B	0.54	81.8	19.7	B	0.79	141.8
NBLTR	24.7	C	0.40	27.9	34.9	C	0.67	44.7
SBLTR	15.2	B	0.08	6.4	10.5	B	0.20	10.0
INT Summary	15.2	C	0.70	-	18.5	B	0.79	-

Table 5.6 Capacity Analysis: 2040 Post-Development Traffic (Off Peak) - Lorne Street / Dewdney Avenue

TRAFFIC MOVEMENTS	OFF PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	6.8	A	0.20	7.5
EBT	10.7	B	0.70	117.2
EBR	2.1	A	0.04	3.1
WBL	5.3	A	0.12	5.0
WBT	22.9	C	0.89	221.4
WBR	1.6	A	0.01	1.3
NBLTR	41.5	D	0.63	40.4
SBLTR	14.7	B	0.18	9.9
INT Summary	17.9	C	0.89	-

The above capacity analysis reveals that all traffic movements at the Lorne Street / Dewdney Avenue intersection are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and LOS D or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configurations with signal control at this intersection will be capable of accommodating the forecasted future traffic.

5.4 CORNWALL STREET / DEWDNEY AVENUE

The Cornwall Street / Dewdney Avenue intersection is recommended to be controlled by stop signs on Cornwall Street with free flow conditions on Dewdney Avenue. To maintain smooth flows on Dewdney Avenue and minimize collision risks, traffic movements from/to Cornwall Street are recommended to be restricted to right-in and right-out. The traffic operational performance at this intersection under the 2040 post-development traffic conditions is summarized in Table 5.7 for AM and PM peak hours and in Table 5.8 for off-peak hours.

Table 5.7 Capacity Analysis: 2040 Post-Development Traffic (Peak Hour) - Cornwall Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBT,TR	0.0	A	0.53	0.0	0.0	A	0.48	0.0
WBT,TR	0.0	A	0.41	0.0	0.0	A	0.51	0.0
NBR	15.2	C	0.09	1.1	14.4	B	0.11	3.2
SBR	12.5	B	0.03	0.5	15.7	C	0.17	4.8
INT Summary	0.3	A	0.53	-	0.7	A	0.51	-

Table 5.8 Capacity Analysis: 2040 Post-Development Traffic (Off Peak) - Cornwall Street / Dewdney Avenue

TRAFFIC MOVEMENTS	OFF PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)
EBT	0.0	A	0.52	0.0
EBR	0.0	A	0.00	0.0
WBT	0.0	A	0.55	0.0
WBR	0.0	A	0.01	0.0
NBR	16.7	C	0.10	2.4
SBR	18.3	C	0.16	4.2
INT Summary	0.8	A	0.52	-

Tables 5.7 and 5.8 reveal that all traffic movements at the Cornwall Street / Dewdney Avenue are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configurations at this intersection will be capable of accommodating the forecasted future traffic.

5.5 SCARTH STREET / DEWDNEY AVENUE

Similar to the Cornwall Street / Dewdney Avenue intersection, the Scarth Street / Dewdney Avenue intersection is recommended to be controlled by stop signs on Scarth Street with free flow conditions on Dewdney Avenue. Traffic movements from/to Scarth Street are recommended to be restricted to right-in and right-out. The traffic operational performance at this intersection under the 2040 post-development traffic conditions is summarized in Table 5.9 for AM and PM peak hours and in Table 5.10 for off-peak hours.

Table 5.9 Capacity Analysis: 2040 Post-Development Traffic (Peak Hour) - Scarth Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBT,TR	0.0	A	0.53	0.0	0.0	A	0.48	0.0
WBT,TR	0.0	A	0.41	0.0	0.0	B	0.49	0.0
NBR	14.7	B	0.09	1.1	14.1	B	0.03	1.6
SBR	12.6	B	0.03	0.5	15.1	C	0.09	4.0
INT Summary	0.2	A	0.53	-	0.5	A	0.48	-

Table 5.10 Capacity Analysis: 2040 Post-Development Traffic (Off Peak) - Scarth Street / Dewdney Avenue

TRAFFIC MOVEMENTS	OFF PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)
EBT	0.0	A	0.52	0.0
EBR	0.0	A	0.03	0.0
WBT	0.0	A	0.53	0.0
WBR	0.0	A	0.01	0.0
NBR	15.9	C	0.04	1.0
SBR	17.5	C	0.14	4.0
INT Summary	0.5	A	0.53	-

Tables 5.9 and 5.10 reveal that all traffic movements at the Scarth Street / Dewdney Avenue are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configurations at this intersection will be capable of accommodating the forecasted future traffic.

5.6 HAMILTON STREET / DEWDNEY AVENUE

The Hamilton Street / Dewdney Avenue intersection will be the first intersection accessing to the railyard site from the east. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements on Dewdney Avenue. On-street parking is recommended to be restricted during peak hours. Thus, two through lanes (one way) will be available on Dewdney Avenue in the AM and PM peak hours. One through lane will be provided in the off-peak hours since on-street parking will be permitted on the curb lanes. The curb lanes in the vicinity of the intersection will function as right turn lanes. Tables 5.11 and 5.12 summarize the traffic operational performance at this intersection in the AM and PM peak hours and off-peak hours under the 2040 post-development traffic conditions.

Table 5.11 Capacity Analysis: 2040 Post-Development Traffic (Peak Hour) - Hamilton Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	5.2	A	0.11	6.3	5.5	A	0.09	5.0
EBT,TR	16.1	B	0.69	133.4	16.7	B	0.68	121.3
WBL	6.9	A	0.27	10.2	7.6	A	0.32	12.3
WBT,TR	11.2	B	0.49	77.5	12.7	B	0.58	113.0
NBLTR	12.0	B	0.32	15.0	13.1	B	0.39	17.5
SBLTR	2.4	A	0.11	2.6	5.0	A	0.18	6.3
INT Summary	13.3	B	0.68	-	14.0	B	0.68	-

Table 5.12 Capacity Analysis: 2040 Post-Development Traffic (Off Peak) - Hamilton Street / Dewdney Avenue

TRAFFIC MOVEMENTS	OFF PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	6.6	A	0.08	4.4
EBT	18.1	B	0.78	187.5
EBR	3.4	A	0.03	3.1
WBL	9.2	A	0.25	13.2
WBT	17.3	B	0.77	182.4
WBR	1.9	A	0.01	1.2
NBLTR	16.1	B	0.30	18.0
SBLTR	11.6	B	0.14	9.2
INT Summary	16.7	B	0.78	-

The above capacity analysis reveals that all traffic movements at the Hamilton Street / Dewdney Avenue intersection are expected to operate at an acceptable LOS B or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configurations with signal control at this intersection will be capable of accommodating the forecasted future traffic.

5.7 ROSE STREET / DEWDNEY AVENUE

The Rose Street / Dewdney Avenue intersection is a three-legged intersection and is recommended to be controlled by a stop sign on Rose Street. Traffic movements from/to Rose Street are recommended to be restricted to right-in and right-out. The traffic operational performance at this intersection under the 2040 post-development traffic conditions is summarized in Table 5.13 for AM and PM peak hours and in Table 5.14 for off-peak hours.

Table 5.13 Capacity Analysis: 2040 Post-Development Traffic (Peak Hour) - Rose Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBT,T	0.0	A	0.40	0.0	0.0	A	0.37	0.0
WBT,TR	0.0	A	0.41	0.0	0.0	A	0.47	0.0
SBR	12.7	B	0.04	1.0	14.8	B	0.15	4.0
INT Summary	0.1	A	0.40	-	0.4	A	0.47	-

Table 5.14 Capacity Analysis: 2040 Post-Development Traffic (Off Peak) - Rose Street / Dewdney Avenue

TRAFFIC MOVEMENTS	OFF PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)
EBT	0.0	A	0.53	0.0
WBT	0.0	A	0.51	0.0
WBR	0.0	A	0.01	0.0
SBR	16.9	C	0.14	3.6
INT Summary	0.4	A	0.53	-

Tables 5.13 and 5.14 reveal that all traffic movements at the Rose Street / Dewdney Avenue are expected to operate at an acceptable LOS B or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and operate at LOS C or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configurations at this intersection will be capable of accommodating the forecasted future traffic.

5.8 BROAD STREET / DEWDNEY AVENUE

The Broad Street / Dewdney Avenue intersection is currently controlled by signals. Table 5.15 summarizes the traffic operational performance at this intersection during the AM and PM peak hours under the 2040 post-development traffic conditions. The off-peak traffic operational performance is shown in Table 5.16.

Table 5.15 Capacity Analysis: 2040 Post-Development Traffic (Peak Hour) – Broad Street / Dewdney Avenue

TRAFFIC MOVEMENTS	AM PEAK HOUR				PM PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	54.4	D	0.85	156.2	> 100	F	1.61	196.9
EBT	29.8	C	0.15	30.8	40.2	D	0.31	39.2
EBR	49.5	D	1.01	210.6	25.9	C	0.90	107.6
WBL	24.9	C	0.02	4.5	27.8	C	0.08	10.4
WBTR	33.3	C	0.15	21.7	42.9	D	0.44	42.9
NBL	> 100	F	1.60	289.6	> 100	F	1.22	308.9
NBT,TR	16.2	B	0.46	76.1	19.6	B	0.76	204.8
SBL	30.4	C	0.08	7.5	41.4	D	0.22	10.1
SBT,T	> 100	F	1.18	231.1	> 100	F	1.15	208.0
SBR	13.2	B	0.54	43.3	13.2	B	0.60	45.2
INT Summary	101.1	F	1.60	-	84.5	F	1.61	-

Table 5.16 Capacity Analysis: 2040 Post-Development Traffic (Off Peak) – Broad Street / Dewdney Avenue

TRAFFIC MOVEMENTS	OFF PEAK HOUR			
	Delay (s)	LOS	V/C	95th Queue Length (m)
EBL	> 100	F	1.24	93.0
EBT	38.9	D	0.25	26.7
EBR	9.5	A	0.71	25.6
WBL	28.8	C	0.07	7.4
WBTR	43.0	D	0.43	28.7
NBL	24.5	C	0.79	185.8
NBT,TR	11.1	B	0.52	119.2
SBL	32.6	C	0.10	7.4
SBT,T	47.2	D	0.85	134.3
SBR	6.9	A	0.46	20.5
INT Summary	36.6	D	1.24	-

The above capacity analysis reveals that the existing lane configurations at the Broad Street / Dewdney Avenue intersection are not expected to be capable of accommodating the forecasted 2040 peak hour traffic volumes. The eastbound left turn movement is expected to operate at LOS F in the off-peak hours.

Adding lanes to the intersection to improve traffic operational performance will be difficult due to the right-of-way constraints and the railway overpass bridge on Broad Street to the south. Transportation demand management strategies and active transportation programs to reduce future traffic demand should be considered by the City.

6 TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) is one of the approaches that Canadian municipalities and regional transportation authorities are using to create sustainable, more efficient and reliable transportation systems. By definition, TDM is a multi-faceted and multi modal approach used to reduce or redistribute transportation demand. The primary purpose of TDM is to reduce the number of vehicles using the road network by influencing individual travel behaviour and providing a wide variety of mobility options to those who wish to travel. TDM is a key tool in transportation planning and operations and represents a cost-effective way to ease congestion, expand transportation choice, and reduce the need to expand capacity.

The City's Transportation Master Plan (2015) depicts TDM policies and actions that the City should adopt and implement. These policies and actions are expected to influence travel behaviour towards more sustainable choices including shifting modes away from single occupant vehicles (SOVs) to active modes, transit, and carpooling; reducing the number of trips they make (e.g. telecommuting), and travelling more efficiently (e.g. travelling outside of peak hours).

The forecasted future traffic volumes are expected to exceed the existing intersection capacity at the two major intersections on Albert Street and Broad Street. The following TDM strategies can be considered to minimize infrastructure needs by reducing the number and length of auto trips, and by shifting vehicle trips away from Dewdney Avenue.

6.1 ALTERNATE ROUTES

The existing traffic flow patterns indicate that approximately 75% of the trips on Dewdney Avenue between Albert Street and Broad Street are pass-by trips (origins or destinations are outside of the corridor area).

If alternate routes with suitable traffic operation performance (less congestion, shorter delay, and fewer stops) are available, commuters may use alternative routes to reach their destinations instead of using Dewdney Avenue. Saskatchewan Drive to the south and 7th Avenue to the north are potential roadways that commuters may use as alternate routes to Dewdney Avenue. 7th Avenue is located approximately 350 m north of and parallel to Dewdney Avenue and is a two-lane collector road in the City's Warehouse District. 7th Avenue could possess capacity to accommodate diverted traffic from Dewdney Avenue. If access management strategies (minimize number of accesses along the corridor) is applied and on-street parking is restricted during the AM and PM peak hours, 7th Avenue may attract more traffic and result in reduced traffic demand on Dewdney Avenue. Between Albert Street and Broad Street, Saskatchewan Drive is a divided arterial road running through the City's downtown area. Saskatchewan Drive may not be an ideal alternate route to divert the traffic from Dewdney Avenue as it is anticipated to be congested already in the peak hours. However, some low cost methods could be implemented to improve traffic operation performance along the corridor, such as restricting on-street parking during peak hours and optimizing traffic signal timing.

6.2 PUBLIC TRANSIT

Public transit presents a realistic alternative to private automobile travel because it provides accessible service for long and short commutes, and is comfortable in inclement weather.

There are currently two bus routes (#4, #5) provided on Dewdney Avenue that serve the RRP site. The City could consider increasing the transit service frequency to meet the future transit patron demand as a result of the Railyard Renewal Project. In addition, the City should provide safe, secure bike parking at major transit stops and stations. Valuing the people who ride public transit with proper provision of shelters and services is essential to increasing ridership.

6.3 PEDESTRIAN FACILITIES

Walking is the simplest and most sustainable form of transportation. It carries zero cost, is versatile and is impervious to congestion or delay on the roads. Except in the most extreme temperatures, walking is a viable means of travel for all short trips.

To encourage walking within the City centre, in addition to improving the existing pedestrian facility conditions, more pedestrian facilities such as sidewalks, crosswalks and shared pathways should be developed. Pedestrian accessibility features, such as ramps, audible signals and countdown timers that make walking an easy choice for everyone should also be added. The proposed pedestrian bridge linking the railyard with downtown is anticipated to reduce the automobile traffic demand from the RRP development.

6.4 CYCLING

Cycling plays an important role in transportation demand management and can substitute directly for automobile trips. Communities that improve cycling conditions often experience significant increases in bicycle travel and related reductions in vehicle travel.

Providing adequate bicycle facilities, including Bike Lanes, Bicycle Boulevards, Cycle Tracks, Bicycle End-of-Trip Facilities and other infrastructure, will encourage cycling as a daily mode of transportation.

Provision of convenient and secure bicycle parking is an important part of cycling infrastructure. The City may require private parking lots and garages for cars, as well as commercial and residential buildings to provide bicycle parking. Effective bicycle parking requires a properly designed rack in an appropriate location.

It is recommended that the City of Regina create more bicycle-friendly infrastructure throughout the City including the RRP and Downtown areas and integrate it with the City policies, practices and programs. A Pedestrian and Bicycle Master Plan is recommended to be developed to assess the existing pedestrian and bicycle facilities within the City and to create a comprehensive City-wide pedestrian and cycling network, as well as to provide supporting policies and programs to encourage walking and cycling. A dedicated bike lane is recommended to be provided on the pedestrian bridge linking the railyard with downtown.

6.5 CARPOOLING

Carpooling is a form of ridesharing and can reduce traffic congestion. For example, if every citizen in Regina carpooled with one other person for their trip to work, the number of autos on the road would be reduced by up to half, there would be substantial reductions in fuel consumption, congestion and delays, and the costs associated with such delays would diminish. While this is not likely to happen, it does illustrate the positive impact that can result from carpooling.

Carpooling is most effective when it is undertaken on a company-wide or office-wide/specific location basis, with formal monitoring and website support to “match” appropriate people. Although there are some start-up costs, it should largely be a self-sustaining system once fully operational. It is recommended that the City develop a website to support carpooling.

6.6 PARKING MANAGEMENT

Parking Management is a term for strategies that encourage more efficient use of existing parking facilities, reduce parking demand and shift travel to non-single-occupant-vehicle modes. Managing parking helps to reduce the undesirable impacts of parking demand on local and regional traffic levels and the resulting impacts on community livability and design. At the same time, smart management of parking helps to ensure access to retail businesses, provides access for visitors to regional and neighborhood attractions and supports neighborhood vitality.

The supply of free or inexpensive parking at the final destination is a key decision factor cited for choosing to drive a personal auto rather than taking a bus, bike, walk or carpool. When free or inexpensive parking is offered, it leads to overuse, often by long-term or all-day parkers who occupy valuable spaces at the expense of short-term parkers, limiting access to retail businesses and service industries catering to short-term users.

Cost based parking strategies that link parking rates directly to demand are very effective in reducing total parking demand, shifting travel to other modes, and reducing vehicle kilometer traveled (VKT). To implement this strategy, parking meters may be installed along Dewdney Avenue with variable parking rates that fluctuate with parking demand.

7 CONCLUSIONS AND RECOMMENDATIONS

This study has examined the traffic impacts associated with the proposed Railyard Renewal Project which is one of the primary components of the Regina Revitalization Initiative (RRI). The Railyard Renewal Project located at the old CP Intermodal Land site, north of the City's downtown area. To accommodate the forecasted future post-development traffic and develop a Complete Street framework for the Dewdney Avenue corridor, the following recommendations were reached:

CONCEPTUAL CROSS SECTIONS ON DEWDNEY AVENUE

Complete Street principles were applied in the process of developing cross sections for Dewdney Avenue adjacent to the RRP site. One of the challenging aspects of designing Complete Streets is the balancing act required in finding space for all of the desired uses within a limited ROW resource. The proposed concept for the mid-block road cross section is illustrated in Figure E-1 and the road cross section at signalized intersections is shown in Figure E-2.

The conceptual cross sections will accommodate public transit buses, future bike lanes on both sides, wide sidewalks, and on-street parking during off-peak periods. Four through lanes (two-way) are proposed to carry traffic during the AM and PM peak hours, while two through lanes are deemed to be adequate to accommodate the off-peak traffic volumes. The curb lanes can be used as parking lane during off-peak hours. Dedicated left turn lanes will be provided at the proposed signalized intersections.

DEWDNEY AVENUE INTERSECTION ASSESSMENT FINDINGS

ALBERT STREET / DEWDNEY AVENUE

— The existing lane configurations at the Albert Street / Dewdney Avenue intersection are not expected to be capable of accommodating the forecasted 2040 PM peak hour post-development traffic. However, this intersection is expected to operate at acceptable levels of service in the AM peak hours and off-peak hours.

— Adding lanes to the intersection to improve traffic operational performance will be difficult due to the right-of-way constraints and the existing built developments. Transportation demand management strategies and active transportation programs should be considered by the City to reduce future traffic demand.

— The proposed two future site access points at the 9th Avenue and 10th Avenue intersections on Albert Street are anticipated to reduce the traffic burden at the Albert Street / Dewdney Avenue intersection. The proposed pedestrian bridge linking the railyard with downtown is anticipated to reduce the automobile traffic demand from the railyard site.

MCINTYRE STREET / DEWDNEY AVENUE

— The McIntyre Street / Dewdney Avenue intersection is currently controlled by stop signs on McIntyre Street. Left turn lanes are provided for the eastbound and westbound traffic. Two eastbound through lanes and two westbound through lanes are anticipated to be maintained during both peak and off-peak hours at this intersection.

— All traffic movements at this intersection are expected to operate at an acceptable LOS E or better during the AM and PM peak hours except for the northbound and southbound left/through movements which are expected to experience longer delay during the AM peak hours. Since the traffic volumes of the northbound and southbound left/through movements will be low, it is deemed that the existing intersection treatment and control type at this intersection will be adequate to accommodate the forecasted future traffic.

LORNE STREET / DEWDNEY AVENUE

— The Lorne Street / Dewdney Avenue intersection will be the first intersection accessing the RRP site from the west. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements. On-street parking is recommended to be restricted during peak hours. Two through lanes (one way) will be available on Dewdney Avenue in the AM and PM peak hours. One through lane will be provided in the off-peak hours since on-street parking will be permitted in the curb lanes.

— All traffic movements at the Lorne Street / Dewdney Avenue intersection are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and will operate at LOS D or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions. The proposed intersection lane configurations with signal control will be capable of accommodating the forecasted future traffic.

CORNWALL STREET / DEWDNEY AVENUE

— The Cornwall Street / Dewdney Avenue intersection is recommended to be controlled by stop signs on Cornwall Street with free flow conditions on Dewdney Avenue. To maintain smooth flows on Dewdney Avenue and minimize collision risks, traffic movements from/to Cornwall Street are recommended to be restricted to right-in and right-out movements.

— All traffic movements at the Cornwall Street / Dewdney Avenue are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions.

SCARTH STREET / DEWDNEY AVENUE

— The Scarth Street / Dewdney Avenue intersection is recommended to be controlled by stop signs on Scarth Street with free flow conditions on Dewdney Avenue. Traffic movements from/to Scarth Street are recommended to be restricted to right-in and right-out movements.

— All traffic movements at the Scarth Street / Dewdney Avenue are expected to operate at an acceptable LOS C or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions.

HAMILTON STREET / DEWDNEY AVENUE

— The Hamilton Street / Dewdney Avenue intersection will be the first intersection accessing the RRP site from the east. It is recommended that traffic signals be installed at this intersection and left turn lanes be provided for the east and westbound traffic movements on Dewdney Avenue.

— All traffic movements at the Hamilton Street / Dewdney Avenue intersection are expected to operate at an acceptable LOS B or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and in the off-peak hours with one through lane under the 2040 post-development traffic conditions.

ROSE STREET / DEWDNEY AVENUE

— The Rose Street / Dewdney Avenue intersection is a three-legged intersection and is recommended to be controlled by a stop sign on Rose Street. Traffic movements from/to Rose Street are recommended to be restricted to right-in and right-out movements.

— All traffic movements at the Rose Street / Dewdney Avenue are expected to operate at an acceptable LOS B or better in the AM and PM peak hours with two through lanes (one way) on Dewdney Avenue and operate at LOS C or better in the off-peak hours with one through lane under the 2040 post-development traffic conditions.

BROAD STREET / DEWDNEY AVENUE

— The existing lane configurations at the Broad Street / Dewdney Avenue intersection are not expected to be capable of accommodating the forecasted 2040 peak hour traffic volumes. The eastbound left turn movement is expected to operate at LOS F in the off-peak hours.

— Adding lanes to the intersection to improve traffic operational performance will be difficult due to the right-of-way constraints and the railway overpass bridge on Broad Street to the south. Transportation management strategies and active transportation programs to reduce future traffic demand should be considered by the City.

SIGNALIZED INTERSECTION SPACING

— The signalized intersection spacing along Dewdney Avenue between Albert Street and Lorne Street, Lorne Street and Hamilton Street, Hamilton Street and Broad Street is approximately 300 m, 300 m, and 200 m respectively. Although the spacing is not ideal signalized intersection spacing (400 m) for signal progression for a speed of 50 km/h, signal coordination for the Lorne Street and Hamilton Street intersections is recommended to progress traffic flow along the Dewdney Avenue corridor and to reduce overall delays.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

The forecasted future traffic volumes are expected to exceed the existing intersection capacity at the Dewdney Avenue intersections at Albert Street and at Broad Street. The following TDM strategies should be considered to minimize infrastructure needs by reducing the number and length of auto trips, and by shifting vehicle trips away from Dewdney Avenue:

- **Alternative Routes:** If alternate routes with suitable traffic operation performance (less congestion, shorter delay, and fewer stops) are available, commuters may use alternative routes to reach their destinations instead of using Dewdney Avenue.
- **Public Transit**: The City may consider increasing the transit service frequency to meet the future transit patron demand as a result of the Railyard Renewal Project.
- **Pedestrian and Bicycle Facilities**: To encourage walking and cycling within the City centre, in addition to improving the existing pedestrian and bicycle facility conditions, more pedestrian and bicycle facilities such as sidewalks, crosswalks, shared pathways, and bike lanes should be developed.
- **Carpooling**: Carpooling is a form of ridesharing and can reduce traffic congestion. It is recommended that the City develop a website to support carpooling.
- **Parking Management**: Managing parking helps to reduce the undesirable impacts of parking demand on local and regional traffic levels and the resulting impacts on community livability and design. Parking meters may be installed along Dewdney Avenue with variable parking rates that fluctuate with parking demand.

INTERNAL ROADWAY NETWORK

The internal roadway network within the Railyard site is based on a grid system with the extension of existing north-south local streets and walkways (Lorne Street, Cornwall Street, Scarth Street and Hamilton Street) south across Dewdney Avenue into the site. The north-south local streets will be linked by an east-west local street, extending from Lorne Street to Rose Street, to facilitate movement throughout the site for pedestrians, cyclists and drivers. These internal streets will be contained within a 22-meter right-of-way with 11 meters assigned to the street for two vehicle travel lanes and parking on both sides and 5.5-meters on each side for pedestrian amenities. The pedestrian boulevards will accommodate 2.5 meter sidewalks and zones for street trees, furnishings, utility boxes and streetlights. Pedestrian crossings and traffic control (signage and pavement markings) should be designed to enhance pedestrian safety to create safe interfaces between different modes of travel and a comfortable environment for circulation. The internal streets and intersections should be designed to accommodate the movement of emergency vehicles (e.g., fire truck) and garbage trucks.

SECONDARY PLAN AREA

It should be noted that when individual developments in the Secondary Plan area are proposed, a traffic impact study should be carried out for each particular development.

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- Development Standards Manual (2010), City of Regina.
- City of Regina, http://www.regina.ca/residents/index.htm, Retrieved November 16, 2015.

APPENDIX

A ABBREVIATION AND UNITS

APPENDIX

ABBREVIATION	DESCRIPTION
ITE	Institute of Transportation Engineers
AADT	Average Annual Daily Traffic
ASDT	Average Summer Daily Traffic
ATR	Automatic Traffic Recorder
V/C	Volume to Capacity Ratio
LOS	Level of Service
LT	Left Turn
TIMS	Transportation Infrastructure Management System
INT	Intersection
EBL	Eastbound Left
WBL	Westbound Left
NBL	Northbound Left
SBL	Southbound Left
NBLR	Northbound Left and Right
EBLTR	Eastbound Left, Through and Right
WBLTR	Westbound Left, Through and Right
HCM	Highway Capacity Manual
TAC	Transportation Association of Canada
s	Second
m	Meter
km/h	Kilometers per hour

APPENDIX

B PROJECT INFORMATION

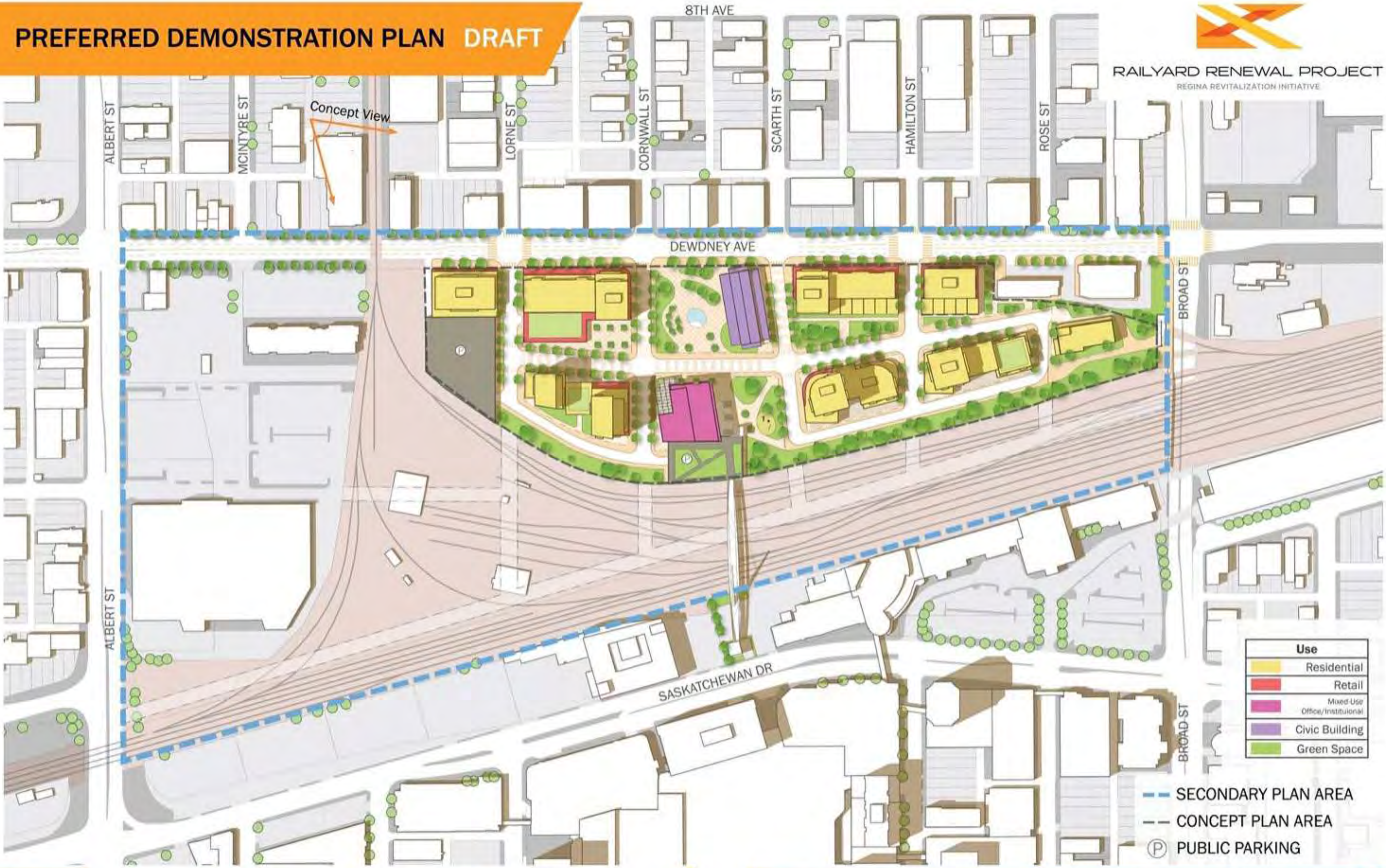
- Dewdney Avenue Photos
- Development Concept Plan
- Preferred Concept Yields By Building

Dewdney Avenue Looking West

Dewdney Avenue Looking West

PREFERRED DEMONSTRATION PLAN DRAFT

RAILYARD RENEWAL PROJECT
REGINA REVITALIZATION INITIATIVE



URBAN STRATEGIES INC. WSP P3A VRBANIC RRI City of Regina | REGINA

Preferred Concept - Building Identification | Full Development

Preferred Concept - Full Development Yields

January, 2018

	Total Storeys	Use	Storeys	GFA (m2)	Units
BUILDING #1 (Stick & Rental)	6	Residential	5	6,700	67
		Retail	1	1,500	
				8,200	
BUILDING #2A (Concrete & Condo)	10	Residential	8	6,500	65
		Retail	1	900	
		Office	1	900	
				8,300	
BUILDING #2B (Stick & Rental)	6	Residential	4	4,000	40
		Retail	1	3,000	
		Office	1	1,500	
				8,500	
				16,800	**105**
BUILDING #3 (Stick)	3	Retail	1	1,000	n/a
		Community	2	3,200	
				4,200	
BUILDING #4A (Concrete & Condo)	10	Residential	8	6,600	66
		Retail	1	700	
		Office	1	700	
				8,000	
BUILDING #4B (Stick & Condo)	6	Residential	4	6,300	63
		Retail	1	900	
		Office	1	900	
				8,100	
				16,100	**129**
BUILDING #5 (Stick & Rental)	6	Residential	4	6,600	66
		Retail	1	800	
		Office	1	800	
				8,200	
BUILDING #6A (Concrete & Rental)	16	Residential	16	9,600	96
BUILDING #6B (Concrete & Condo)	20	Residential	19	15,100	151
		Retail	1	600	
				15,700	
				25,300	**247**
BUILDING #7 (Concrete)	6	Institutional/Cultural	3	4,100	n/a
		Office	3	4,000	
				8,100	
BUILDING #8 (Concrete & Condo)	20	Residential	19	21,600	216
		Retail	1	600	
				22,200	
BUILDING #9A (Concrete & Rental)	14	Residential	14	11,200	112
BUILDING #9B (Stick & Condo)	6	Residential	6	6,000	60
				17,200	172
BUILDING #10 (Concrete & Condo)	8	Residential	8	6,900	69
				6,900	
TOTAL				**133,200**	**1,071**

Retail	10,000	**Condo**	690	64%
Office	8,800	**Rental**	381	36%
Institutional / Cultural	4,100	**Towns** (BLDGs 4&5)	45	4%
Community	3,200			
Residential	107,100	**Stick**	43,200	32%
TOTAL GFA (m2)	**133,200**	**Concrete**	90,000	68%

APPENDIX

C TRAFFIC ANALYSIS

- Traffic Turning Movement Diagrams
- EMME 2040 Output
- Internal Trip Estimates
- City's Response Email

Intersection of:
Dewdney Avenue / Albert Street
City of Regina, SK

2015 a.m. Peak Hour ESTIMATES

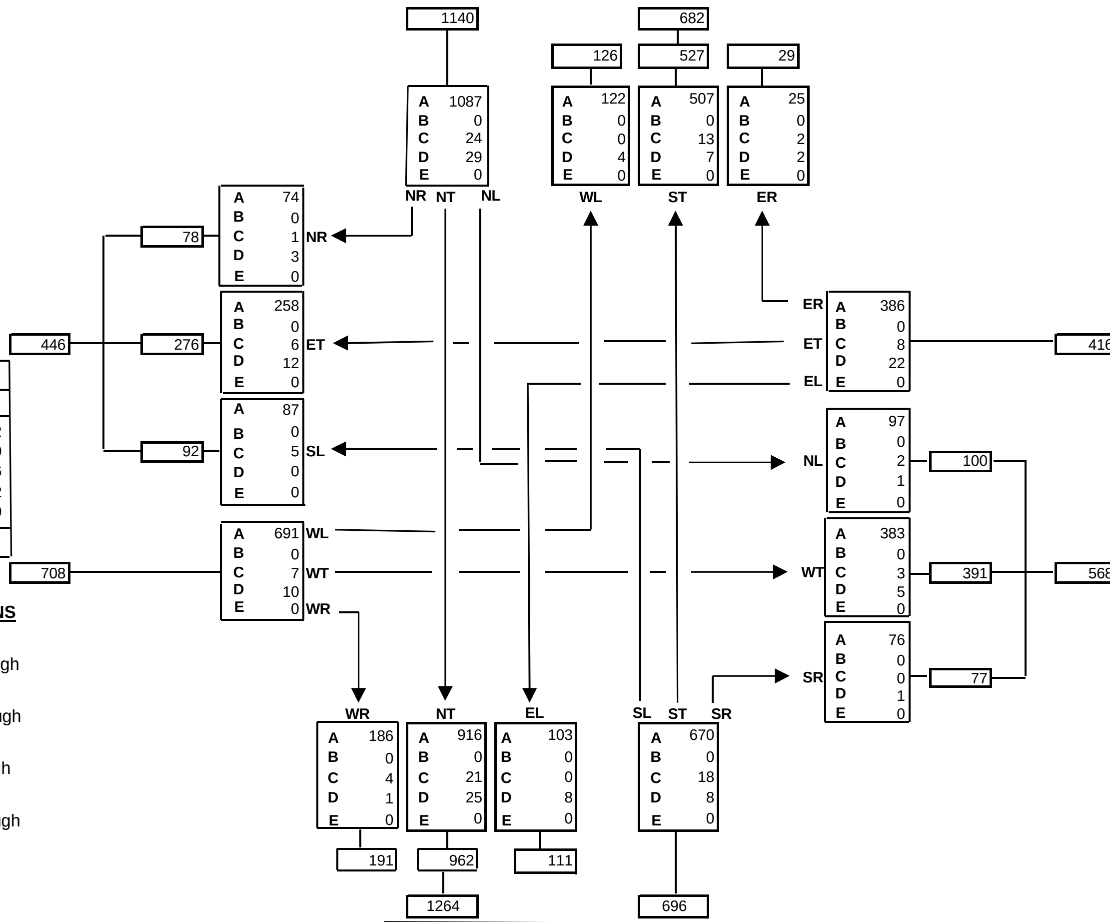
(7:30 a.m. - 8:30 a.m.)

Turning Movement Summary Diagram

WSP

North On Albert Street

Vehicle Type	Vol	%
A Passenger Vehicle	1741	95.6
B Recreational Vehicle	0	0.0
C Bus	39	2.1
D Single Unit Truck	42	2.3
E Tractor Trailer Unit	0	0.0
Total	1822	



West On Dewdney Avenue

Vehicle Type	Vol	%
A Passenger Vehicle	1110	96.2
B Recreational Vehicle	0	0.0
C Bus	19	1.6
D Single Unit Truck	25	2.2
E Tractor Trailer Unit	0	0.0
Total	1154	

East On Dewdney Avenue

Vehicle Type	Vol	%
A Passenger Vehicle	942	95.7
B Recreational Vehicle	0	0 0
C Bus	13	1 3
D Single Unit Truck	29	2 9
E Tractor Trailer Unit	0	0 0
Total	984	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On Albert Street

Vehicle Type	Vol	%
A Passenger Vehicle	1875	95.7
B Recreational Vehicle	0	0.0
C Bus	43	2.2
D Single Unit Truck	42	2.1
E Tractor Trailer Unit	0	0.0
Total	1960	

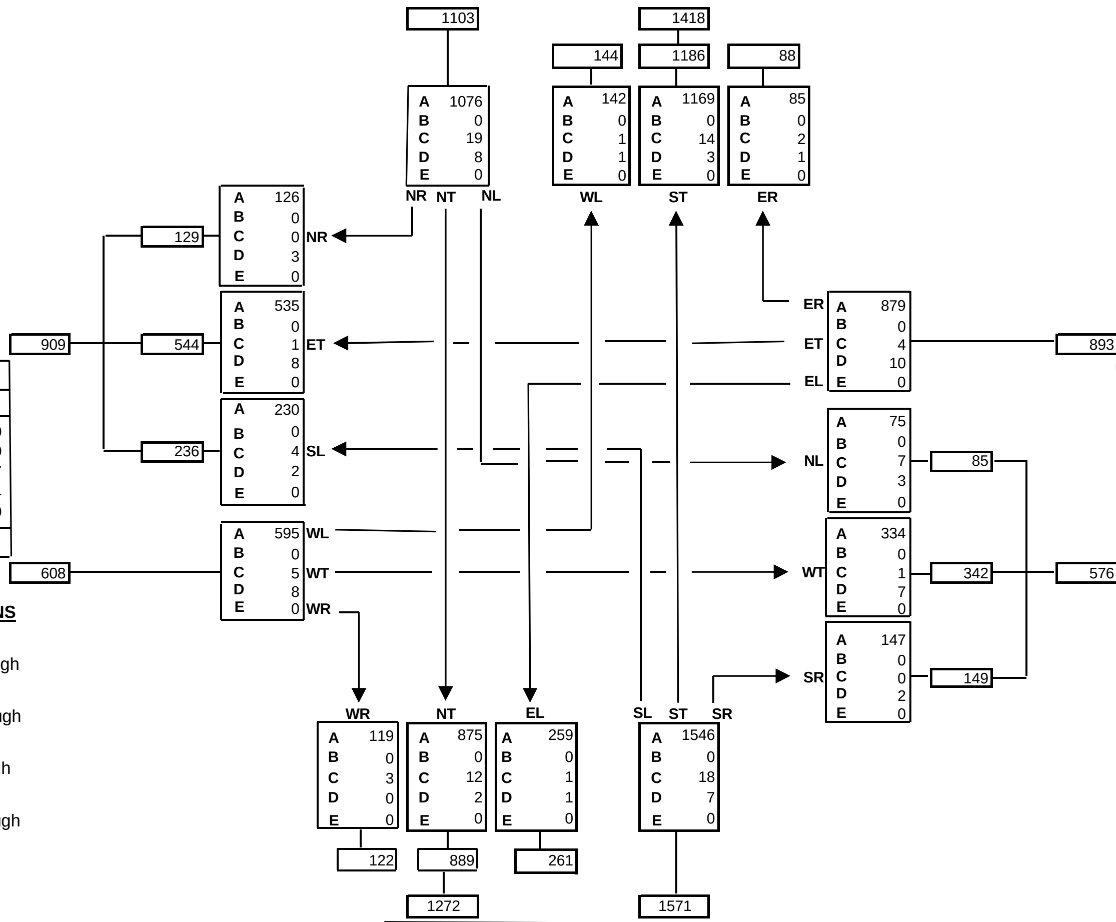
Intersection of:
Dewdney Avenue / Albert Street
City of Regina, SK

2015 p.m. Peak Hour ESTIMATES

(4:30 p.m. - 5:30 p.m.)

Turning Movement Summary Diagram

North On Albert Street			
	Vehicle Type	Vol	%
A	Passenger Vehicle	2472	98.1
B	Recreational Vehicle	0	0.0
C	Bus	36	1.4
D	Single Unit Truck	13	0.5
E	Tractor Trailer Unit	0	0.0
	Total	2521	



West On Dewdney Avenue			
	Vehicle Type	Vol	%
A	Passenger Vehicle	1486	98.0
B	Recreational Vehicle	0	0.0
C	Bus	10	0.7
D	Single Unit Truck	21	1.4
E	Tractor Trailer Unit	0	0.0
	Total	1517	

East On Dewdney Avenue			
	Vehicle Type	Vol	%
A	Passenger Vehicle	1435	97.7
B	Recreational Vehicle	0	0 0
C	Bus	12	0 8
D	Single Unit Truck	22	1 5
E	Tractor Trailer Unit	0	0 0
	Total	1469	

South On Albert Street			
	Vehicle Type	Vol	%
A	Passenger Vehicle	2799	98.5
B	Recreational Vehicle	0	0.0
C	Bus	34	1.2
D	Single Unit Truck	10	0.4
E	Tractor Trailer Unit	0	0.0
	Total	2843	

TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

Intersection of:
Dewdney Avenue / Broad Street
City of Regina, SK

2015 a.m. Peak Hour ESTIMATES

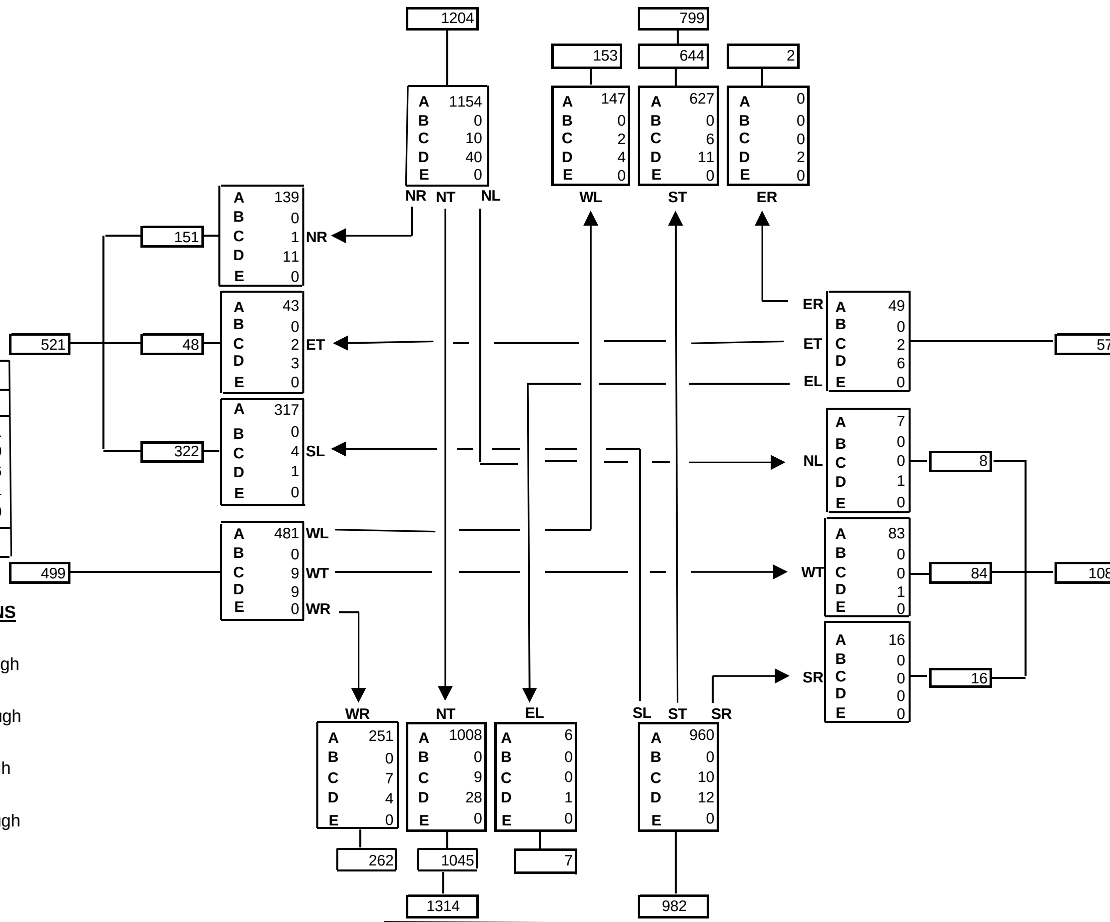
(7:15 a.m. - 8:15 a.m.)

Turning Movement Summary Diagram

WSP

North On Broad Street

Vehicle Type	Vol	%
A Passenger Vehicle	1928	96.3
B Recreational Vehicle	0	0.0
C Bus	18	0.9
D Single Unit Truck	57	2.8
E Tractor Trailer Unit	0	0.0
Total	2003	



West On Dewdney Avenue

Vehicle Type	Vol	%
A Passenger Vehicle	980	96.1
B Recreational Vehicle	0	0.0
C Bus	16	1.6
D Single Unit Truck	24	2.4
E Tractor Trailer Unit	0	0.0
Total	1020	

East On Dewdney Avenue

Vehicle Type	Vol	%
A Passenger Vehicle	155	93 9
B Recreational Vehicle	0	0 0
C Bus	2	1 2
D Single Unit Truck	8	4 8
E Tractor Trailer Unit	0	0 0
Total	165	

South On Broad Street

Vehicle Type	Vol	%
A Passenger Vehicle	2225	96.9
B Recreational Vehicle	0	0.0
C Bus	26	1.1
D Single Unit Truck	45	2.0
E Tractor Trailer Unit	0	0.0
Total	2296	

TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

Intersection of:
Dewdney Avenue / Broad Street
City of Regina, SK

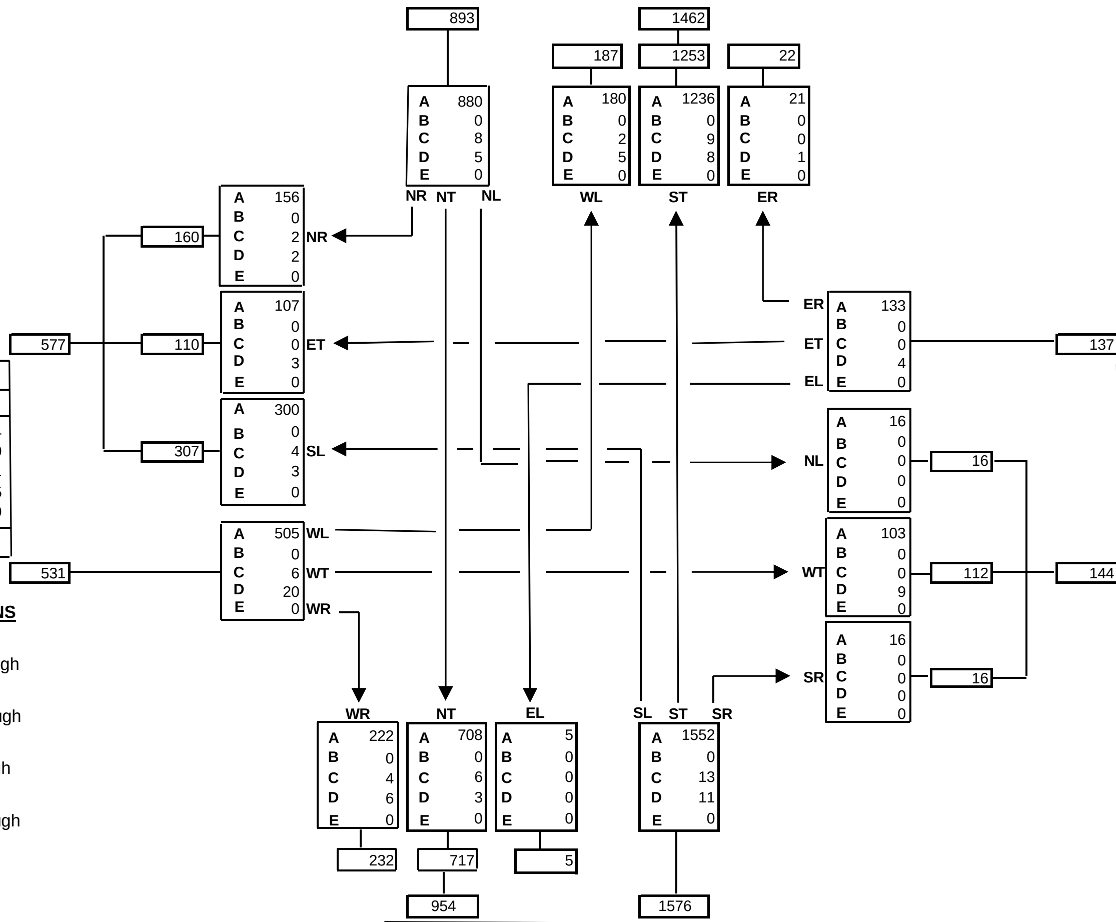
2015 p.m. Peak Hour ESTIMATES

(4:30 p.m. - 5:30 p.m.)

Turning Movement Summary Diagram

North On Broad Street			
	Vehicle Type	Vol	%
A	Passenger Vehicle	2317	98.4
B	Recreational Vehicle	0	0.0
C	Bus	19	0.8
D	Single Unit Truck	19	0.8
E	Tractor Trailer Unit	0	0.0
	Total	2355	

West On Dewdney Avenue			
	Vehicle Type	Vol	%
A	Passenger Vehicle	1068	96.4
B	Recreational Vehicle	0	0.0
C	Bus	12	1.1
D	Single Unit Truck	28	2.5
E	Tractor Trailer Unit	0	0.0
	Total	1108	



East On Dewdney Avenue			
	Vehicle Type	Vol	%
A	Passenger Vehicle	268	95.4
B	Recreational Vehicle	0	0 0
C	Bus	0	0 0
D	Single Unit Truck	13	4 6
E	Tractor Trailer Unit	0	0 0
	Total	281	

South On Broad Street			
	Vehicle Type	Vol	%
A	Passenger Vehicle	2487	98.3
B	Recreational Vehicle	0	0.0
C	Bus	23	0.9
D	Single Unit Truck	20	0.8
E	Tractor Trailer Unit	0	0.0
	Total	2530	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic From South Turning Left
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ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

Intersection of:
Dewdney Avenue / Lorne Street
City of Regina, SK

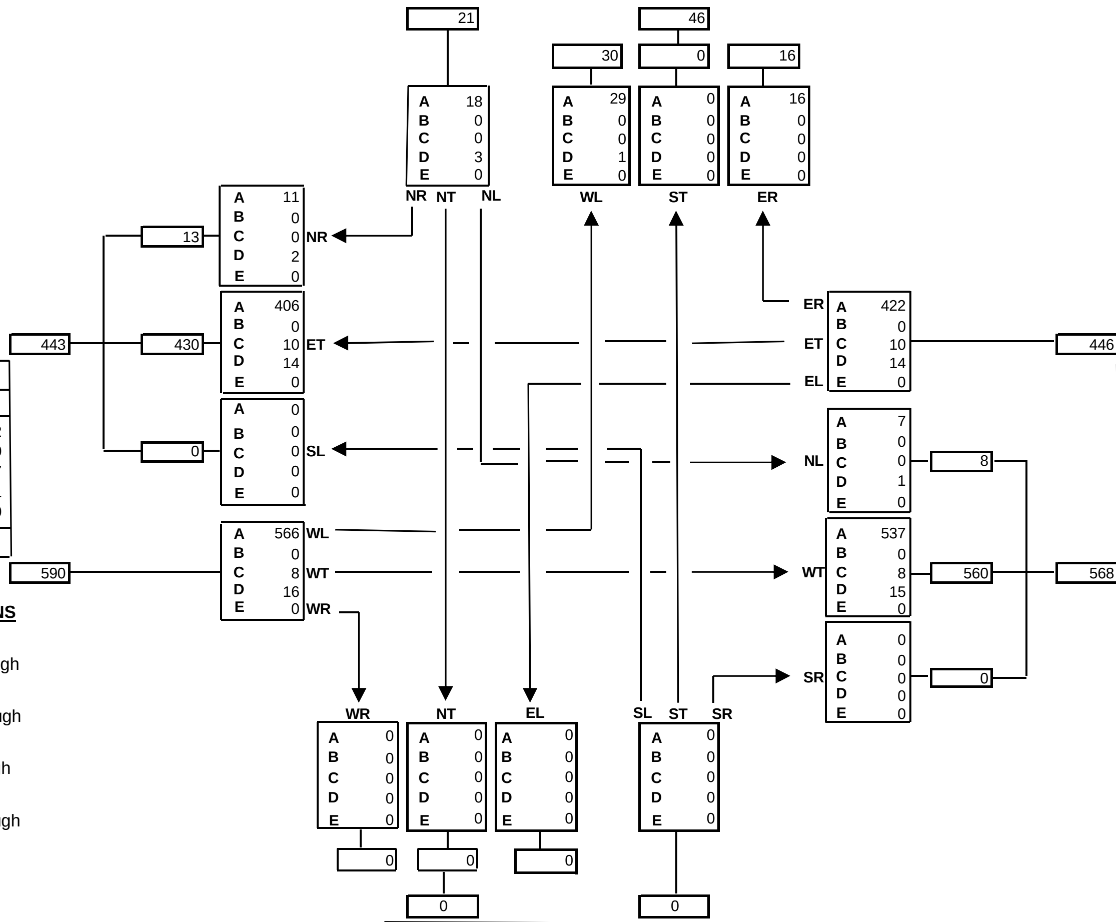
2015 a.m. Peak Hour ESTIMATES

(7:30 a.m. - 8:30 a.m.)

Turning Movement Summary Diagram

North On Lorne Street

Vehicle Type	Vol	%
A Passenger Vehicle	63	94.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	4	6.0
E Tractor Trailer Unit	0	0.0
Total	67	



West On Dewdney Avenue

Vehicle Type	Vol	%
A Passenger Vehicle	983	95.2
B Recreational Vehicle	0	0.0
C Bus	18	1.7
D Single Unit Truck	32	3.1
E Tractor Trailer Unit	0	0.0
Total	1033	

East On Dewdney Avenue

Vehicle Type	Vol	%
A Passenger Vehicle	966	95 3
B Recreational Vehicle	0	0 0
C Bus	18	1 8
D Single Unit Truck	30	3 0
E Tractor Trailer Unit	0	0 0
Total	1014	

South On

Vehicle Type	Vol	%
A Passenger Vehicle	0	0.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

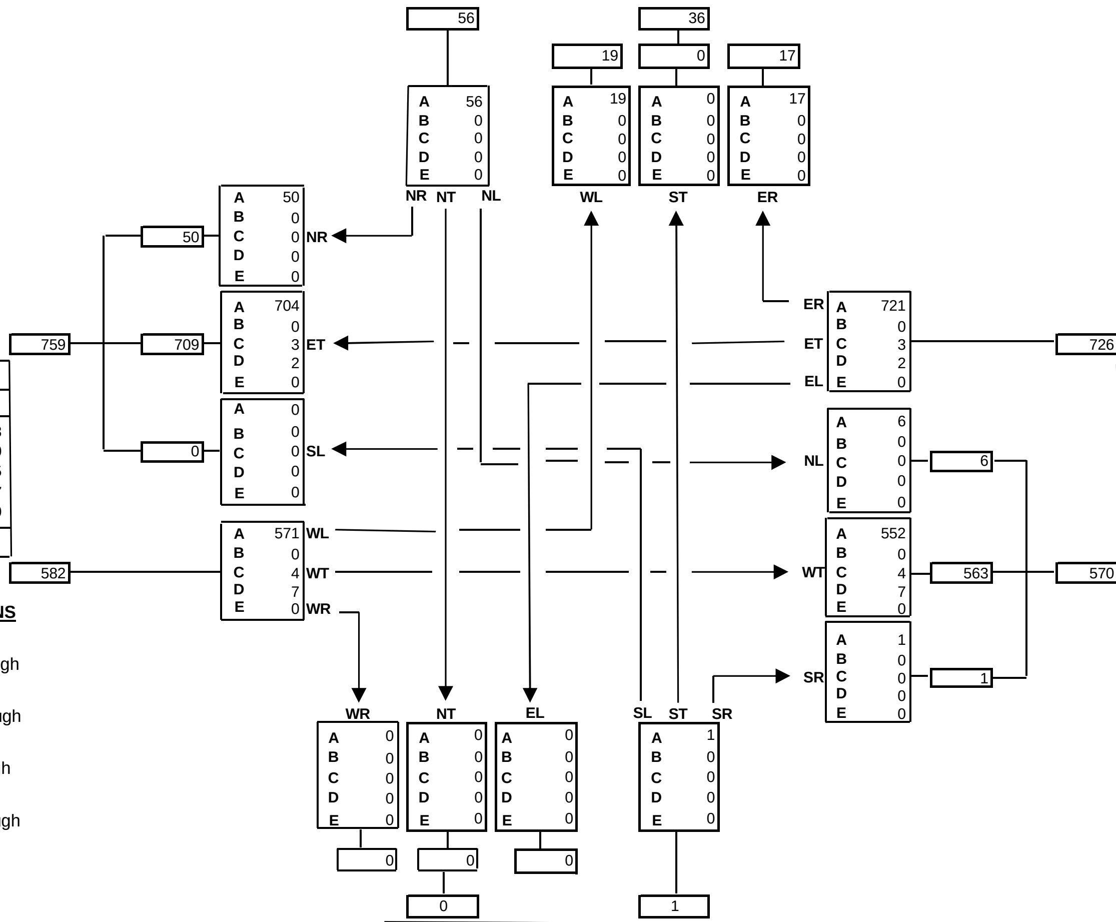
Intersection of:
Dewdney Avenue / Lorne Street
City of Regina, SK

2015 p.m. Peak Hour ESTIMATES

(4:30 p.m. - 5:30 p.m.)

Turning Movement Summary Diagram

North On Lorne Street		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	92	100.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	92	



West On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	1325	98.8
B Recreational Vehicle	0	0.0
C Bus	7	0.5
D Single Unit Truck	9	0.7
E Tractor Trailer Unit	0	0.0
Total	1341	

East On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	1280	98 8
B Recreational Vehicle	0	0 0
C Bus	7	0 5
D Single Unit Truck	9	0.7
E Tractor Trailer Unit	0	0 0
Total	1296	

South On		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	1	100.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	1	

TURNING MOVEMENT ABBREVIATIONS
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SL: Traffic From South Turning Left
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ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

Intersection of:
Dewdney Avenue / Cornwall Street
City of Regina, SK

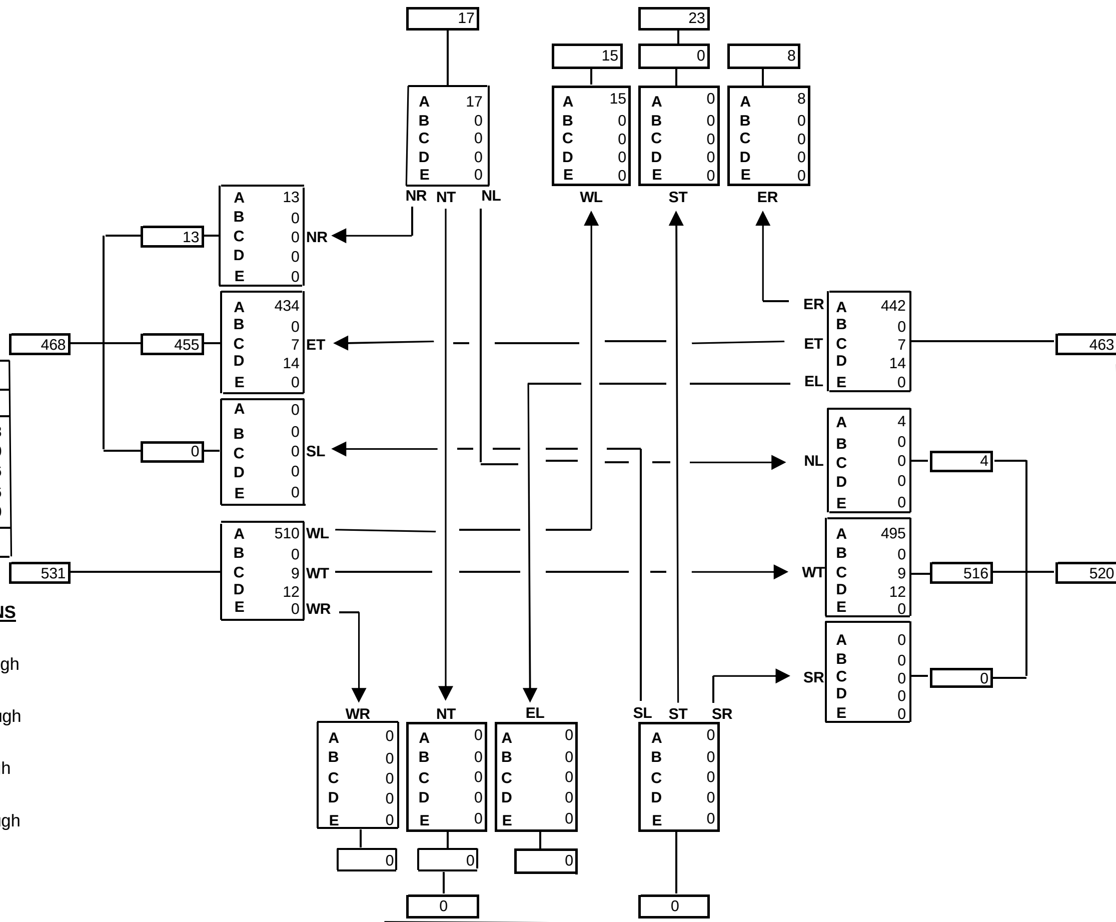
2015 a.m. Peak Hour ESTIMATES

(7:30 a.m. - 8:30 a.m.)

Turning Movement Summary Diagram

North On Cornwall Street		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	40	100.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	40	

West On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	957	95.8
B Recreational Vehicle	0	0.0
C Bus	16	1.6
D Single Unit Truck	26	2.6
E Tractor Trailer Unit	0	0.0
Total	999	



East On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	941	95.7
B Recreational Vehicle	0	0 0
C Bus	16	1 6
D Single Unit Truck	26	2 6
E Tractor Trailer Unit	0	0 0
Total	983	

TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On Cornwall Street		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	0	0.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	0	

Intersection of:
Dewdney Avenue / Cornwall Street
City of Regina, SK

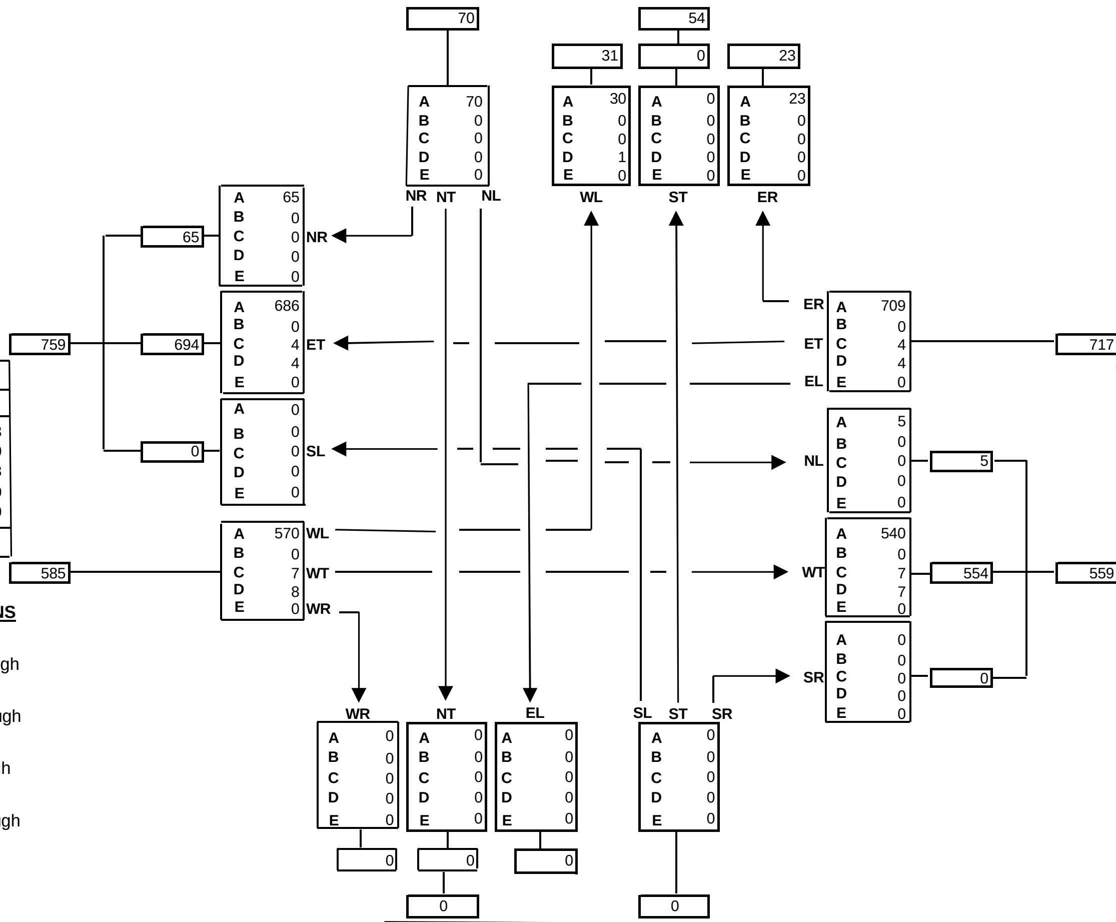
2015 p.m. Peak Hour ESTIMATES

(4:15 p.m. - 5:15 p.m.)

Turning Movement Summary Diagram

WSP

North On Cornwall Street		
Vehicle Type	Vol	%
A Passenger Vehicle	123	99.2
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	1	0.8
E Tractor Trailer Unit	0	0.0
Total	124	



West On Dewdney Avenue		
Vehicle Type	Vol	%
A Passenger Vehicle	1321	98.3
B Recreational Vehicle	0	0.0
C Bus	11	0.8
D Single Unit Truck	12	0.9
E Tractor Trailer Unit	0	0.0
Total	1344	

East On Dewdney Avenue		
Vehicle Type	Vol	%
A Passenger Vehicle	1254	98 3
B Recreational Vehicle	0	0 0
C Bus	11	0 9
D Single Unit Truck	11	0 9
E Tractor Trailer Unit	0	0 0
Total	1276	

TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On Cornwall Street		
Vehicle Type	Vol	%
A Passenger Vehicle	0	0.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	0	

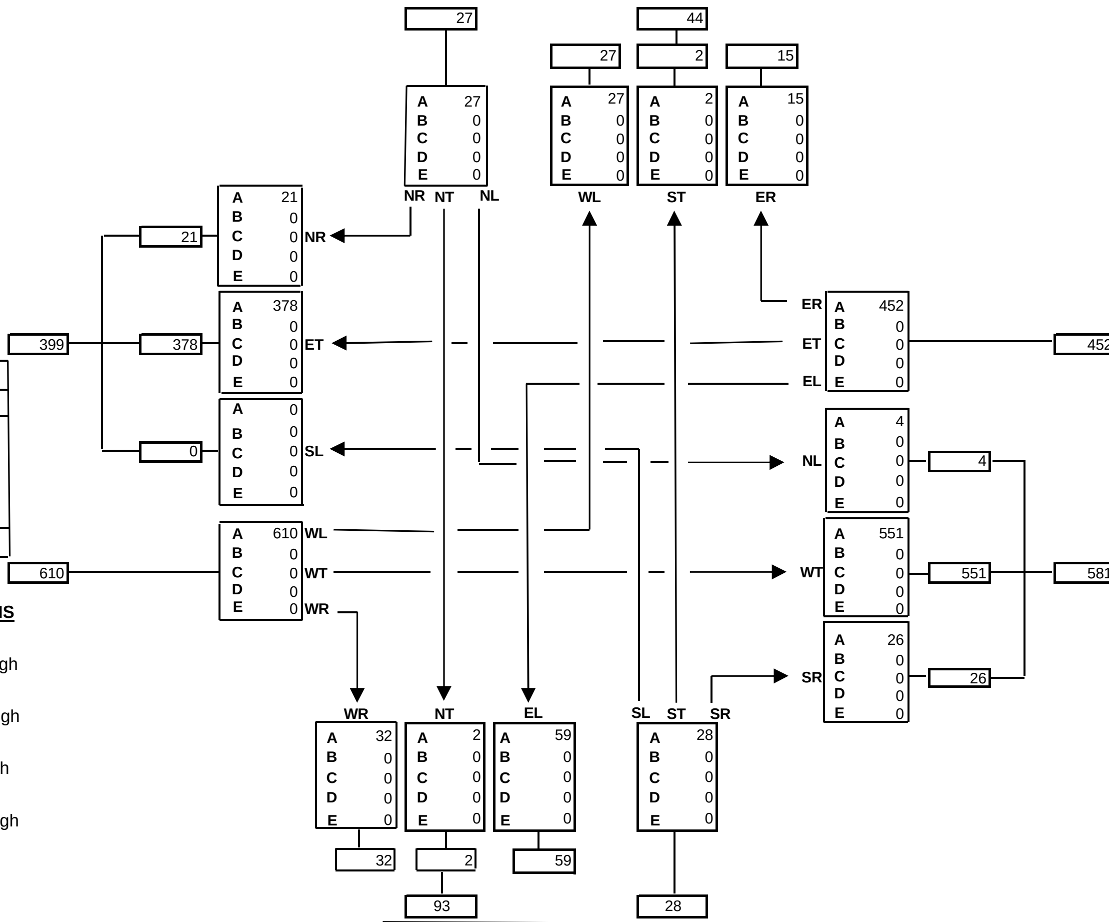
Intersection of:
Dewdney Avenue / McIntype Atreet
City of Regina, SK

2015 a.m. Peak Hour ESTIMATES

(7:30 a.m. - 8:30 a.m.)

Turning Movement Summary Diagram

North On McIntype Street		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	71	100.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	71	



West On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	1009	100.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	1009	

East On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	1033	100 0
B Recreational Vehicle	0	0 0
C Bus	0	0 0
D Single Unit Truck	0	0 0
E Tractor Trailer Unit	0	0 0
Total	1033	

South On McIntype Street		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	121	100.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	121	

TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

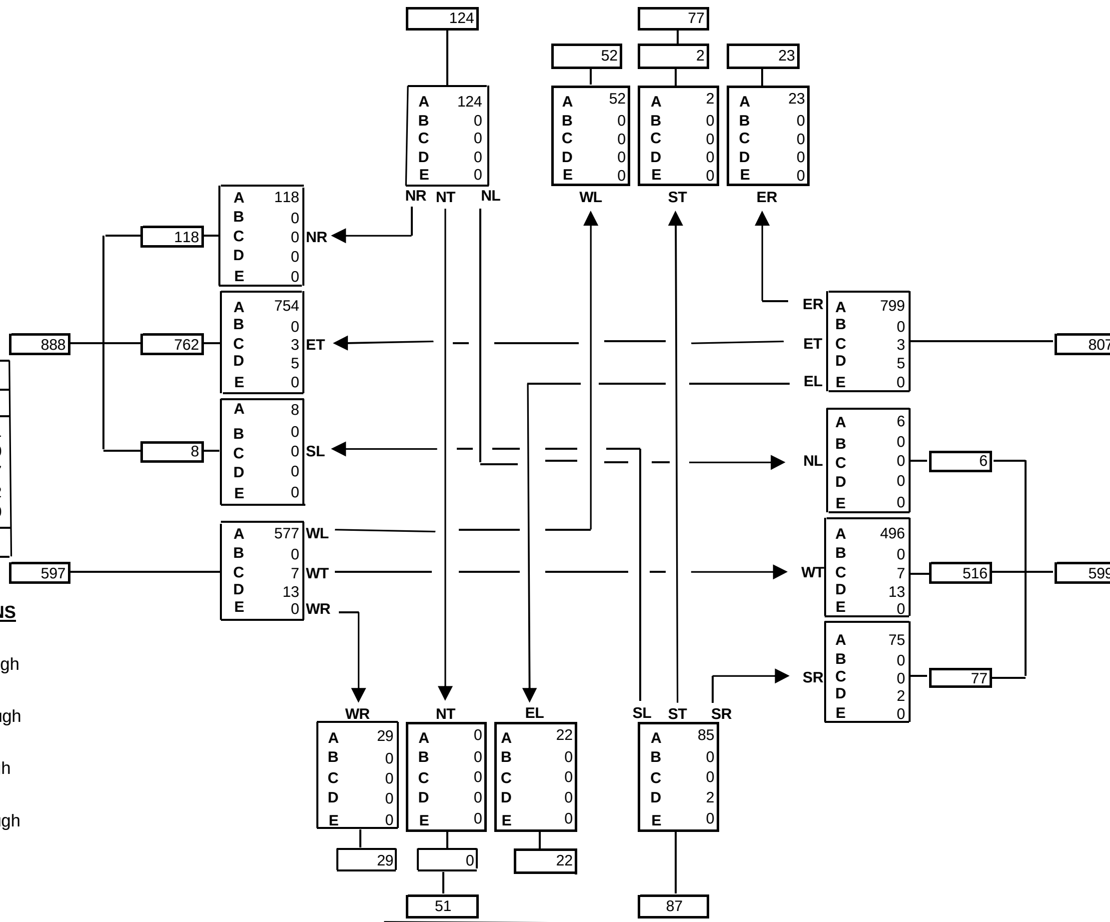
Intersection of:
Dewdney Avenue / McIntype Atreet
City of Regina, SK

2015 p.m. Peak Hour ESTIMATES

(4:40 p.m. - 5:30 p.m.)

Turning Movement Summary Diagram

North On McIntype Street			
	Vehicle Type	**Vol**	**%**
A	Passenger Vehicle	201	100.0
B	Recreational Vehicle	0	0.0
C	Bus	0	0.0
D	Single Unit Truck	0	0.0
E	Tractor Trailer Unit	0	0.0
	Total	201	



West On Dewdney Avenue			
	Vehicle Type	**Vol**	**%**
A	Passenger Vehicle	1457	98.1
B	Recreational Vehicle	0	0.0
C	Bus	10	0.7
D	Single Unit Truck	18	1.2
E	Tractor Trailer Unit	0	0.0
	Total	1485	

East On Dewdney Avenue			
	Vehicle Type	**Vol**	**%**
A	Passenger Vehicle	1376	97 9
B	Recreational Vehicle	0	0 0
C	Bus	10	0.7
D	Single Unit Truck	20	1.4
E	Tractor Trailer Unit	0	0 0
	Total	1406	

TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On McIntype Street			
	Vehicle Type	**Vol**	**%**
A	Passenger Vehicle	136	98.6
B	Recreational Vehicle	0	0.0
C	Bus	0	0.0
D	Single Unit Truck	2	1.4
E	Tractor Trailer Unit	0	0.0
	Total	138	

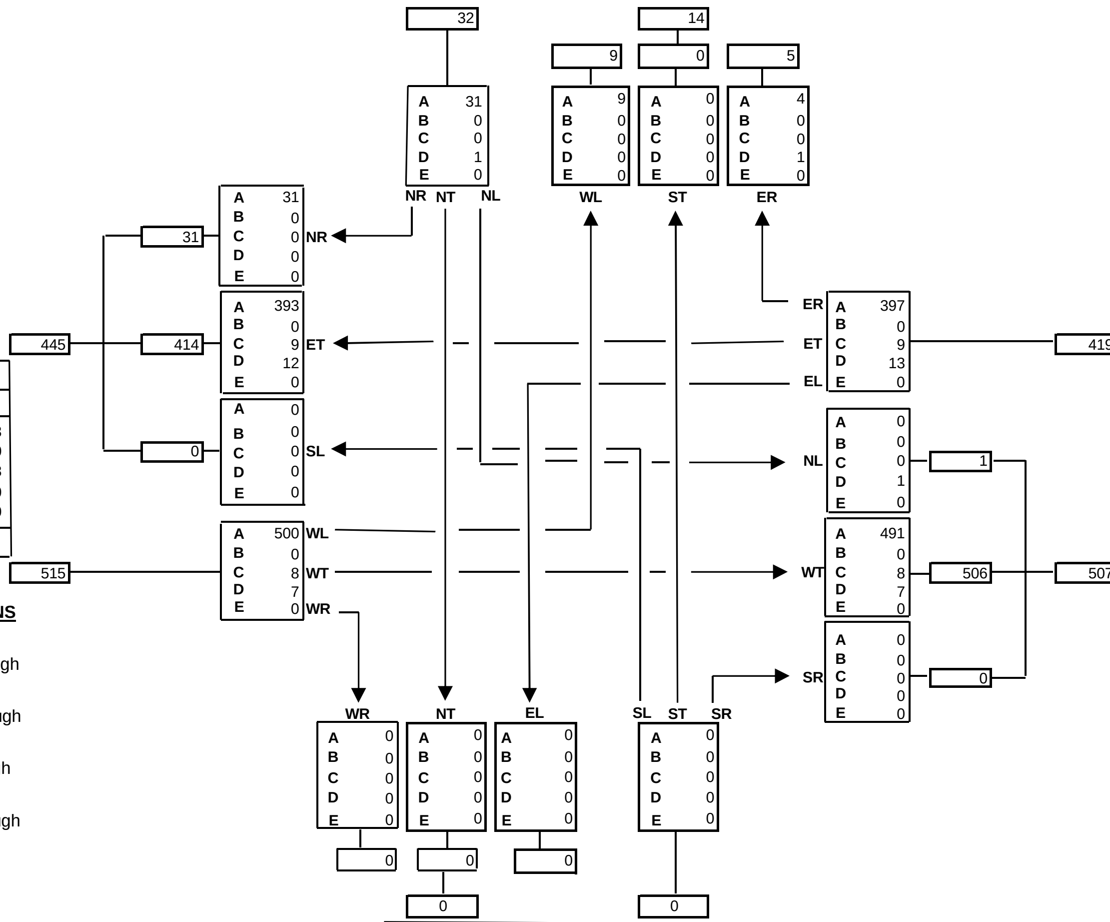
Intersection of:
Dewdney Avenue / Hamilton Street
City of Regina, SK

2015 a.m. Peak Hour ESTIMATES

(7:15 a.m. - 8:15 a.m.)

Turning Movement Summary Diagram

North On Hamilton Street		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	44	95.7
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	2	4.3
E Tractor Trailer Unit	0	0.0
Total	46	



West On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	924	96.3
B Recreational Vehicle	0	0.0
C Bus	17	1.8
D Single Unit Truck	19	2.0
E Tractor Trailer Unit	0	0.0
Total	960	

East On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	888	95 9
B Recreational Vehicle	0	0 0
C Bus	17	1 8
D Single Unit Truck	21	2 3
E Tractor Trailer Unit	0	0 0
Total	926	

TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	0	0.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	0	

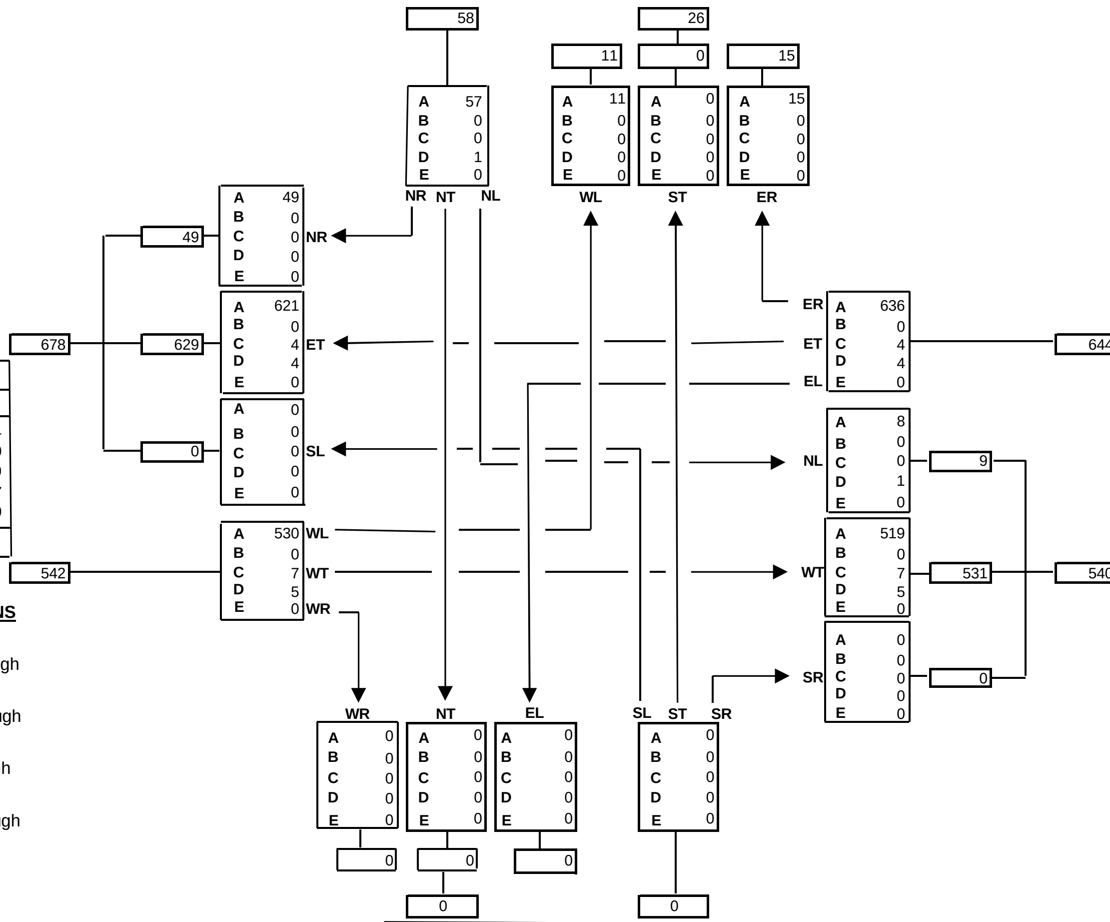
Intersection of:
Dewdney Avenue / Hamilton Street
City of Regina, SK

2015 p.m. Peak Hour ESTIMATES

(4:15 p.m. - 5:15 p.m.)

Turning Movement Summary Diagram

North On Hamilton Street		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	83	98.8
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	1	1.2
E Tractor Trailer Unit	0	0.0
Total	84	

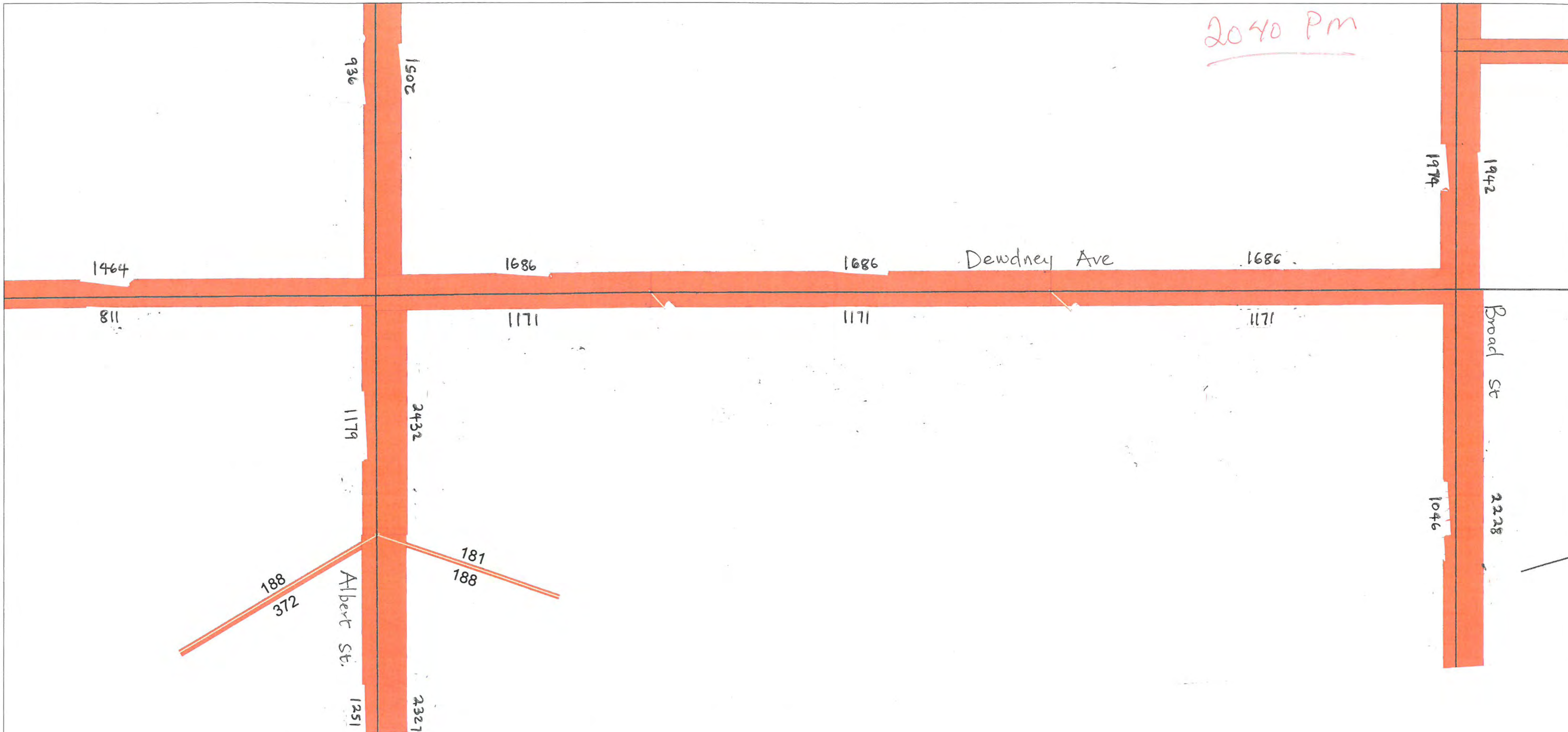


West On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	1200	98.4
B Recreational Vehicle	0	0.0
C Bus	11	0.9
D Single Unit Truck	9	0.7
E Tractor Trailer Unit	0	0.0
Total	1220	

East On Dewdney Avenue		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	1163	98.2
B Recreational Vehicle	0	0.0
C Bus	11	0.9
D Single Unit Truck	10	0.8
E Tractor Trailer Unit	0	0.0
Total	1184	

TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On		
Vehicle Type	**Vol**	**%**
A Passenger Vehicle	0	0.0
B Recreational Vehicle	0	0.0
C Bus	0	0.0
D Single Unit Truck	0	0.0
E Tractor Trailer Unit	0	0.0
Total	0	


2040 PM
Dewdney Ave
Albert St.
Broad St
1464
811
936
2051
1686
1171
1686
1171
1686
1171
1974
1942
1179
2432
1046
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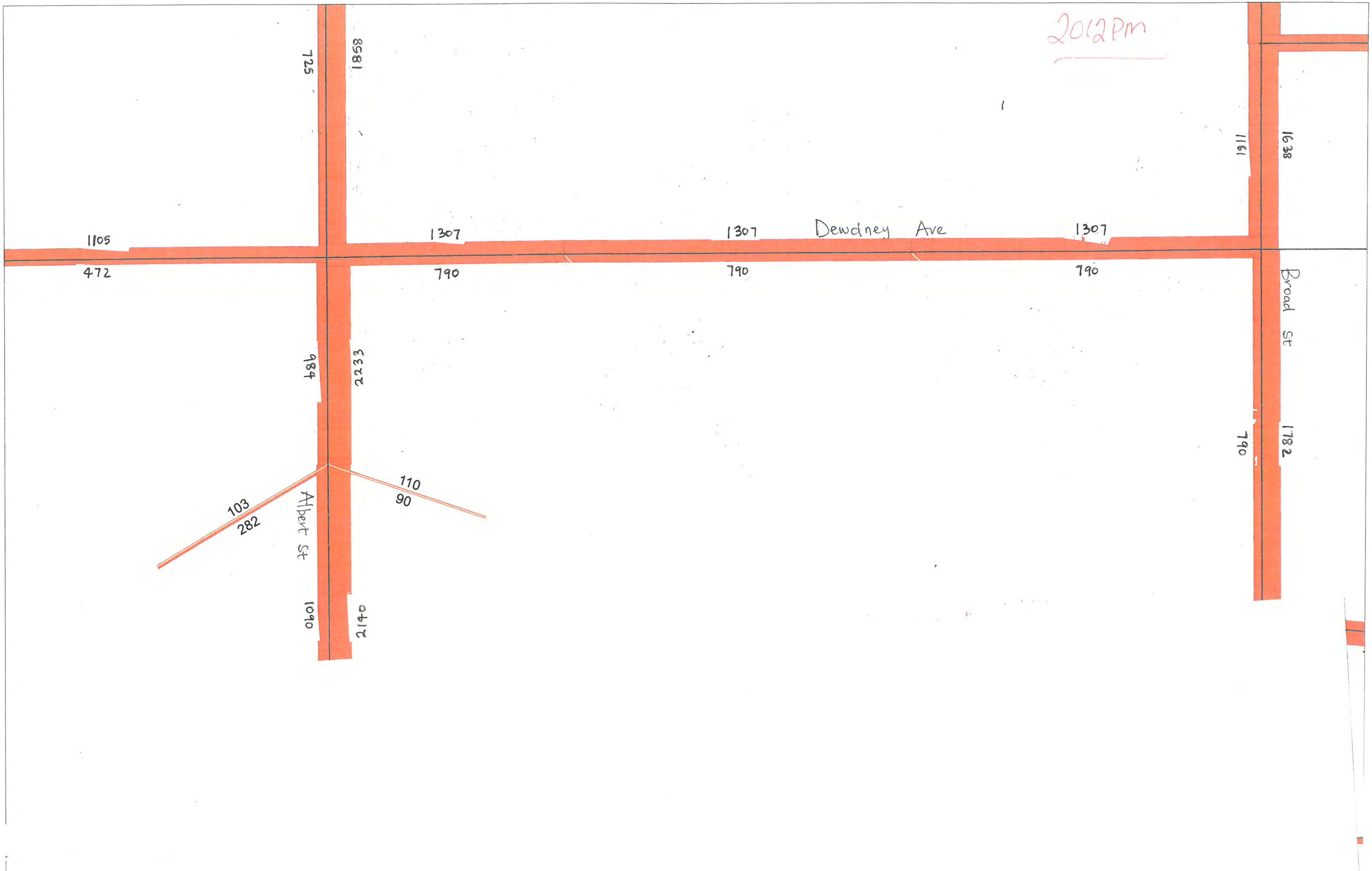
188
188
372
1251
2327


2012PM
Dewdney Ave
Albert St
Broad St
725
1858
1105
472
1307
790
1307
790
1307
790
1911
1638
984
2233
790
1782
110
90
103
282
1090
2140

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Regina Railyard Renewal Project	**Organization:**	WSP Canada Inc.
Project Location:	City of Regina	**Performed By:**	James Sun
Scenario Description:		**Date:**	25/07/2016
Analysis Year:		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Es imated Vehicle-Trips[3]		
	ITE LUCs[1]	Quan ity	Units	Total	Entering	Exiting
Office				243	214	29
Retail				145	90	55
Restaurant				0		
Cinema/Entertainment				0		
Residential				369	102	267
Hotel				0		
All Other Land Uses[2]				0		
				757	406	351

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00	20%		1 00	20%	
Retail	1.00	20%		1 00	20%	
Restaurant						
Cinema/Entertainment						
Residential	1.00	20%		1 00	20%	
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		8	0	0	0	0
Retail	9		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	5	3	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	757	406	351
Internal Capture Percentage	7%	7%	8%
External Vehicle-Trips[5]	562	303	259
External Transit-Trips[6]	141	76	65
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	7%	28%
Retail	12%	20%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	3%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual* , published by the Ins itute of Transportation Engineers.

[2]Total es imate for all other land uses at mixed-use development site is not subject to internal trip capture computa ions in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation hat has been rounded to the nearest whole number.

Es imation Tool Developed by the Texas A&M Transportation Ins itute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Regina Railyard Renewal Project	**Organization:**	WSP Canada Inc.
Project Location:	City of Regina	**Performed By:**	James Sun
Scenario Description:		**Date:**	25/07/2016
Analysis Year:		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				233	40	193
Retail				401	171	230
Restaurant				0		
Cinema/Entertainment				0		
Residential				451	269	182
Hotel				0		
All Other Land Uses[2]				0		
				1,085	480	605

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00	20%		1.00	20%	
Retail	1.00	20%		1.00	20%	
Restaurant						
Cinema/Entertainment						
Residential	1.00	20%		1.00	20%	
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Des ination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		420			1120	
Retail					1420	
Restaurant						
Cinema/Entertainment						
Residential		1420				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Des ination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		13	0	0	3	0
Retail	5		0	0	48	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	7	11	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,085	480	605
Internal Capture Percentage	16%	18%	14%
External Vehicle-Trips[5]	729	314	415
External Transit-Trips[6]	182	79	103
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	30%	8%
Retail	14%	23%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	19%	10%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.
[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in his estimator.
[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).
[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
[5]Vehicle-trips computed using he mode split and vehicle occupancy values provided in Table 2-P.
[6]Person-Trips
*Indicates computation that has been rounded to he nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Sun, James

From: Scott Thomas <STHOMAS@regina.ca>
Sent: August-03-16 1:12 PM
To: Sun, James
Cc: Scott Thomas; Michael Price
Subject: RE: Regina Revitalization: Railyard Renewal - TIA requirements

Hi Sun:

Thanks for contacting the City in regards to the TIA for the CPR lands. Your TIA will need to consider the following:

The TIA should include:

- For purposes of this project, please prepare the analysis for the 2040 PM peak. I believe that the City already provided background traffic forecasts.

- Traffic forecasts (generation, distribution & assignment). Please use the latest ITE traffic generation manual. You are required to provide justification for rates used that differ from ITE rates. Please verify the generation, distribution and assignment (including pass by, diverted link and synergy) with City Staff prior to proceeding to the analysis stage. – City comments on the proposed land uses in your previous email are below in **bold red**.

- Operational Analysis – LOS for all movements and the intersection as a whole, 95% Queues & V/C ratios –> Max acceptable V/C = 1.0 & max acceptable LOS for an intersection is LOS E Please provide a copy of the Synchro model before proceeding to the write-up

- Please identify the recommended intersection geometry, intersection control, roadway classifications & x-sections to maintain the maximum acceptable V/C & LOS

- Discuss and illustrate the provision of alternative modes, including:
    - Proposed transit routes & transit hubs
    - Proposed bikeways
    - Pedestrian accommodation plans including pedestrian protection
    - Alternative modes should be compatible with the OCP & TMP

- Prepare a noise study for any residential areas backing onto the CPR

- Provide a construction phasing plan

Synchro parameters that the City requires are as follows:

- SAT flow rate of 1800 vphpl
- PHF based on actual counts
- A minimum green time of 10 seconds is used for through movements and 7 seconds for left turns
- The amber time on a level terrain is based on the approach speed and be as follows:
    - ≤ 50km/h = 3.5 seconds
    - 60km/h = 4.0 seconds
    - 70km/h = 4.5 seconds
    - 80km/h = 5.0 seconds

- Red time varies depending on the intersection width and posted speed, but for analysis purposes, you can assume:
  - Minimum all red time = 1.0 seconds

- Pedestrian walk time is preferred to be 10 seconds but can be reduced to 7 seconds under time constrained situations
- Pedestrian walk speeds ranging between 0.9m/s (locations designed for audible signals) to 1.2m/s at wide intersections with few seniors be used.
- Main Street to be coordinated.
- Side street and left turns to be actuated with presence detectors (i.e. recall mode set to none).
- Synchro model to be submitted to the City of Regina for review prior to finalizing your report.

Please let me know if you have any further questions or comments.

Regards

Scott Thomas, M.A.Sc., P.Eng., PTOE
Senior Transportation Engineer
Infrastructure Planning Branch
City Planning & Development Division
City of Regina
(p) (306) 777-7567
(f) (306) 546-6023
REGINA | City of Regina

From: Sun, James [mailto:James.Sun@wspgroup.com]
Sent: Tuesday, July 26, 2016 9:41 AM
To: Scott Thomas <STHOMAS@regina.ca>
Subject: FW: Regina Revitalization: Railyard Renewal

Hi Scott,

Would you please also let me know if the City requires any specific parameters set up in the Synchro model? Since the project timeline is tight, I appreciate if you could reply to me at your earliest convenience.

Thanks

WSP

James Sun, MSc., P.Eng.
Transportation Engineer

WSP Canada Inc.
Suite 1200, 10909 Jasper Avenue
Edmonton, Alberta T5J 3L9
T 587-489-0161
C 780-233-0757

www.wspgroup.com

Please consider the environment before printing this email.

From: Sun, James
Sent: July-21-16 10:10 AM
To: Scott Thomas (STHOMAS@regina.ca)
Cc: Fong, Janis; Halliday, Jeffrey
Subject: RE: Regina Revitalization: Railyard Renewal

Hi Scott,

We are preparing the TIA for the Railyard Renewal Project. I would like to use the following corresponding ITE land uses for the proposed development trip generation:

- Buildings (3 to 10 floors) – ITE Land Use: 223, Mid-Rise Apartment - **acceptable**
- Buildings (more than 10 floors) – ITE Land Use: 222, High-Rise Apartment - **acceptable**
- Retail – ITE Land Use: 826, Specialty Retail Center – **Need to see a scan of the pages from ITE Trip Gen Manual as the City does not have this land use in our manual. Also – why specialty retail? What is the impact if this becomes just 'retail'? or a grocery store? Or a factory outlet?**
- Office - ITE Land Use: 710, General Office - **acceptable**
- Community – ITE Land Use: 495, Recreational Community Center – **Need to see a description of what is proposed for the site before we can determine if the ITE land use is acceptable**
- Cultural development – No corresponding ITE land use. Most of the traffic generated by the Cultural development are anticipated to be internal trips on weekends when there are events occurring. The Cultural development trips would be negligible in the TIA. – **Need to see a description of what is proposed for the site before we can determine if the proposed land use is acceptable. Also, how large is the proposed site**
- Internal trips – Be calculated based on ITE method. – **Need to see proposed distribution and assignments before we can approve or deny**
- Trip reduction rate due to public transit – 20%? Please advise. – **There are only three buses per hour per direction on Dewdney Avenue. The City busses are very small (hold 38 people). At most, there might be room for 6 or 7 people per bus per hour destined to this site …**

Would you please let me know your comments on the above? It would be greatly appreciated if you could reply to me at your earliest convenience.

Thanks

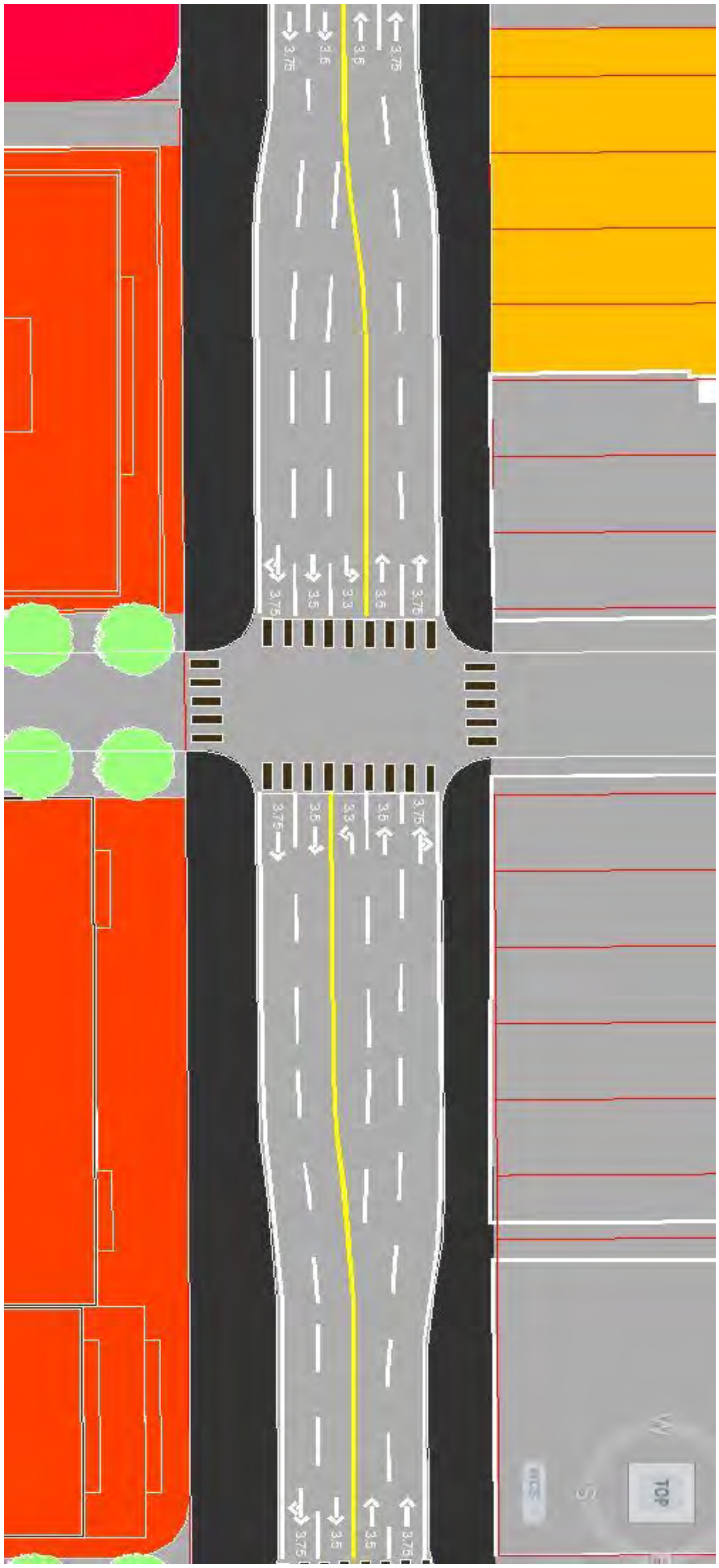
James Sun, MSc., P.Eng.
Transportation Engineer

WSP Canada Inc.
300, 9925 – 109 Street
Edmonton, Alberta T5K 2J8
T 780-466-6555 ext. 4106052
F 780-463-0177
C 780-233-0757
www.wspgroup.com

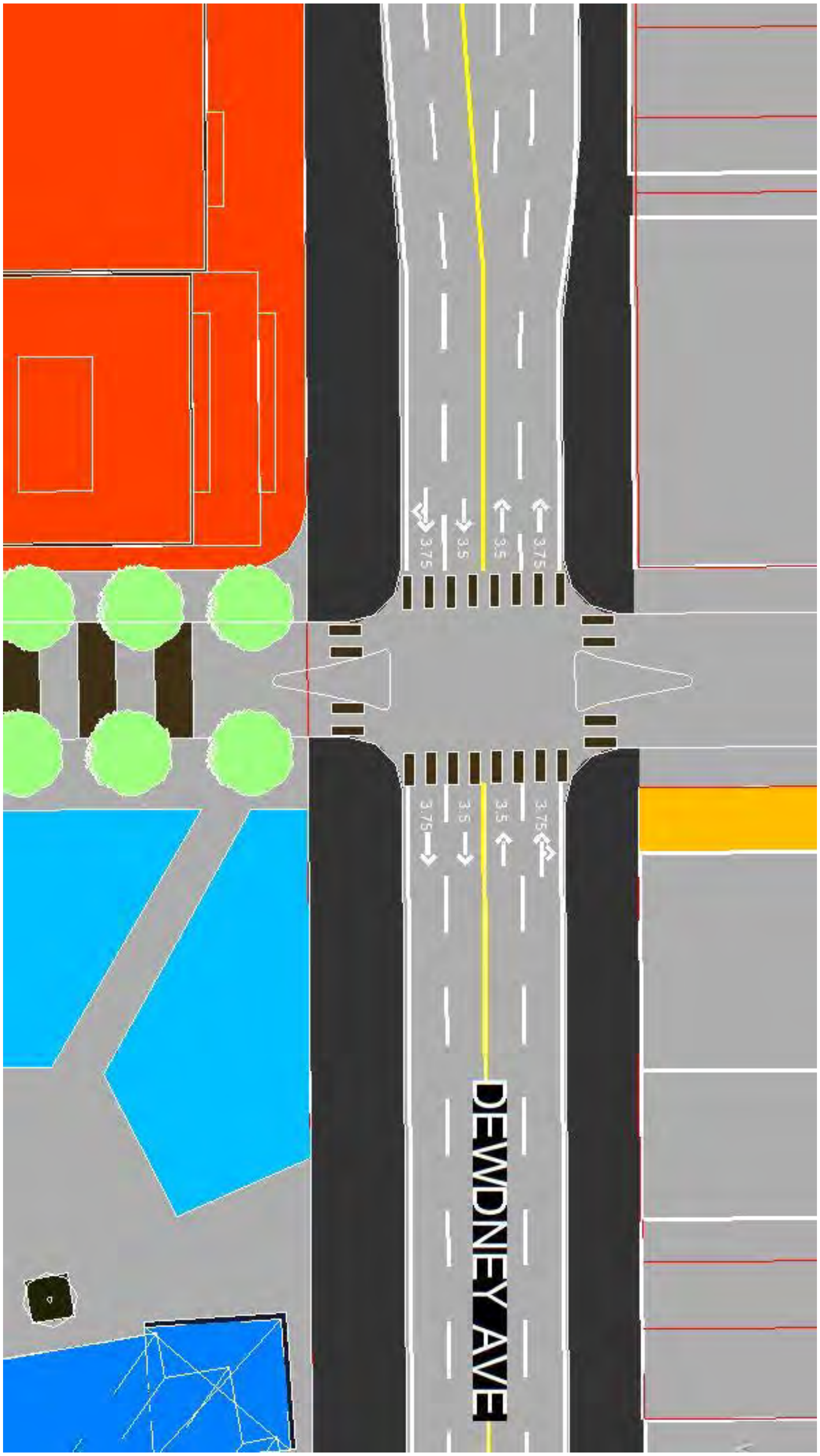
APPENDIX

D INTERSECTION ANALYSIS

— Proposed Intersection Treatment



Proposed Signalized Intersection Treatment



Proposed Unsignalized Intersection Treatment

APPENDIX

E CAPACITY ANALYSIS

— Synchro Outputs

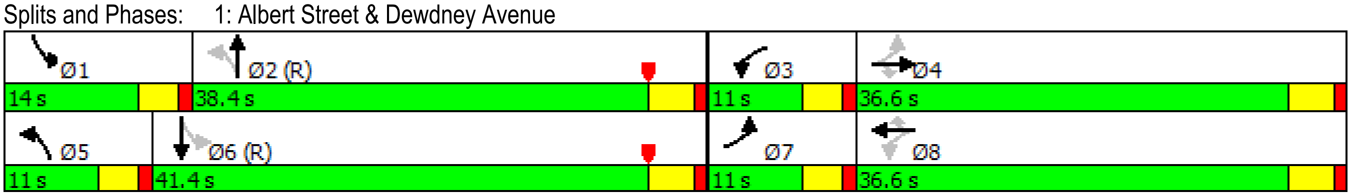
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	521	191	111	366	29	109	527	117	124	1173	94
Future Volume (vph)	126	521	191	111	366	29	109	527	117	124	1173	94
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	0.99		0.98	1.00		0.97	1.00	1.00		1.00	1.00	
Frt			0.850			0.850		0.973			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	3357	1502	1679	3357	1502	1679	4672	0	1679	4757	0
Flt Permitted	0.389			0.242			0.102			0.284		
Satd. Flow (perm)	682	3357	1473	426	3357	1460	180	4672	0	500	4757	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			215			104		54			15	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	17		8	8		17	26		13	13		26
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	148	613	225	131	431	34	128	620	138	146	1380	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	148	613	225	131	431	34	128	758	0	146	1491	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		7.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		11.0	33.5	
Total Split (s)	11.0	36.6	36.6	11.0	36.6	36.6	11.0	38.4		14.0	41.4	
Total Split (%)	11.0%	36.6%	36.6%	11.0%	36.6%	36.6%	11.0%	38.4%		14.0%	41.4%	
Maximum Green (s)	7.0	32.1	32.1	7.0	32.1	32.1	7.0	33.9		10.0	36.9	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		15	15		15	15		8			15	
Act Effct Green (s)	34.5	27.0	27.0	34.5	27.0	27.0	48.3	39.2		50.7	40.4	
Actuated g/C Ratio	0.34	0.27	0.27	0.34	0.27	0.27	0.48	0.39		0.51	0.40	
v/c Ratio	0.49	0.68	0.41	0.56	0.48	0.07	0.60	0.41		0.40	0.77	
Control Delay	25.9	36.1	6.5	29.4	31.7	0.3	30.1	22.1		16.4	29.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	25.9	36.1	6.5	29.4	31.7	0.3	30.1	22.1		16.4	29.7	
LOS	C	D	A	C	C	A	C	C		B	C	
Approach Delay		27.8			29.4			23.2			28.5	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	18.8	55.4	1.4	16.5	36.5	0.0	12.0	36.3		13.8	93.4	
Queue Length 95th (m)	28.1	64.0	14.3	25.2	44.4	0.0	#33.5	46.7		25.0	104.5	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	305	1077	618	234	1077	539	215	1863		378	1931	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.49	0.57	0.36	0.56	0.40	0.06	0.60	0.41		0.39	0.77	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 27.3 Intersection LOS: C
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: Albert Street & Dewdney Avenue



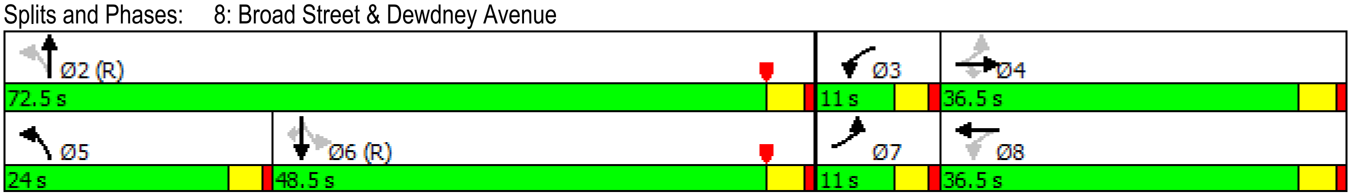
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	84	407	7	48	4	322	700	21	13	1064	151
Future Volume (vph)	160	84	407	7	48	4	322	700	21	13	1064	151
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	0.99				1.00							0.96
Frt			0.850		0.988			0.996				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	1767	1502	1647	1709	0	1679	3344	0	1679	3357	1502
Flt Permitted	0.567			0.693			0.077			0.333		
Satd. Flow (perm)	993	1767	1502	1201	1709	0	136	3344	0	588	3357	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			416		4			4				141
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	9					9	23					23
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	3%	3%	3%	5%	5%	5%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	188	99	479	8	56	5	379	824	25	15	1252	178
Shared Lane Traffic (%)												
Lane Group Flow (vph)	188	99	479	8	61	0	379	849	0	15	1252	178
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		24.0	72.5		48.5	48.5	48.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		20.0%	60.4%		40.4%	40.4%	40.4%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		20.0	68.0		44.0	44.0	44.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					9					15	15	15
Act Effct Green (s)	23.3	21.4	21.4	20.2	14.8		87.9	87.4		51.3	51.3	51.3
Actuated g/C Ratio	0.19	0.18	0.18	0.17	0.12		0.73	0.73		0.43	0.43	0.43
v/c Ratio	0.80	0.31	0.79	0.04	0.28		0.74	0.35		0.06	0.87	0.26

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	66.2	43.3	16.9	32.0	45.1		39.2	7.9		23.6	40.2	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	66.2	43.3	16.9	32.0	45.1		39.2	7.9		23.6	40.2	7.5
LOS	E	D	B	C	D		D	A		C	D	A
Approach Delay		32.4			43.6			17.6			36.0	
Approach LOS		C			D			B			D	
Queue Length 50th (m)	41.2	20.6	12.9	1.6	12.9		62.2	30.5		2.0	137.2	5.0
Queue Length 95th (m)	46.9	30.7	36.2	4.3	19.8		#136.0	67.0		6.9	#185.5	18.0
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	236	471	705	228	458		512	2435		250	1433	694
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.80	0.21	0.68	0.04	0.13		0.74	0.35		0.06	0.87	0.26

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 28.9 Intersection LOS: C
Intersection Capacity Utilization 76.7% 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: 8: Broad Street & Dewdney Avenue



Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	703	32	59	484	15	1	2	26	4	2	21
Future Vol, veh/h	27	703	32	59	484	15	1	2	26	4	2	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	33	868	40	73	598	19	1	2	32	5	2	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	616	0	0	907	0	0	1400	1716	454	1254	1726	308
Stage 1	-	-	-	-	-	-	954	954	-	752	752	-
Stage 2	-	-	-	-	-	-	446	762	-	502	974	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	953	-	-	740	-	-	99	88	550	127	87	685
Stage 1	-	-	-	-	-	-	276	333	-	366	414	-
Stage 2	-	-	-	-	-	-	559	409	-	517	326	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	953	-	-	740	-	-	84	77	550	105	76	685
Mov Cap-2 Maneuver	-	-	-	-	-	-	84	77	-	105	76	-
Stage 1	-	-	-	-	-	-	266	321	-	353	373	-
Stage 2	-	-	-	-	-	-	482	369	-	466	315	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.1	16.8	19.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	341	953	-	-	740	-	-	284
HCM Lane V/C Ratio	0.105	0.035	-	-	0.098	-	-	0.117
HCM Control Delay (s)	16.8	8.9	-	-	10.4	-	-	19.4
HCM Lane LOS	C	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.3	-	-	0.4

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	702	1	1	544	16	1	1	1	8	1	13
Future Vol, veh/h	30	702	1	1	544	16	1	1	1	8	1	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	37	867	1	1	672	20	1	1	1	10	1	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	691	0	0	868	0	0	1280	1635	434	1192	1626	346
Stage 1	-	-	-	-	-	-	941	941	-	684	684	-
Stage 2	-	-	-	-	-	-	339	694	-	508	942	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	893	-	-	765	-	-	122	99	567	142	100	647
Stage 1	-	-	-	-	-	-	281	338	-	402	445	-
Stage 2	-	-	-	-	-	-	646	440	-	513	337	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	893	-	-	765	-	-	110	91	567	131	92	647
Mov Cap-2 Maneuver	-	-	-	-	-	-	110	91	-	131	92	-
Stage 1	-	-	-	-	-	-	259	311	-	370	444	-
Stage 2	-	-	-	-	-	-	627	439	-	469	310	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	32	22
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	137	893	-	-	765	-	-	239
HCM Lane V/C Ratio	0.027	0.041	-	-	0.002	-	-	0.114
HCM Control Delay (s)	32	9.2	0.3	-	9.7	0	-	22
HCM Lane LOS	D	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.4

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	696	0	0	548	8	0	0	0	4	0	13
Future Vol, veh/h	15	696	0	0	548	8	0	0	0	4	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	19	859	0	0	677	10	0	0	0	5	0	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	686	0	0	859	0	0	1234	1582	430	1148	1577	343
Stage 1	-	-	-	-	-	-	896	896	-	681	681	-
Stage 2	-	-	-	-	-	-	338	686	-	467	896	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	897	-	-	772	-	-	132	107	571	153	107	650
Stage 1	-	-	-	-	-	-	299	355	-	404	446	-
Stage 2	-	-	-	-	-	-	647	444	-	543	355	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	897	-	-	772	-	-	125	103	571	148	103	650
Mov Cap-2 Maneuver	-	-	-	-	-	-	125	103	-	148	103	-
Stage 1	-	-	-	-	-	-	287	340	-	387	446	-
Stage 2	-	-	-	-	-	-	631	444	-	521	340	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	0	15.6
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	897	-	-	772	-	-	361
HCM Lane V/C Ratio	-	0.021	-	-	-	-	-	0.058
HCM Control Delay (s)	0	9.1	0.2	-	0	-	-	15.6
HCM Lane LOS	A	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	683	535	7	2	21
Future Vol, veh/h	17	683	535	7	2	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	21	843	660	9	2	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	669	0	-	0	1129	335
Stage 1	-	-	-	-	665	-
Stage 2	-	-	-	-	464	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	910	-	-	-	196	658
Stage 1	-	-	-	-	470	-
Stage 2	-	-	-	-	596	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	910	-	-	-	188	658
Mov Cap-2 Maneuver	-	-	-	-	188	-
Stage 1	-	-	-	-	470	-
Stage 2	-	-	-	-	570	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	12
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	910	-	-	-	541
HCM Lane V/C Ratio	0.023	-	-	-	0.052
HCM Control Delay (s)	9	0.2	-	-	12
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	676	511	5	1	31
Future Vol, veh/h	9	676	511	5	1	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	11	835	631	6	1	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	637	0	-	0	1074	319
Stage 1	-	-	-	-	634	-
Stage 2	-	-	-	-	440	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	936	-	-	-	213	674
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	613	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	936	-	-	-	208	674
Mov Cap-2 Maneuver	-	-	-	-	208	-
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	600	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	936	-	-	-	630
HCM Lane V/C Ratio	0.012	-	-	-	0.063
HCM Control Delay (s)	8.9	0.1	-	-	11.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	27	650	498	23	1	18
Future Vol, veh/h	27	650	498	23	1	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	33	802	615	28	1	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	643	0	-	0	1097	322
Stage 1	-	-	-	-	629	-
Stage 2	-	-	-	-	468	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	931	-	-	-	206	671
Stage 1	-	-	-	-	491	-
Stage 2	-	-	-	-	594	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	931	-	-	-	193	671
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	491	-
Stage 2	-	-	-	-	556	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	11.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	931	-	-	-	594
HCM Lane V/C Ratio	0.036	-	-	-	0.039
HCM Control Delay (s)	9	0.3	-	-	11.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

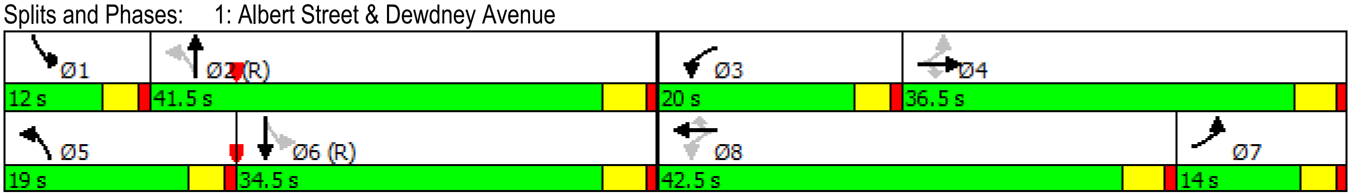
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	436	140	261	557	96	236	1199	170	93	889	133
Future Volume (vph)	144	436	140	261	557	96	236	1199	170	93	889	133
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	0.99		0.98	0.99		0.97	1.00	1.00		1.00	0.99	
Frt			0.850			0.850		0.981			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4758	0	1695	4744	0
Flt Permitted	0.423			0.430			0.134			0.100		
Satd. Flow (perm)	750	3390	1480	763	3390	1479	238	4758	0	178	4744	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			152			139		25			25	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	157	474	152	284	605	104	257	1303	185	101	966	145
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	474	152	284	605	104	257	1488	0	101	1111	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		8.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	14.0	36.5	36.5	20.0	42.5	42.5	19.0	41.5		12.0	34.5	
Total Split (%)	12.7%	33.2%	33.2%	18.2%	38.6%	38.6%	17.3%	37.7%		10.9%	31.4%	
Maximum Green (s)	10.0	32.0	32.0	16.0	38.0	38.0	15.0	37.0		8.0	30.0	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	22.2	21.7	21.7	25.8	25.3	25.3	59.5	47.2		48.9	40.3	
Actuated g/C Ratio	0.20	0.20	0.20	0.23	0.23	0.23	0.54	0.43		0.44	0.37	
v/c Ratio	0.61	0.71	0.37	0.90	0.77	0.23	0.78	0.72		0.53	0.63	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	52.1	46.7	7.7	70.2	46.5	3.4	37.5	29.3		29.5	31.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	52.1	46.7	7.7	70.2	46.5	3.4	37.5	29.3		29.5	31.8	
LOS	D	D	A	E	D	A	D	C		C	C	
Approach Delay		40.2			48.8			30.5			31.6	
Approach LOS		D			D			C			C	
Queue Length 50th (m)	30.3	51.0	0.0	56.5	64.5	0.0	29.7	91.6		9.8	70.7	
Queue Length 95th (m)	43.9	59.6	14.4	#89.4	77.3	6.4	#79.1	#139.3		#27.4	98.4	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	257	986	538	314	1171	601	346	2054		191	1752	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.61	0.48	0.28	0.90	0.52	0.17	0.74	0.72		0.53	0.63	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 36.2 Intersection LOS: D
Intersection Capacity Utilization 84.7% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



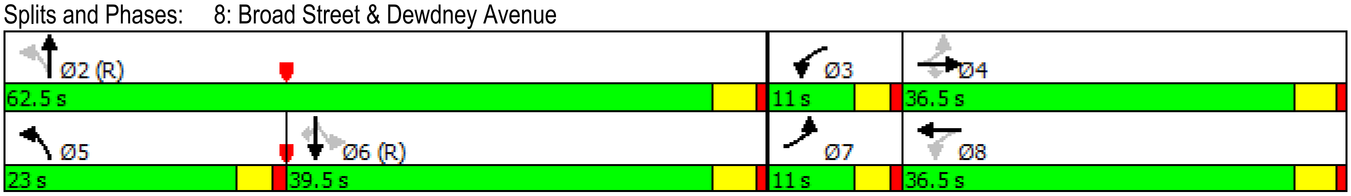
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	208	112	313	26	110	22	370	1386	21	16	987	160
Future Volume (vph)	208	112	313	26	110	22	370	1386	21	16	987	160
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.975			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1713	0	1695	3383	0	1695	3390	1517
Flt Permitted	0.462			0.679			0.095			0.168		
Satd. Flow (perm)	822	1784	1517	1212	1713	0	170	3383	0	300	3390	1402
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			340		9			2				163
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	226	122	340	28	120	24	402	1507	23	17	1073	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	226	122	340	28	144	0	402	1530	0	17	1073	174
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		23.0	62.5		39.5	39.5	39.5
Total Split (%)	10.0%	33.2%	33.2%	10.0%	33.2%		20.9%	56.8%		35.9%	35.9%	35.9%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		19.0	58.0		35.0	35.0	35.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	25.4	20.7	20.7	23.8	16.3		74.2	73.7		39.9	39.9	39.9
Actuated g/C Ratio	0.23	0.19	0.19	0.22	0.15		0.67	0.67		0.36	0.36	0.36
v/c Ratio	0.92	0.36	0.61	0.10	0.55		0.76	0.67		0.16	0.87	0.28

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	78.7	41.8	8.7	28.4	47.0		37.0	14.6		30.0	42.5	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	78.7	41.8	8.7	28.4	47.0		37.0	14.6		30.0	42.5	6.3
LOS	E	D	A	C	D		D	B		C	D	A
Approach Delay		37.6			44.0			19.2			37.3	
Approach LOS		D			D			B			D	
Queue Length 50th (m)	~47.8	25.2	0.0	4.8	28.2		59.5	84.0		2.4	108.0	1.5
Queue Length 95th (m)	52.4	34.8	20.8	9.3	38.9		#146.3	176.2		8.8	#165.8	16.6
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	245	518	682	292	504		528	2267		108	1228	612
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.92	0.24	0.50	0.10	0.29		0.76	0.67		0.16	0.87	0.28

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 29.0 Intersection LOS: C
Intersection Capacity Utilization 91.0% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue



Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	618	29	22	788	23	8	2	77	6	1	118
Future Vol, veh/h	52	618	29	22	788	23	8	2	77	6	1	118
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	57	672	32	24	857	25	9	2	84	7	1	128

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	882	0	0	703	0	0	1278	1730	352	1367	1733	441
Stage 1	-	-	-	-	-	-	801	801	-	917	917	-
Stage 2	-	-	-	-	-	-	477	929	-	450	816	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	756	-	-	884	-	-	122	86	641	105	86	561
Stage 1	-	-	-	-	-	-	342	393	-	291	347	-
Stage 2	-	-	-	-	-	-	535	342	-	556	386	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	756	-	-	884	-	-	86	77	641	82	77	561
Mov Cap-2 Maneuver	-	-	-	-	-	-	86	77	-	82	77	-
Stage 1	-	-	-	-	-	-	316	363	-	269	338	-
Stage 2	-	-	-	-	-	-	400	333	-	444	357	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.2	18.3	17.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	364	756	-	-	884	-	-	422
HCM Lane V/C Ratio	0.26	0.075	-	-	0.027	-	-	0.322
HCM Control Delay (s)	18.3	10.1	-	-	9.2	-	-	17.5
HCM Lane LOS	C	B	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1	0.2	-	-	0.1	-	-	1.4

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	681	1	1	783	17	0	1	1	6	1	50
Future Vol, veh/h	19	681	1	1	783	17	0	1	1	6	1	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	21	740	1	1	851	18	0	1	1	7	1	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	870	0	0	741	0	0	1210	1654	371	1275	1646	435
Stage 1	-	-	-	-	-	-	782	782	-	863	863	-
Stage 2	-	-	-	-	-	-	428	872	-	412	783	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	764	-	-	855	-	-	137	96	623	123	97	566
Stage 1	-	-	-	-	-	-	351	401	-	314	367	-
Stage 2	-	-	-	-	-	-	572	364	-	585	400	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	764	-	-	855	-	-	118	91	623	117	92	566
Mov Cap-2 Maneuver	-	-	-	-	-	-	118	91	-	117	92	-
Stage 1	-	-	-	-	-	-	335	382	-	299	366	-
Stage 2	-	-	-	-	-	-	515	363	-	555	381	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	28	16.3
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	159	764	-	-	855	-	-	379
HCM Lane V/C Ratio	0.014	0.027	-	-	0.001	-	-	0.163
HCM Control Delay (s)	28	9.8	0.2	-	9.2	0	-	16.3
HCM Lane LOS	D	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	657	0	0	736	23	0	0	0	5	0	65
Future Vol, veh/h	31	657	0	0	736	23	0	0	0	5	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	34	714	0	0	800	25	0	0	0	5	0	71

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	825	0	0	714	0	0	1182	1607	357	1237	1595	413
Stage 1	-	-	-	-	-	-	782	782	-	813	813	-
Stage 2	-	-	-	-	-	-	400	825	-	424	782	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	795	-	-	875	-	-	144	103	637	131	105	585
Stage 1	-	-	-	-	-	-	351	401	-	336	388	-
Stage 2	-	-	-	-	-	-	595	383	-	576	401	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	795	-	-	875	-	-	120	96	637	124	98	585
Mov Cap-2 Maneuver	-	-	-	-	-	-	120	96	-	124	98	-
Stage 1	-	-	-	-	-	-	326	373	-	312	388	-
Stage 2	-	-	-	-	-	-	523	383	-	535	373	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	0	14.3
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	795	-	-	875	-	-	462
HCM Lane V/C Ratio	-	0.042	-	-	-	-	-	0.165
HCM Control Delay (s)	0	9.7	0.3	-	0	-	-	14.3
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	646	701	14	7	58
Future Vol, veh/h	16	646	701	14	7	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	17	702	762	15	8	63

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	777	0	-	0	1156	389
Stage 1	-	-	-	-	770	-
Stage 2	-	-	-	-	386	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	829	-	-	-	188	607
Stage 1	-	-	-	-	415	-
Stage 2	-	-	-	-	654	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	829	-	-	-	182	607
Mov Cap-2 Maneuver	-	-	-	-	182	-
Stage 1	-	-	-	-	415	-
Stage 2	-	-	-	-	632	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	13.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	829	-	-	-	485
HCM Lane V/C Ratio	0.021	-	-	-	0.146
HCM Control Delay (s)	9.4	0.2	-	-	13.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	642	666	15	9	49
Future Vol, veh/h	11	642	666	15	9	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	12	698	724	16	10	53

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	740	0	-	0	1105	370
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	373	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	856	-	-	-	203	624
Stage 1	-	-	-	-	434	-
Stage 2	-	-	-	-	664	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	856	-	-	-	198	624
Mov Cap-2 Maneuver	-	-	-	-	198	-
Stage 1	-	-	-	-	434	-
Stage 2	-	-	-	-	649	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	13.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	856	-	-	-	468
HCM Lane V/C Ratio	0.014	-	-	-	0.135
HCM Control Delay (s)	9.3	0.1	-	-	13.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	631	618	22	2	63
Future Vol, veh/h	20	631	618	22	2	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	22	686	672	24	2	68

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	696	0	-	0	1070	348
Stage 1	-	-	-	-	684	-
Stage 2	-	-	-	-	386	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	889	-	-	-	214	645
Stage 1	-	-	-	-	460	-
Stage 2	-	-	-	-	654	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	889	-	-	-	205	645
Mov Cap-2 Maneuver	-	-	-	-	205	-
Stage 1	-	-	-	-	460	-
Stage 2	-	-	-	-	628	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	889	-	-	-	605
HCM Lane V/C Ratio	0.024	-	-	-	0.117
HCM Control Delay (s)	9.2	0.2	-	-	11.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

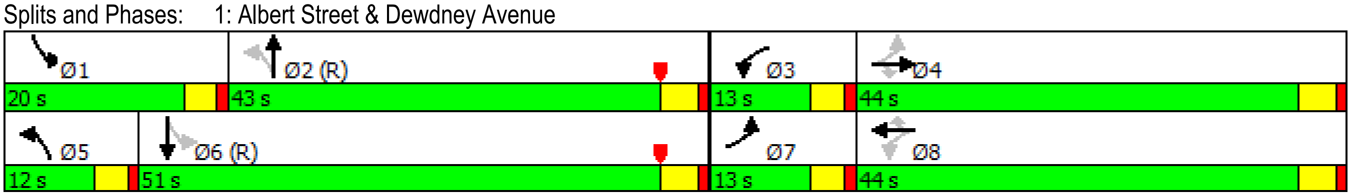
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	895	225	144	653	47	122	588	142	165	1381	112
Future Volume (vph)	144	895	225	144	653	47	122	588	142	165	1381	112
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.98	1.00		0.97	1.00	0.99		1.00	1.00	
Frt			0.850			0.850		0.971			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	3357	1502	1679	3357	1502	1679	4659	0	1679	4755	0
Flt Permitted	0.189			0.101			0.098			0.202		
Satd. Flow (perm)	332	3357	1471	178	3357	1456	173	4659	0	356	4755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			162			123		50			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	17		8	8		17	26		13	13		26
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	169	1053	265	169	768	55	144	692	167	194	1625	132
Shared Lane Traffic (%)												
Lane Group Flow (vph)	169	1053	265	169	768	55	144	859	0	194	1757	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		7.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		11.0	33.5	
Total Split (s)	13.0	44.0	44.0	13.0	44.0	44.0	12.0	43.0		20.0	51.0	
Total Split (%)	10.8%	36.7%	36.7%	10.8%	36.7%	36.7%	10.0%	35.8%		16.7%	42.5%	
Maximum Green (s)	9.0	39.5	39.5	9.0	39.5	39.5	8.0	38.5		16.0	46.5	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		15	15		15	15		8			15	
Act Effct Green (s)	49.0	39.5	39.5	49.0	39.5	39.5	49.2	40.7		58.6	46.5	
Actuated g/C Ratio	0.41	0.33	0.33	0.41	0.33	0.33	0.41	0.34		0.49	0.39	
v/c Ratio	0.72	0.95	0.45	0.91	0.70	0.10	0.84	0.53		0.60	0.95	
Control Delay	40.1	57.6	14.7	74.6	39.0	0.3	63.9	31.8		25.6	47.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	40.1	57.6	14.7	74.6	39.0	0.3	63.9	31.8		25.6	47.7	
LOS	D	E	B	E	D	A	E	C		C	D	
Approach Delay		48.0			42.9			36.4			45.5	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	24.2	127.0	17.4	24.9	82.3	0.0	19.0	56.4		25.5	144.2	
Queue Length 95th (m)	#38.4	#152.2	36.2	#59.2	96.4	0.0	#49.8	66.2		37.6	152.0	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	236	1105	592	185	1105	561	171	1612		351	1850	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.72	0.95	0.45	0.91	0.70	0.10	0.84	0.53		0.55	0.95	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 44.0 Intersection LOS: D
Intersection Capacity Utilization 86.9% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



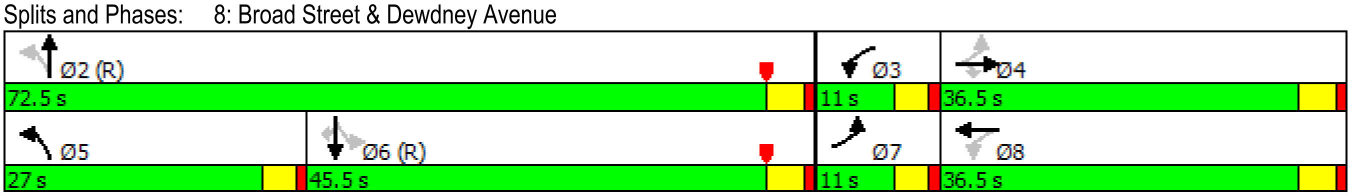
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	287	84	720	7	48	4	553	791	21	13	1169	259
Future Volume (vph)	287	84	720	7	48	4	553	791	21	13	1169	259
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	0.99				1.00							0.96
Frt			0.850		0.988			0.996				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	1767	1502	1647	1709	0	1679	3344	0	1679	3357	1502
Flt Permitted	0.627			0.693			0.096			0.299		
Satd. Flow (perm)	1098	1767	1502	1201	1709	0	170	3344	0	528	3357	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			459		4			4				211
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	9					9	23					23
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	3%	3%	3%	5%	5%	5%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	338	99	847	8	56	5	651	931	25	15	1375	305
Shared Lane Traffic (%)												
Lane Group Flow (vph)	338	99	847	8	61	0	651	956	0	15	1375	305
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		27.0	72.5		45.5	45.5	45.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		22.5%	60.4%		37.9%	37.9%	37.9%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		23.0	68.0		41.0	41.0	41.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					9					15	15	15
Act Effct Green (s)	42.7	40.8	40.8	33.0	27.6		68.5	68.0		41.0	41.0	41.0
Actuated g/C Ratio	0.36	0.34	0.34	0.28	0.23		0.57	0.57		0.34	0.34	0.34
v/c Ratio	0.74	0.16	1.04	0.02	0.15		1.69	0.50		0.08	1.20	0.48

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	44.6	30.0	61.7	24.9	32.6		346.5	16.9		28.5	134.3	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	44.6	30.0	61.7	24.9	32.6		346.5	16.9		28.5	134.3	12.4
LOS	D	C	E	C	C		F	B		C	F	B
Approach Delay		54.8			31.7			150.4			111.4	
Approach LOS		D			C			F			F	
Queue Length 50th (m)	63.0	15.7	~136.5	1.2	10.2		~210.2	68.1		2.4	~206.6	15.5
Queue Length 95th (m)	#95.8	30.7	#197.9	4.3	19.8		#259.1	78.0		7.2	#226.8	35.0
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	459	601	813	356	458		386	1896		180	1146	629
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.74	0.16	1.04	0.02	0.13		1.69	0.50		0.08	1.20	0.48

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.69
Intersection Signal Delay: 108.1 Intersection LOS: F
Intersection Capacity Utilization 100.7% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue



Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	1143	32	59	823	15	1	2	26	4	2	21
Future Vol, veh/h	27	1143	32	59	823	15	1	2	26	4	2	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	33	1411	40	73	1016	19	1	2	32	5	2	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1035	0	0	1451	0	0	2153	2678	725	1944	2688	517
Stage 1	-	-	-	-	-	-	1498	1498	-	1171	1171	-
Stage 2	-	-	-	-	-	-	655	1180	-	773	1517	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	661	-	-	458	-	-	27	21	365	39	21	501
Stage 1	-	-	-	-	-	-	127	182	-	203	263	-
Stage 2	-	-	-	-	-	-	419	260	-	356	178	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	661	-	-	458	-	-	19	17	365	27	17	501
Mov Cap-2 Maneuver	-	-	-	-	-	-	19	17	-	27	17	-
Stage 1	-	-	-	-	-	-	121	173	-	193	221	-
Stage 2	-	-	-	-	-	-	330	219	-	304	169	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.9	47.3	69
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	120	661	-	-	458	-	-	88
HCM Lane V/C Ratio	0.298	0.05	-	-	0.159	-	-	0.379
HCM Control Delay (s)	47.3	10.7	-	-	14.3	-	-	69
HCM Lane LOS	E	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1.1	0.2	-	-	0.6	-	-	1.5

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	1142	1	1	883	16	1	1	1	8	1	13
Future Vol, veh/h	30	1142	1	1	883	16	1	1	1	8	1	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	37	1410	1	1	1090	20	1	1	1	10	1	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1110	0	0	1411	0	0	2033	2597	706	1882	2587	555
Stage 1	-	-	-	-	-	-	1485	1485	-	1102	1102	-
Stage 2	-	-	-	-	-	-	548	1112	-	780	1485	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	619	-	-	474	-	-	33	24	376	43	25	473
Stage 1	-	-	-	-	-	-	129	185	-	224	283	-
Stage 2	-	-	-	-	-	-	486	280	-	352	185	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	619	-	-	474	-	-	24	17	376	32	18	473
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	17	-	32	18	-
Stage 1	-	-	-	-	-	-	93	134	-	162	281	-
Stage 2	-	-	-	-	-	-	465	278	-	251	134	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0	146.5	93.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	29	619	-	-	474	-	-	66
HCM Lane V/C Ratio	0.128	0.06	-	-	0.003	-	-	0.412
HCM Control Delay (s)	146.5	11.2	1.5	-	12.6	0	-	93.4
HCM Lane LOS	F	B	A	-	B	A	-	F
HCM 95th %tile Q(veh)	0.4	0.2	-	-	0	-	-	1.6

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	1136	0	0	887	8	0	0	0	4	0	13
Future Vol, veh/h	15	1136	0	0	887	8	0	0	0	4	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	19	1402	0	0	1095	10	0	0	0	5	0	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1105	0	0	1402	0	0	1988	2545	701	1838	2540	552
Stage 1	-	-	-	-	-	-	1440	1440	-	1100	1100	-
Stage 2	-	-	-	-	-	-	548	1105	-	738	1440	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	622	-	-	478	-	-	36	26	379	46	26	475
Stage 1	-	-	-	-	-	-	138	195	-	225	284	-
Stage 2	-	-	-	-	-	-	486	283	-	373	195	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	622	-	-	478	-	-	31	22	379	41	22	475
Mov Cap-2 Maneuver	-	-	-	-	-	-	31	22	-	41	22	-
Stage 1	-	-	-	-	-	-	119	168	-	194	284	-
Stage 2	-	-	-	-	-	-	470	283	-	322	168	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0	0	36.2
HCM LOS			A	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	622	-	-	478	-	-	136
HCM Lane V/C Ratio	-	0.03	-	-	-	-	-	0.154
HCM Control Delay (s)	0	11	0.7	-	0	-	-	36.2
HCM Lane LOS	A	B	A	-	A	-	-	E
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	0.5

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	1123	874	7	2	21
Future Vol, veh/h	17	1123	874	7	2	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	21	1386	1079	9	2	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1088	0	-	0	1818	544
Stage 1	-	-	-	-	1083	-
Stage 2	-	-	-	-	735	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	631	-	-	-	68	481
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	433	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	631	-	-	-	58	481
Mov Cap-2 Maneuver	-	-	-	-	58	-
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	370	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	18.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	631	-	-	-	294
HCM Lane V/C Ratio	0.033	-	-	-	0.097
HCM Control Delay (s)	10.9	0.8	-	-	18.6
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	1116	850	5	1	31
Future Vol, veh/h	9	1116	850	5	1	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	11	1378	1049	6	1	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1056	0	-	0	1763	528
Stage 1	-	-	-	-	1052	-
Stage 2	-	-	-	-	711	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	649	-	-	-	74	492
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	445	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	649	-	-	-	69	492
Mov Cap-2 Maneuver	-	-	-	-	69	-
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	413	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	14.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	649	-	-	-	413
HCM Lane V/C Ratio	0.017	-	-	-	0.096
HCM Control Delay (s)	10.6	0.4	-	-	14.6
HCM Lane LOS	B	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	27	1090	837	23	1	18
Future Vol, veh/h	27	1090	837	23	1	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	33	1346	1033	28	1	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1062	0	-	0	1788	531
Stage 1	-	-	-	-	1048	-
Stage 2	-	-	-	-	740	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	646	-	-	-	72	490
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	430	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	646	-	-	-	57	490
Mov Cap-2 Maneuver	-	-	-	-	57	-
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	343	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	16
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	646	-	-	-	350
HCM Lane V/C Ratio	0.052	-	-	-	0.067
HCM Control Delay (s)	10.9	1	-	-	16
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

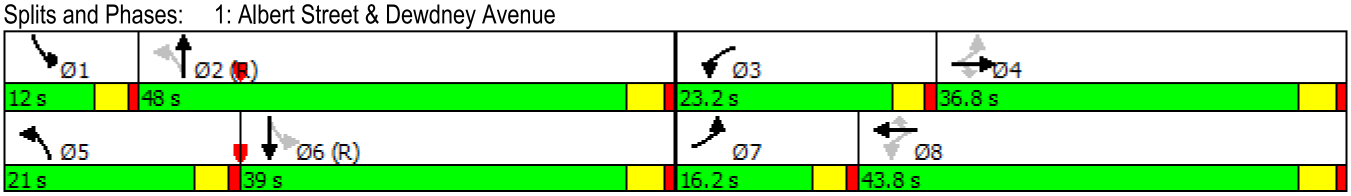
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	749	165	295	862	136	265	1338	206	124	1047	158
Future Volume (vph)	164	749	165	295	862	136	265	1338	206	124	1047	158
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.97	1.00		0.97		1.00		1.00	0.99	
Frt			0.850			0.850		0.980			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4751	0	1695	4742	0
Flt Permitted	0.131			0.113			0.102			0.113		
Satd. Flow (perm)	233	3390	1478	201	3390	1477	182	4751	0	201	4742	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159			123		27			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	178	814	179	321	937	148	288	1454	224	135	1138	172
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	814	179	321	937	148	288	1678	0	135	1310	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		8.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	16.2	36.8	36.8	23.2	43.8	43.8	21.0	48.0		12.0	39.0	
Total Split (%)	13.5%	30.7%	30.7%	19.3%	36.5%	36.5%	17.5%	40.0%		10.0%	32.5%	
Maximum Green (s)	12.2	32.3	32.3	19.2	39.3	39.3	17.0	43.5		8.0	34.5	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	43.2	31.4	31.4	55.1	39.4	39.4	56.9	44.4		44.0	35.5	
Actuated g/C Ratio	0.36	0.26	0.26	0.46	0.33	0.33	0.47	0.37		0.37	0.30	
v/c Ratio	0.81	0.92	0.36	0.97	0.84	0.26	0.96	0.95		0.78	0.92	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	52.9	59.0	9.3	76.1	45.7	8.7	76.1	48.5		54.6	52.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	52.9	59.0	9.3	76.1	45.7	8.7	76.1	48.5		54.6	52.2	
LOS	D	E	A	E	D	A	E	D		D	D	
Approach Delay		50.5			48.7			52.5			52.5	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	24.7	97.2	3.5	60.0	107.4	4.0	53.0	139.1		18.0	109.0	
Queue Length 95th (m)	#57.6	#130.9	21.0	#116.3	133.7	18.6	#107.1	#173.2		#49.3	#139.0	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	234	912	514	331	1117	569	300	1774		173	1418	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.76	0.89	0.35	0.97	0.84	0.26	0.96	0.95		0.78	0.92	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 51.2 Intersection LOS: D
Intersection Capacity Utilization 95.8% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	360	112	542	26	110	22	635	1567	21	16	1084	274
Future Volume (vph)	360	112	542	26	110	22	635	1567	21	16	1084	274
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.975			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1713	0	1695	3383	0	1695	3390	1517
Flt Permitted	0.456			0.679			0.104			0.138		
Satd. Flow (perm)	811	1784	1517	1212	1713	0	186	3383	0	246	3390	1394
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			525		8			2				227
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	391	122	589	28	120	24	690	1703	23	17	1178	298
Shared Lane Traffic (%)												
Lane Group Flow (vph)	391	122	589	28	144	0	690	1726	0	17	1178	298
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		32.0	72.5		40.5	40.5	40.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		26.7%	60.4%		33.8%	33.8%	33.8%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		28.0	68.0		36.0	36.0	36.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	27.1	22.4	22.4	25.5	18.0		82.5	82.0		36.0	36.0	36.0
Actuated g/C Ratio	0.23	0.19	0.19	0.21	0.15		0.69	0.68		0.30	0.30	0.30
v/c Ratio	1.67	0.37	0.83	0.10	0.55		1.05	0.75		0.23	1.16	0.52

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	349.0	45.2	17.4	31.5	50.4		81.6	16.8		41.5	120.8	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	349.0	45.2	17.4	31.5	50.4		81.6	16.8		41.5	120.8	12.4
LOS	F	D	B	C	D		F	B		D	F	B
Approach Delay		138.1			47.3			35.3			98.3	
Approach LOS		F			D			D			F	
Queue Length 50th (m)	~118.6	27.7	14.1	5.3	31.3		140.3	109.7		3.0	~172.6	12.3
Queue Length 95th (m)	#172.9	39.0	54.5	10.6	43.6		#283.6	218.6		10.1	#213.9	38.4
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	234	475	789	285	462		656	2312		73	1017	577
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.67	0.26	0.75	0.10	0.31		1.05	0.75		0.23	1.16	0.52

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.67
Intersection Signal Delay: 75.7 Intersection LOS: E
Intersection Capacity Utilization 114.6% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	999	29	22	1167	23	8	2	77	6	1	118
Future Vol, veh/h	52	999	29	22	1167	23	8	2	77	6	1	118
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	57	1086	32	24	1268	25	9	2	84	7	1	128

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1293	0	0	1117	0	0	1898	2556	559	1986	2559	647
Stage 1	-	-	-	-	-	-	1215	1215	-	1329	1329	-
Stage 2	-	-	-	-	-	-	683	1341	-	657	1230	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	527	-	-	615	-	-	42	26	470	36	26	411
Stage 1	-	-	-	-	-	-	191	250	-	162	220	-
Stage 2	-	-	-	-	-	-	403	218	-	418	246	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	527	-	-	615	-	-	25	22	470	24	22	411
Mov Cap-2 Maneuver	-	-	-	-	-	-	25	22	-	24	22	-
Stage 1	-	-	-	-	-	-	170	223	-	144	211	-
Stage 2	-	-	-	-	-	-	265	209	-	303	219	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.2	62.2	46.7
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	151	527	-	-	615	-	-	215
HCM Lane V/C Ratio	0.626	0.107	-	-	0.039	-	-	0.632
HCM Control Delay (s)	62.2	12.7	-	-	11.1	-	-	46.7
HCM Lane LOS	F	B	-	-	B	-	-	E
HCM 95th %tile Q(veh)	3.4	0.4	-	-	0.1	-	-	3.7

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	1062	1	1	1162	17	1	1	1	6	1	50
Future Vol, veh/h	19	1062	1	1	1162	17	1	1	1	6	1	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	21	1154	1	1	1263	18	1	1	1	7	1	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1282	0	0	1155	0	0	1830	2480	578	1893	2471	641
Stage 1	-	-	-	-	-	-	1196	1196	-	1274	1274	-
Stage 2	-	-	-	-	-	-	634	1284	-	619	1197	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	532	-	-	595	-	-	47	29	457	42	29	415
Stage 1	-	-	-	-	-	-	196	256	-	175	234	-
Stage 2	-	-	-	-	-	-	431	232	-	440	255	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	532	-	-	595	-	-	36	26	457	37	26	415
Mov Cap-2 Maneuver	-	-	-	-	-	-	36	26	-	37	26	-
Stage 1	-	-	-	-	-	-	174	228	-	156	233	-
Stage 2	-	-	-	-	-	-	371	231	-	389	227	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0	93.3	35.7
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	44	532	-	-	595	-	-	178
HCM Lane V/C Ratio	0.074	0.039	-	-	0.002	-	-	0.348
HCM Control Delay (s)	93.3	12	0.6	-	11.1	0	-	35.7
HCM Lane LOS	F	B	A	-	B	A	-	E
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	1.5

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	1038	0	0	1115	23	0	0	0	5	0	65
Future Vol, veh/h	31	1038	0	0	1115	23	0	0	0	5	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	34	1128	0	0	1212	25	0	0	0	5	0	71

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1237	0	0	1128	0	0	1802	2433	564	1856	2420	618
Stage 1	-	-	-	-	-	-	1196	1196	-	1224	1224	-
Stage 2	-	-	-	-	-	-	606	1237	-	632	1196	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	553	-	-	609	-	-	49	31	466	45	32	430
Stage 1	-	-	-	-	-	-	196	256	-	188	248	-
Stage 2	-	-	-	-	-	-	448	244	-	433	256	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	553	-	-	609	-	-	36	26	466	39	27	430
Mov Cap-2 Maneuver	-	-	-	-	-	-	36	26	-	39	27	-
Stage 1	-	-	-	-	-	-	164	214	-	157	248	-
Stage 2	-	-	-	-	-	-	374	244	-	362	214	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0	0	25.5
HCM LOS			A	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	553	-	-	609	-	-	251
HCM Lane V/C Ratio	-	0.061	-	-	-	-	-	0.303
HCM Control Delay (s)	0	11.9	0.9	-	0	-	-	25.5
HCM Lane LOS	A	B	A	-	A	-	-	D
HCM 95th %tile Q(veh)	-	0.2	-	-	0	-	-	1.2

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	1027	1080	14	7	58
Future Vol, veh/h	16	1027	1080	14	7	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	17	1116	1174	15	8	63

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1189	0	-	0	1775	595
Stage 1	-	-	-	-	1182	-
Stage 2	-	-	-	-	593	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	577	-	-	-	73	445
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	512	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	577	-	-	-	67	445
Mov Cap-2 Maneuver	-	-	-	-	67	-
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	22.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	577	-	-	-	277
HCM Lane V/C Ratio	0.03	-	-	-	0.255
HCM Control Delay (s)	11.4	0.4	-	-	22.4
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1

Intersection						
Int Delay, s/veh	0.8					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	1023	1045	15	9	49
Future Vol, veh/h	11	1023	1045	15	9	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	12	1112	1136	16	10	53

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1152	0	-	0	1724	576
Stage 1	-	-	-	-	1144	-
Stage 2	-	-	-	-	580	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	597	-	-	-	79	458
Stage 1	-	-	-	-	264	-
Stage 2	-	-	-	-	520	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	597	-	-	-	75	458
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	264	-
Stage 2	-	-	-	-	492	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	23.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	597	-	-	-	256
HCM Lane V/C Ratio	0.02	-	-	-	0.246
HCM Control Delay (s)	11.2	0.3	-	-	23.6
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.9

Intersection						
Int Delay, s/veh	0.8					
Movement	**EBL**	**EBT**	**WBT**	**WBR**	**SBL**	**SBR**
Lane Configurations						
Traffic Vol, veh/h	20	1012	997	22	2	63
Future Vol, veh/h	20	1012	997	22	2	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	22	1100	1084	24	2	68
Major/Minor	**Major1**		**Major2**		**Minor2**	
Conflicting Flow All	1108	0	-	0	1689	554
Stage 1	-	-	-	-	1096	-
Stage 2	-	-	-	-	593	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	620	-	-	-	84	473
Stage 1	-	-	-	-	280	-
Stage 2	-	-	-	-	512	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	620	-	-	-	76	473
Mov Cap-2 Maneuver	-	-	-	-	76	-
Stage 1	-	-	-	-	280	-
Stage 2	-	-	-	-	465	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	15.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	620	-	-	-	408
HCM Lane V/C Ratio	0.035	-	-	-	0.173
HCM Control Delay (s)	11	0.5	-	-	15.7
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

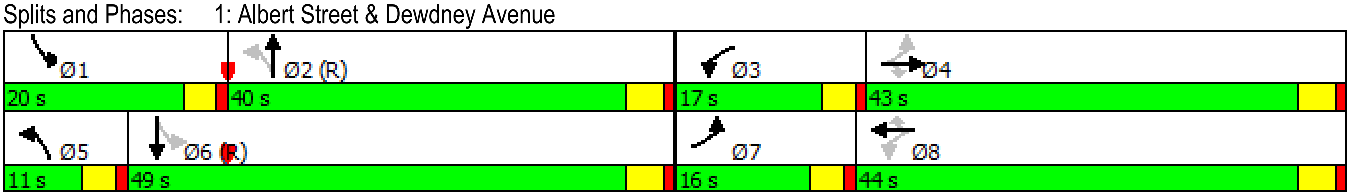
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	950	225	210	685	79	122	588	221	220	1381	112
Future Volume (vph)	144	950	225	210	685	79	122	588	221	220	1381	112
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.97	1.00		0.97	1.00	0.99		0.99	1.00	
Frt			0.850			0.850		0.959			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4625	0	1695	4799	0
Flt Permitted	0.226			0.098			0.106			0.181		
Satd. Flow (perm)	402	3390	1478	175	3390	1477	189	4625	0	321	4799	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			151			123		81			12	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	157	1033	245	228	745	86	133	639	240	239	1501	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	1033	245	228	745	86	133	879	0	239	1623	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		8.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	16.0	43.0	43.0	17.0	44.0	44.0	11.0	40.0		20.0	49.0	
Total Split (%)	13.3%	35.8%	35.8%	14.2%	36.7%	36.7%	9.2%	33.3%		16.7%	40.8%	
Maximum Green (s)	12.0	38.5	38.5	13.0	39.5	39.5	7.0	35.5		16.0	44.5	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	49.0	38.2	38.2	54.0	40.9	40.9	45.3	37.7		55.9	44.6	
Actuated g/C Ratio	0.41	0.32	0.32	0.45	0.34	0.34	0.38	0.31		0.47	0.37	
v/c Ratio	0.57	0.96	0.43	0.94	0.65	0.15	0.83	0.58		0.77	0.91	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	27.8	59.3	14.7	73.5	35.4	6.0	62.9	33.4		37.4	43.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	27.8	59.3	14.7	73.5	35.4	6.0	62.9	33.4		37.4	43.9	
LOS	C	E	B	E	D	A	E	C		D	D	
Approach Delay		48.3			41.2			37.3			43.1	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	21.2	124.6	16.0	34.8	81.7	0.3	17.7	58.8		34.1	130.7	
Queue Length 95th (m)	34.8	#166.8	38.4	#83.7	115.6	7.4	#52.4	73.7		#58.0	151.9	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	299	1087	576	243	1154	584	161	1507		334	1792	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.53	0.95	0.43	0.94	0.65	0.15	0.83	0.58		0.72	0.91	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 43.0 Intersection LOS: D
Intersection Capacity Utilization 92.3% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	365	86	785	7	53	4	635	791	21	13	1169	299
Future Volume (vph)	365	86	785	7	53	4	635	791	21	13	1169	299
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.990			0.996				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1745	0	1695	3377	0	1695	3390	1517
Flt Permitted	0.627			0.697			0.103			0.322		
Satd. Flow (perm)	1114	1784	1517	1244	1745	0	184	3377	0	575	3390	1394
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			504		3			4				235
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	397	93	853	8	58	4	690	860	23	14	1271	325
Shared Lane Traffic (%)												
Lane Group Flow (vph)	397	93	853	8	62	0	690	883	0	14	1271	325
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		30.0	72.5		42.5	42.5	42.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		25.0%	60.4%		35.4%	35.4%	35.4%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		26.0	68.0		38.0	38.0	38.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	42.7	40.8	40.8	33.0	27.6		68.5	68.0		38.0	38.0	38.0
Actuated g/C Ratio	0.36	0.34	0.34	0.28	0.23		0.57	0.57		0.32	0.32	0.32
v/c Ratio	0.85	0.15	1.01	0.02	0.15		1.60	0.46		0.08	1.18	0.54

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	48.2	23.3	49.9	24.9	33.3		306.9	16.2		30.4	129.8	13.2
Queue Delay	0.0	0.0	16.9	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	48.2	23.3	66.8	24.9	33.3		306.9	16.2		30.4	129.8	13.2
LOS	D	C	E	C	C		F	B		C	F	B
Approach Delay		58.3			32.3			143.7			105.4	
Approach LOS		E			C			F			F	
Queue Length 50th (m)	87.8	12.4	146.8	1.2	10.6		~217.8	60.8		2.3	~189.3	15.5
Queue Length 95th (m)	#160.7	m28.1	#215.4	4.5	21.7		#289.6	76.1		7.5	#231.1	43.3
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	465	606	848	368	467		432	1915		182	1073	602
Starvation Cap Reductn	0	0	42	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.85	0.15	1.06	0.02	0.13		1.60	0.46		0.08	1.18	0.54

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.60

Intersection Signal Delay: 103.6 Intersection LOS: F

Intersection Capacity Utilization 110.1% ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Splits and Phases: 8: Broad Street & Dewdney Avenue

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	1332	32	59	953	15	1	2	26	4	2	21
Future Vol, veh/h	27	1332	32	59	953	15	1	2	26	4	2	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	29	1448	35	64	1036	16	1	2	28	4	2	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1052	0	0	1483	0	0	2171	2704	741	1956	2713	526
Stage 1	-	-	-	-	-	-	1524	1524	-	1172	1172	-
Stage 2	-	-	-	-	-	-	647	1180	-	784	1541	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	651	-	-	445	-	-	26	21	356	38	20	494
Stage 1	-	-	-	-	-	-	122	177	-	203	262	-
Stage 2	-	-	-	-	-	-	424	260	-	350	174	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	651	-	-	445	-	-	19	17	356	27	16	494
Mov Cap-2 Maneuver	-	-	-	-	-	-	19	17	-	27	16	-
Stage 1	-	-	-	-	-	-	117	169	-	194	224	-
Stage 2	-	-	-	-	-	-	343	223	-	304	166	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.8	45.8	67.2
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	119	651	-	-	445	-	-	86
HCM Lane V/C Ratio	0.265	0.045	-	-	0.144	-	-	0.341
HCM Control Delay (s)	45.8	10.8	-	-	14.4	-	-	67.2
HCM Lane LOS	E	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1	0.1	-	-	0.5	-	-	1.3

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	1263	14	32	994	8	5	0	30	4	0	13
Future Vol, veh/h	15	1263	14	32	994	8	5	0	30	4	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	300	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	16	1373	15	35	1080	9	5	0	33	4	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1089	0	0	1388	0	0	2023	2572	694	1873	2575	545
Stage 1	-	-	-	-	-	-	1413	1413	-	1154	1154	-
Stage 2	-	-	-	-	-	-	610	1159	-	719	1421	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	631	-	-	484	-	-	34	25	383	44	25	480
Stage 1	-	-	-	-	-	-	144	201	-	208	268	-
Stage 2	-	-	-	-	-	-	446	266	-	383	199	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	631	-	-	484	-	-	31	23	383	37	23	480
Mov Cap-2 Maneuver	-	-	-	-	-	-	31	23	-	37	23	-
Stage 1	-	-	-	-	-	-	140	196	-	203	249	-
Stage 2	-	-	-	-	-	-	402	247	-	342	194	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	38.1	38.4
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	146	631	-	-	484	-	-	126
HCM Lane V/C Ratio	0.261	0.026	-	-	0.072	-	-	0.147
HCM Control Delay (s)	38.1	10.9	-	-	13	-	-	38.4
HCM Lane LOS	E	B	-	-	B	-	-	E
HCM 95th %tile Q(veh)	1	0.1	-	-	0.2	-	-	0.5

Intersection	
Int Delay, s/veh	9.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	1215	65	15	970	7	43	0	10	2	0	21
Future Vol, veh/h	17	1215	65	15	970	7	43	0	10	2	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	300	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	18	1321	71	16	1054	8	47	0	11	2	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1062	0	0	1391	0	0	1953	2488	696	1788	2519	531
Stage 1	-	-	-	-	-	-	1393	1393	-	1091	1091	-
Stage 2	-	-	-	-	-	-	560	1095	-	697	1428	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	646	-	-	483	-	-	~ 38	28	382	51	27	490
Stage 1	-	-	-	-	-	-	148	205	-	227	287	-
Stage 2	-	-	-	-	-	-	478	286	-	395	197	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	646	-	-	483	-	-	~ 35	26	382	47	25	490
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 35	26	-	47	25	-
Stage 1	-	-	-	-	-	-	144	199	-	221	277	-
Stage 2	-	-	-	-	-	-	441	277	-	373	192	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.2	$ 419.1	19.8
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	42	646	-	-	483	-	-	269
HCM Lane V/C Ratio	1.372	0.029	-	-	0.034	-	-	0.093
HCM Control Delay (s)	$ 419.1	10.7	-	-	12.7	-	-	19.8
HCM Lane LOS	F	B	-	-	B	-	-	C
HCM 95th %tile Q(veh)	5.7	0.1	-	-	0.1	-	-	0.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	27	1235	963	23	1	18
Future Vol, veh/h	27	1235	963	23	1	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	300	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	29	1342	1047	25	1	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1072	0	-	0	1789	536
Stage 1	-	-	-	-	1059	-
Stage 2	-	-	-	-	730	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	640	-	-	-	72	486
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	435	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	640	-	-	-	69	486
Mov Cap-2 Maneuver	-	-	-	-	69	-
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	415	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	15.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	640	-	-	-	369
HCM Lane V/C Ratio	0.046	-	-	-	0.056
HCM Control Delay (s)	10.9	-	-	-	15.3
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

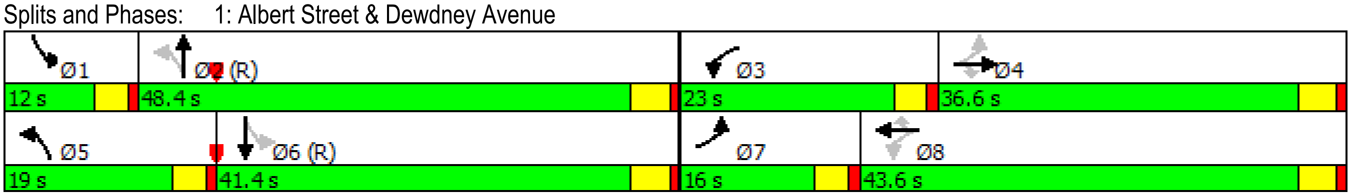
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	794	165	395	929	203	265	1338	284	169	1047	158
Future Volume (vph)	164	794	165	395	929	203	265	1338	284	169	1047	158
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.97	1.00		0.97		0.99			0.99	
Frt			0.850			0.850		0.974			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4714	0	1695	4742	0
Flt Permitted	0.125			0.111			0.098			0.108		
Satd. Flow (perm)	223	3390	1478	198	3390	1477	175	4714	0	193	4742	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159			123		43			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	178	863	179	429	1010	221	288	1454	309	184	1138	172
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	863	179	429	1010	221	288	1763	0	184	1310	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		8.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	16.0	36.6	36.6	23.0	43.6	43.6	19.0	48.4		12.0	41.4	
Total Split (%)	13.3%	30.5%	30.5%	19.2%	36.3%	36.3%	15.8%	40.3%		10.0%	34.5%	
Maximum Green (s)	12.0	32.1	32.1	19.0	39.1	39.1	15.0	43.9		8.0	36.9	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	43.5	31.9	31.9	55.4	39.8	39.8	56.6	43.9		45.6	36.9	
Actuated g/C Ratio	0.36	0.27	0.27	0.46	0.33	0.33	0.47	0.37		0.38	0.31	
v/c Ratio	0.82	0.96	0.35	1.31	0.90	0.39	1.05	1.01		1.05	0.89	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	55.6	65.1	9.3	185.5	52.3	18.4	99.9	60.4		109.9	47.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	55.6	65.1	9.3	185.5	52.3	18.4	99.9	60.4		109.9	47.5	
LOS	E	E	A	F	D	B	F	E		F	D	
Approach Delay		55.6			82.2			65.9			55.2	
Approach LOS		E			F			E			E	
Queue Length 50th (m)	25.6	105.4	3.5	~117.8	133.1	19.7	~59.3	~150.3		~32.2	105.7	
Queue Length 95th (m)	#59.9	#144.8	21.0	#174.6	#163.0	44.3	#113.6	#186.6		#77.9	124.9	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	230	906	511	328	1123	571	275	1751		176	1474	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.77	0.95	0.35	1.31	0.90	0.39	1.05	1.01		1.05	0.89	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 125
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.31
Intersection Signal Delay: 65.7 Intersection LOS: E
Intersection Capacity Utilization 105.8% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	419	117	643	26	113	22	708	1567	21	16	1084	342
Future Volume (vph)	419	117	643	26	113	22	708	1567	21	16	1084	342
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.976			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1715	0	1695	3383	0	1695	3390	1517
Flt Permitted	0.508			0.676			0.099			0.122		
Satd. Flow (perm)	903	1784	1517	1206	1715	0	177	3383	0	218	3390	1394
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			495		8			2				290
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	455	127	699	28	123	24	770	1703	23	17	1178	372
Shared Lane Traffic (%)												
Lane Group Flow (vph)	455	127	699	28	147	0	770	1726	0	17	1178	372
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		30.0	72.5		42.5	42.5	42.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		25.0%	60.4%		35.4%	35.4%	35.4%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		26.0	68.0		38.0	38.0	38.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	33.2	28.5	28.5	31.6	24.1		76.4	75.9		38.0	38.0	38.0
Actuated g/C Ratio	0.28	0.24	0.24	0.26	0.20		0.64	0.63		0.32	0.32	0.32
v/c Ratio	1.54	0.30	0.95	0.08	0.42		1.42	0.81		0.25	1.10	0.58

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	285.1	31.0	34.7	26.7	40.9		229.8	22.5		41.6	97.2	12.0
Queue Delay	0.0	0.0	6.4	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	285.1	31.0	41.1	26.7	40.9		229.8	22.5		41.6	97.2	12.0
LOS	F	C	D	C	D		F	C		D	F	B
Approach Delay		126.8			38.7			86.5			76.4	
Approach LOS		F			D			F			E	
Queue Length 50th (m)	~142.2	25.1	91.8	4.3	26.2		~258.9	180.2		3.0	~165.3	14.0
Queue Length 95th (m)	#206.0	38.0	#138.1	10.6	44.3		#332.7	218.6		10.2	#206.6	44.2
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	295	475	767	345	463		541	2140		69	1073	639
Starvation Cap Reductn	0	0	47	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.54	0.27	0.97	0.08	0.32		1.42	0.81		0.25	1.10	0.58

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.54
Intersection Signal Delay: 91.4 Intersection LOS: F
Intersection Capacity Utilization 122.3% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue

Intersection	
Int Delay, s/veh	14.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	1166	29	22	1400	23	8	2	77	6	1	118
Future Vol, veh/h	52	1166	29	22	1400	23	8	2	77	6	1	118
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	57	1267	32	24	1522	25	9	2	84	7	1	128

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1547	0	0	1299	0	0	2205	2991	649	2330	2994	773
Stage 1	-	-	-	-	-	-	1396	1396	-	1582	1582	-
Stage 2	-	-	-	-	-	-	809	1595	-	748	1412	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	420	-	-	524	-	-	24	13	410	19	13	340
Stage 1	-	-	-	-	-	-	147	204	-	112	166	-
Stage 2	-	-	-	-	-	-	338	163	-	368	201	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	420	-	-	524	-	-	12	11	410	11	11	340
Mov Cap-2 Maneuver	-	-	-	-	-	-	12	11	-	11	11	-
Stage 1	-	-	-	-	-	-	127	176	-	97	158	-
Stage 2	-	-	-	-	-	-	199	156	-	250	174	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.2	226.2	166.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	84	420	-	-	524	-	-	127
HCM Lane V/C Ratio	1.126	0.135	-	-	0.046	-	-	1.07
HCM Control Delay (s)	226.2	14.9	-	-	12.2	-	-	166.9
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	6.7	0.5	-	-	0.1	-	-	7.7

Intersection	
Int Delay, s/veh	22.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	1172	9	32	1250	23	39	0	44	5	0	65
Future Vol, veh/h	31	1172	9	32	1250	23	39	0	44	5	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	300	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	34	1274	10	35	1359	25	42	0	48	5	0	71

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1384	0	0	1284	0	0	2095	2799	642	2145	2792	692
Stage 1	-	-	-	-	-	-	1346	1346	-	1441	1441	-
Stage 2	-	-	-	-	-	-	749	1453	-	704	1351	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	486	-	-	531	-	-	~ 30	18	414	27	18	384
Stage 1	-	-	-	-	-	-	158	216	-	138	194	-
Stage 2	-	-	-	-	-	-	368	192	-	391	215	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	486	-	-	531	-	-	~ 22	16	414	21	16	384
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 22	16	-	21	16	-
Stage 1	-	-	-	-	-	-	147	201	-	128	181	-
Stage 2	-	-	-	-	-	-	280	179	-	322	200	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.3	$ 685.6	41.6
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	44	486	-	-	531	-	-	172
HCM Lane V/C Ratio	2.05	0.069	-	-	0.066	-	-	0.442
HCM Control Delay (s)	$ 685.6	13	-	-	12.3	-	-	41.6
HCM Lane LOS	F	B	-	-	B	-	-	E
HCM 95th %tile Q(veh)	9.4	0.2	-	-	0.2	-	-	2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection												
Int Delay, s/veh	38.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	1144	57	17	1176	14	72	0	20	7	0	58
Future Vol, veh/h	16	1144	57	17	1176	14	72	0	20	7	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	300	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	17	1243	62	18	1278	15	78	0	22	8	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1293	0	0	1305	0	0	1985	2639	653	1980	2663	647
Stage 1	-	-	-	-	-	-	1309	1309	-	1323	1323	-
Stage 2	-	-	-	-	-	-	676	1330	-	657	1340	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	527	-	-	521	-	-	~ 36	23	408	36	22	411
Stage 1	-	-	-	-	-	-	167	225	-	163	222	-
Stage 2	-	-	-	-	-	-	407	220	-	418	218	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	527	-	-	521	-	-	~ 29	21	408	32	21	411
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 29	21	-	32	21	-
Stage 1	-	-	-	-	-	-	162	218	-	158	214	-
Stage 2	-	-	-	-	-	-	333	212	-	383	211	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	$ 1038.9	37.1
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	36	527	-	-	521	-	-	181
HCM Lane V/C Ratio	2.778	0.033	-	-	0.035	-	-	0.39
HCM Control Delay (s)	$ 1038.9	12.1	-	-	12.2	-	-	37.1
HCM Lane LOS	F	B	-	-	B	-	-	E
HCM 95th %tile Q(veh)	11.3	0.1	-	-	0.1	-	-	1.7

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	1178	1141	22	2	63
Future Vol, veh/h	20	1178	1141	22	2	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	300	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	22	1280	1240	24	2	68

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1264	0	-	0	1936	632
Stage 1	-	-	-	-	1252	-
Stage 2	-	-	-	-	684	-
Critical Hdwy	4.16	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	2.23	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	540	-	-	-	57	421
Stage 1	-	-	-	-	231	-
Stage 2	-	-	-	-	460	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	540	-	-	-	55	421
Mov Cap-2 Maneuver	-	-	-	-	55	-
Stage 1	-	-	-	-	231	-
Stage 2	-	-	-	-	441	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	17.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	540	-	-	-	349
HCM Lane V/C Ratio	0.04	-	-	-	0.202
HCM Control Delay (s)	11.9	-	-	-	17.9
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7

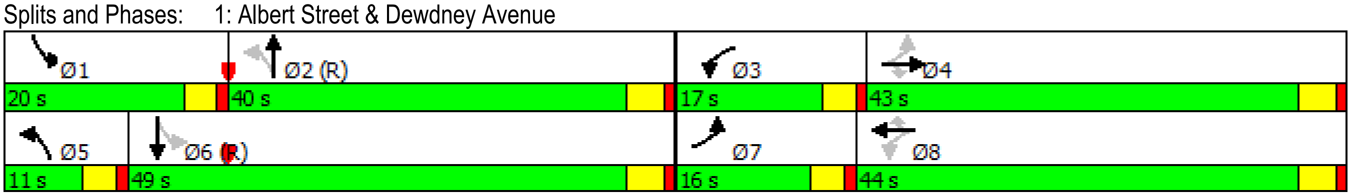
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	950	225	210	685	79	122	588	221	220	1381	112
Future Volume (vph)	144	950	225	210	685	79	122	588	221	220	1381	112
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.97	1.00		0.97	1.00	0.99		0.99	1.00	
Frt			0.850			0.850		0.959			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4625	0	1695	4799	0
Flt Permitted	0.226			0.098			0.106			0.181		
Satd. Flow (perm)	402	3390	1478	175	3390	1477	189	4625	0	321	4799	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			151			123		81			12	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	157	1033	245	228	745	86	133	639	240	239	1501	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	1033	245	228	745	86	133	879	0	239	1623	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		8.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	16.0	43.0	43.0	17.0	44.0	44.0	11.0	40.0		20.0	49.0	
Total Split (%)	13.3%	35.8%	35.8%	14.2%	36.7%	36.7%	9.2%	33.3%		16.7%	40.8%	
Maximum Green (s)	12.0	38.5	38.5	13.0	39.5	39.5	7.0	35.5		16.0	44.5	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	49.0	38.2	38.2	54.0	40.9	40.9	45.3	37.7		55.9	44.6	
Actuated g/C Ratio	0.41	0.32	0.32	0.45	0.34	0.34	0.38	0.31		0.47	0.37	
v/c Ratio	0.57	0.96	0.43	0.94	0.65	0.15	0.83	0.58		0.77	0.91	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	27.8	59.3	14.7	75.1	36.8	2.3	62.9	33.4		37.4	43.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	27.8	59.3	14.7	75.1	36.8	2.3	62.9	33.4		37.4	43.9	
LOS	C	E	B	E	D	A	E	C		D	D	
Approach Delay		48.3			42.3			37.3			43.1	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	21.2	124.6	16.0	38.7	77.9	0.0	17.7	58.8		34.1	130.7	
Queue Length 95th (m)	34.8	#166.8	38.4	#87.4	100.2	4.8	#52.4	73.7		#58.0	151.9	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	299	1087	576	243	1154	584	161	1507		334	1792	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.53	0.95	0.43	0.94	0.65	0.15	0.83	0.58		0.72	0.91	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 43.2 Intersection LOS: D
Intersection Capacity Utilization 92.3% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	365	86	785	7	53	4	635	791	21	13	1169	299
Future Volume (vph)	365	86	785	7	53	4	635	791	21	13	1169	299
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.990			0.996				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1745	0	1695	3377	0	1695	3390	1517
Flt Permitted	0.627			0.697			0.103			0.322		
Satd. Flow (perm)	1114	1784	1517	1244	1745	0	184	3377	0	575	3390	1394
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			504		3			4				235
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	397	93	853	8	58	4	690	860	23	14	1271	325
Shared Lane Traffic (%)												
Lane Group Flow (vph)	397	93	853	8	62	0	690	883	0	14	1271	325
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		30.0	72.5		42.5	42.5	42.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		25.0%	60.4%		35.4%	35.4%	35.4%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		26.0	68.0		38.0	38.0	38.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	42.7	40.8	40.8	33.0	27.6		68.5	68.0		38.0	38.0	38.0
Actuated g/C Ratio	0.36	0.34	0.34	0.28	0.23		0.57	0.57		0.32	0.32	0.32
v/c Ratio	0.85	0.15	1.01	0.02	0.15		1.60	0.46		0.08	1.18	0.54

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	54.4	29.8	49.5	24.9	33.3		306.9	16.2		30.4	129.8	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	54.4	29.8	49.5	24.9	33.3		306.9	16.2		30.4	129.8	13.2
LOS	D	C	D	C	C		F	B		C	F	B
Approach Delay		49.6			32.3			143.7			105.4	
Approach LOS		D			C			F			F	
Queue Length 50th (m)	77.2	14.7	105.1	1.2	10.6		~217.8	60.8		2.3	~189.3	15.5
Queue Length 95th (m)	#156.2	30.8	#210.6	4.5	21.7		#289.6	76.1		7.5	#231.1	43.3
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	465	606	848	368	467		432	1915		182	1073	602
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.85	0.15	1.01	0.02	0.13		1.60	0.46		0.08	1.18	0.54

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.60
Intersection Signal Delay: 101.1 Intersection LOS: F
Intersection Capacity Utilization 110.1% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	1332	32	59	953	15	1	2	26	4	2	21
Future Vol, veh/h	27	1332	32	59	953	15	1	2	26	4	2	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	29	1448	35	64	1036	16	1	2	28	4	2	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1052	0	0	1483	0	0	2171	2704	741	1956	2713	526
Stage 1	-	-	-	-	-	-	1524	1524	-	1172	1172	-
Stage 2	-	-	-	-	-	-	647	1180	-	784	1541	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	651	-	-	445	-	-	26	21	356	38	20	494
Stage 1	-	-	-	-	-	-	122	177	-	203	262	-
Stage 2	-	-	-	-	-	-	424	260	-	350	174	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	651	-	-	445	-	-	19	17	356	27	16	494
Mov Cap-2 Maneuver	-	-	-	-	-	-	19	17	-	27	16	-
Stage 1	-	-	-	-	-	-	117	169	-	194	224	-
Stage 2	-	-	-	-	-	-	343	223	-	304	166	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.8	39.7	60.2
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	18	356	651	-	-	445	-	-	22	494
HCM Lane V/C Ratio	0.181	0.079	0.045	-	-	0.144	-	-	0.296	0.046
HCM Control Delay (s)	244.9	16	10.8	-	-	14.4	-	-	226.9	12.6
HCM Lane LOS	F	C	B	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	0.5	0.3	0.1	-	-	0.5	-	-	0.9	0.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1255	14	0	967	8	0	0	30	0	0	13
Future Vol, veh/h	0	1255	14	0	967	8	0	0	30	0	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	1364	15	0	1051	9	0	0	33	0	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	1898	2432	690	1737	2434	530
Stage 1	-	-	-	-	-	-	1372	1372	-	1055	1055	-
Stage 2	-	-	-	-	-	-	526	1060	-	682	1379	-
Critical Hdwy	-	-	-	-	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	-	-	-	-	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	0	-	-	0	-	-	42	31	385	55	31	491
Stage 1	0	-	-	0	-	-	152	210	-	239	298	-
Stage 2	0	-	-	0	-	-	501	297	-	404	208	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	41	31	385	50	31	491
Mov Cap-2 Maneuver	-	-	-	-	-	-	41	31	-	50	31	-
Stage 1	-	-	-	-	-	-	152	210	-	239	298	-
Stage 2	-	-	-	-	-	-	487	297	-	370	208	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	15.2	12.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	385	-	-	-	-	491
HCM Lane V/C Ratio	0.085	-	-	-	-	0.029
HCM Control Delay (s)	15.2	-	-	-	-	12.5
HCM Lane LOS	C	-	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1220	65	0	954	7	0	0	10	0	0	21
Future Vol, veh/h	0	1220	65	0	954	7	0	0	10	0	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	1326	71	0	1037	8	0	0	11	0	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	1879	2406	698	1704	2438	522
Stage 1	-	-	-	-	-	-	1361	1361	-	1041	1041	-
Stage 2	-	-	-	-	-	-	518	1045	-	663	1397	-
Critical Hdwy	-	-	-	-	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	-	-	-	-	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	0	-	-	0	-	-	43	32	381	59	31	497
Stage 1	0	-	-	0	-	-	155	213	-	244	303	-
Stage 2	0	-	-	0	-	-	506	302	-	414	204	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	41	32	381	57	31	497
Mov Cap-2 Maneuver	-	-	-	-	-	-	41	32	-	57	31	-
Stage 1	-	-	-	-	-	-	155	213	-	244	303	-
Stage 2	-	-	-	-	-	-	483	302	-	402	204	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	14.7	12.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	381	-	-	-	-	497
HCM Lane V/C Ratio	0.029	-	-	-	-	0.046
HCM Control Delay (s)	14.7	-	-	-	-	12.6
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.1

Intersection						
Int Delay, s/veh	0.1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑→		Y	
Traffic Vol, veh/h	0	1236	963	23	0	18
Future Vol, veh/h	0	1236	963	23	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	1343	1047	25	0	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	1731	536
Stage 1	-	-	-	-	1059	-
Stage 2	-	-	-	-	672	-
Critical Hdwy	-	-	-	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	-	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	0	-	-	-	78	486
Stage 1	0	-	-	-	292	-
Stage 2	0	-	-	-	466	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	78	486
Mov Cap-2 Maneuver	-	-	-	-	78	-
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	466	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	486
HCM Lane V/C Ratio	-	-	-	0.04
HCM Control Delay (s)	-	-	-	12.7
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

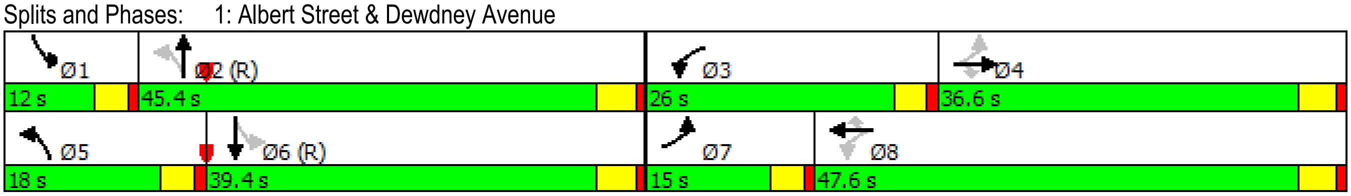
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	794	165	395	929	203	265	1338	284	169	1047	158
Future Volume (vph)	164	794	165	395	929	203	265	1338	284	169	1047	158
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00		0.97	1.00		0.97		0.99			0.99	
Frt			0.850			0.850		0.974			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4714	0	1695	4742	0
Flt Permitted	0.157			0.112			0.103			0.115		
Satd. Flow (perm)	279	3390	1478	199	3390	1477	184	4714	0	205	4742	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159			123		42			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	173	836	174	416	978	214	279	1408	299	178	1102	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	173	836	174	416	978	214	279	1707	0	178	1268	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		7.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	15.0	36.6	36.6	26.0	47.6	47.6	18.0	45.4		12.0	39.4	
Total Split (%)	12.5%	30.5%	30.5%	21.7%	39.7%	39.7%	15.0%	37.8%		10.0%	32.8%	
Maximum Green (s)	11.0	32.1	32.1	22.0	43.1	43.1	14.0	40.9		8.0	34.9	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	42.4	31.5	31.5	58.0	43.2	43.2	54.0	40.9		44.0	34.9	
Actuated g/C Ratio	0.35	0.26	0.26	0.48	0.36	0.36	0.45	0.34		0.37	0.29	
v/c Ratio	0.78	0.94	0.34	1.12	0.80	0.35	1.05	1.04		0.98	0.91	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	48.1	62.2	8.8	118.1	40.7	13.6	100.6	72.8		92.1	50.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	48.1	62.2	8.8	118.1	40.7	13.6	100.6	72.8		92.1	50.7	
LOS	D	E	A	F	D	B	F	E		F	D	
Approach Delay		52.3			57.1			76.7			55.8	
Approach LOS		D			E			E			E	
Queue Length 50th (m)	22.5	101.0	2.6	~97.8	108.3	14.5	~58.3	~157.3		~29.3	103.6	
Queue Length 95th (m)	#52.5	#137.6	19.7	#159.6	134.2	33.7	#111.7	#187.2		#74.3	#129.8	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	230	906	511	370	1220	610	266	1634		181	1396	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.75	0.92	0.34	1.12	0.80	0.35	1.05	1.04		0.98	0.91	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 125
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.12
Intersection Signal Delay: 62.1 Intersection LOS: E
Intersection Capacity Utilization 105.8% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	423	117	648	26	113	22	708	1567	21	16	1084	342
Future Volume (vph)	423	117	648	26	113	22	708	1567	21	16	1084	342
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00							0.92
Frt			0.850		0.976			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1715	0	1695	3383	0	1695	3390	1517
Flt Permitted	0.501			0.678			0.107			0.146		
Satd. Flow (perm)	891	1784	1517	1210	1715	0	191	3383	0	261	3390	1394
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			541		8			2				279
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
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
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	445	123	682	27	119	23	745	1649	22	17	1141	360
Shared Lane Traffic (%)												
Lane Group Flow (vph)	445	123	682	27	142	0	745	1671	0	17	1141	360
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		33.0	72.5		39.5	39.5	39.5
Total Split (%)	9.2%	30.4%	30.4%	9.2%	30.4%		27.5%	60.4%		32.9%	32.9%	32.9%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		29.0	68.0		35.0	35.0	35.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	31.1	26.4	26.4	29.5	22.0		78.5	78.0		35.0	35.0	35.0
Actuated g/C Ratio	0.26	0.22	0.22	0.25	0.18		0.65	0.65		0.29	0.29	0.29
v/c Ratio	1.61	0.31	0.90	0.08	0.44		1.22	0.76		0.22	1.15	0.60

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	318.0	40.2	25.9	27.8	42.9		141.9	19.6		41.4	120.2	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	318.0	40.2	25.9	27.8	42.9		141.9	19.6		41.4	120.2	13.2
LOS	F	D	C	C	D		F	B		D	F	B
Approach Delay		131.3			40.5			57.3			93.9	
Approach LOS		F			D			E			F	
Queue Length 50th (m)	~148.0	24.9	35.9	4.5	27.5		~209.5	141.8		3.1	~166.7	14.4
Queue Length 95th (m)	#196.9	39.2	#107.6	10.4	42.9		#308.9	204.8		10.1	#208.0	45.2
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	277	475	801	325	463		613	2198		76	988	604
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.61	0.26	0.85	0.08	0.31		1.22	0.76		0.22	1.15	0.60

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.61
Intersection Signal Delay: 84.5 Intersection LOS: F
Intersection Capacity Utilization 122.6% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Broad Street & Dewdney Avenue

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	1166	29	22	1400	23	8	2	77	6	1	118
Future Vol, veh/h	52	1166	29	22	1400	23	8	2	77	6	1	118
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	55	1227	31	23	1474	24	8	2	81	6	1	124

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1498	0	0	1258	0	0	2136	2896	629	2256	2899	749
Stage 1	-	-	-	-	-	-	1352	1352	-	1532	1532	-
Stage 2	-	-	-	-	-	-	784	1544	-	724	1367	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	439	-	-	543	-	-	27	15	423	22	15	352
Stage 1	-	-	-	-	-	-	157	215	-	121	175	-
Stage 2	-	-	-	-	-	-	350	173	-	381	211	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	439	-	-	543	-	-	14	13	423	14	13	352
Mov Cap-2 Maneuver	-	-	-	-	-	-	14	13	-	14	13	-
Stage 1	-	-	-	-	-	-	137	188	-	106	168	-
Stage 2	-	-	-	-	-	-	216	166	-	266	185	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.2	71.9	43.3
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	14	423	439	-	-	543	-	-	14	352
HCM Lane V/C Ratio	0.752	0.192	0.125	-	-	0.043	-	-	0.526	0.353
HCM Control Delay (s)	$ 506.5	15.5	14.4	-	-	11.9	-	-	$ 424.4	20.7
HCM Lane LOS	F	C	B	-	-	B	-	-	F	C
HCM 95th %tile Q(veh)	1.8	0.7	0.4	-	-	0.1	-	-	1.3	1.6

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1165	9	0	1229	23	0	0	44	0	0	65
Future Vol, veh/h	0	1165	9	0	1229	23	0	0	44	0	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	1226	9	0	1294	24	0	0	46	0	0	68

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	1878	2549	618	1919	2542	659
Stage 1	-	-	-	-	-	-	1231	1231	-	1306	1306	-
Stage 2	-	-	-	-	-	-	647	1318	-	613	1236	-
Critical Hdwy	-	-	-	-	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	-	-	-	-	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	0	-	-	0	-	-	43	26	430	40	26	404
Stage 1	0	-	-	0	-	-	186	246	-	167	226	-
Stage 2	0	-	-	0	-	-	424	223	-	444	245	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	36	26	430	36	26	404
Mov Cap-2 Maneuver	-	-	-	-	-	-	36	26	-	36	26	-
Stage 1	-	-	-	-	-	-	186	246	-	167	226	-
Stage 2	-	-	-	-	-	-	352	223	-	396	245	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	14.4	15.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	430	-	-	-	-	404
HCM Lane V/C Ratio	0.108	-	-	-	-	0.169
HCM Control Delay (s)	14.4	-	-	-	-	15.7
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1152	57	0	1194	14	0	0	20	0	0	58
Future Vol, veh/h	0	1152	57	0	1194	14	0	0	20	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	1213	60	0	1257	15	0	0	21	0	0	61

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	1871	2515	636	1870	2537	636
Stage 1	-	-	-	-	-	-	1243	1243	-	1264	1264	-
Stage 2	-	-	-	-	-	-	628	1272	-	606	1273	-
Critical Hdwy	-	-	-	-	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	-	-	-	-	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	0	-	-	0	-	-	44	27	418	44	26	418
Stage 1	0	-	-	0	-	-	183	243	-	178	237	-
Stage 2	0	-	-	0	-	-	435	235	-	448	235	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	38	27	418	42	26	418
Mov Cap-2 Maneuver	-	-	-	-	-	-	38	27	-	42	26	-
Stage 1	-	-	-	-	-	-	183	243	-	178	237	-
Stage 2	-	-	-	-	-	-	371	235	-	425	235	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	14.1	15.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	418	-	-	-	-	418
HCM Lane V/C Ratio	0.05	-	-	-	-	0.146
HCM Control Delay (s)	14.1	-	-	-	-	15.1
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1188	1141	22	0	63
Future Vol, veh/h	0	1188	1141	22	0	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	1251	1201	23	0	66

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	1838	612
Stage 1	-	-	-	-	1213	-
Stage 2	-	-	-	-	625	-
Critical Hdwy	-	-	-	-	7.56	6.96
Critical Hdwy Stg 1	-	-	-	-	6.56	-
Critical Hdwy Stg 2	-	-	-	-	6.56	-
Follow-up Hdwy	-	-	-	-	3.53	3.33
Pot Cap-1 Maneuver	0	-	-	-	46	434
Stage 1	0	-	-	-	191	-
Stage 2	0	-	-	-	437	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	46	434
Mov Cap-2 Maneuver	-	-	-	-	46	-
Stage 1	-	-	-	-	191	-
Stage 2	-	-	-	-	437	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	434
HCM Lane V/C Ratio	-	-	-	0.153
HCM Control Delay (s)	-	-	-	14.8
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.5

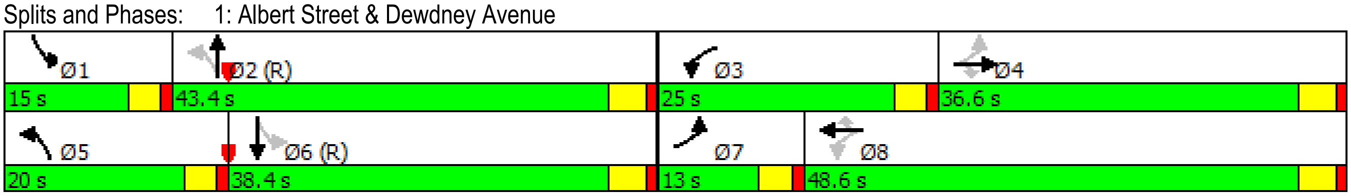
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	794	165	395	929	203	265	1338	284	169	1047	158
Future Volume (vph)	164	794	165	395	929	203	265	1338	284	169	1047	158
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		50.0	30.0		30.0	90.0		0.0	75.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	20.0			25.0			35.0			40.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	0.99		0.97	1.00		0.97	0.99	0.99		1.00	0.99	
Frt			0.850			0.850		0.974			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	4714	0	1695	4742	0
Flt Permitted	0.288			0.151			0.203			0.136		
Satd. Flow (perm)	511	3390	1478	268	3390	1477	360	4714	0	242	4742	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159			123		41			23	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		458.3			110.3			220.1			211.9	
Travel Time (s)		33.0			7.9			15.8			15.3	
Confl. Peds. (#/hr)	13		12	12		13	32		20	20		32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	125	604	126	301	707	154	202	1018	216	129	797	120
Shared Lane Traffic (%)												
Lane Group Flow (vph)	125	604	126	301	707	154	202	1234	0	129	917	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	15.0		7.0	15.0	
Minimum Split (s)	11.0	36.5	36.5	11.0	36.5	36.5	11.0	33.5		12.0	33.5	
Total Split (s)	13.0	36.6	36.6	25.0	48.6	48.6	20.0	43.4		15.0	38.4	
Total Split (%)	10.8%	30.5%	30.5%	20.8%	40.5%	40.5%	16.7%	36.2%		12.5%	32.0%	
Maximum Green (s)	9.0	32.1	32.1	21.0	44.1	44.1	16.0	38.9		11.0	33.9	
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5		3.0	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5		4.0	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0		10.0	10.0		10.0			10.0	
Flash Dont Walk (s)		22.0	22.0		22.0	22.0		19.0			19.0	
Pedestrian Calls (#/hr)		10	10		10	10		10			20	
Act Effct Green (s)	35.5	26.4	26.4	50.0	37.0	37.0	60.7	48.1		55.0	45.2	
Actuated g/C Ratio	0.30	0.22	0.22	0.42	0.31	0.31	0.51	0.40		0.46	0.38	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.53	0.81	0.28	0.89	0.68	0.29	0.64	0.64		0.58	0.51	
Control Delay	30.5	53.2	4.0	56.8	39.2	8.8	27.1	31.4		29.3	31.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	30.5	53.2	4.0	56.8	39.2	8.8	27.1	31.4		29.3	31.1	
LOS	C	D	A	E	D	A	C	C		C	C	
Approach Delay		42.6			39.7			30.8			30.9	
Approach LOS		D			D			C			C	
Queue Length 50th (m)	17.8	71.3	0.0	50.9	75.4	5.1	25.9	83.9		15.8	60.2	
Queue Length 95th (m)	27.4	86.5	8.0	#88.3	88.3	18.6	45.3	111.5		31.4	83.7	
Internal Link Dist (m)		434.3			86.3			196.1			187.9	
Turn Bay Length (m)	30.0		50.0	30.0		30.0	90.0			75.0		
Base Capacity (vph)	241	906	511	361	1245	620	363	1915		249	1801	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.52	0.67	0.25	0.83	0.57	0.25	0.56	0.64		0.52	0.51	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 35.4 Intersection LOS: D
Intersection Capacity Utilization 85.0% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Dewdney Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	423	117	648	26	113	22	708	1567	21	16	1084	342
Future Volume (vph)	423	117	648	26	113	22	708	1567	21	16	1084	342
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	10.0		0.0	35.0		60.0	45.0		0.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	23.0			10.0			25.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00				1.00		0.98					0.87
Frt			0.850		0.975			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	1695	1713	0	1695	3383	0	1695	3390	1517
Flt Permitted	0.525			0.699			0.121			0.233		
Satd. Flow (perm)	933	1784	1517	1247	1713	0	212	3383	0	416	3390	1326
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			493		9			2				260
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		105.7			332.1			329.7			294.1	
Travel Time (s)		7.6			23.9			23.7			21.2	
Confl. Peds. (#/hr)	4					4	51					51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	322	89	493	20	86	17	539	1192	16	12	825	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	89	493	20	103	0	539	1208	0	12	825	260
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	15.0		15.0	15.0	15.0
Minimum Split (s)	11.0	14.5	14.5	11.0	36.5		11.0	19.5		30.5	30.5	30.5
Total Split (s)	11.0	36.5	36.5	11.0	36.5		31.0	62.5		31.5	31.5	31.5
Total Split (%)	10.0%	33.2%	33.2%	10.0%	33.2%		28.2%	56.8%		28.6%	28.6%	28.6%
Maximum Green (s)	7.0	32.0	32.0	7.0	32.0		27.0	58.0		27.0	27.0	27.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5		3.0	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.0	4.5		4.0	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	C-Max
Walk Time (s)					10.0					10.0	10.0	10.0
Flash Dont Walk (s)					22.0					16.0	16.0	16.0
Pedestrian Calls (#/hr)					4					25	25	25
Act Effct Green (s)	24.9	21.6	21.6	22.5	15.0		75.5	75.0		31.4	31.4	31.4
Actuated g/C Ratio	0.23	0.20	0.20	0.20	0.14		0.69	0.68		0.29	0.29	0.29

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	1.24	0.25	0.71	0.07	0.43		0.79	0.52		0.10	0.85	0.46
Control Delay	172.7	38.9	9.5	28.8	43.0		34.5	11.1		32.6	47.2	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	172.7	38.9	9.5	28.8	43.0		34.5	11.1		32.6	47.2	6.9
LOS	F	D	A	C	D		C	B		C	D	A
Approach Delay		70.5			40.7			18.3			37.5	
Approach LOS		E			D			B			D	
Queue Length 50th (m)	~91.8	16.3	0.0	3.5	19.7		80.4	50.8		1.8	82.8	0.0
Queue Length 95th (m)	#93.0	26.7	25.6	7.4	28.7		#185.8	119.2		7.4	#134.3	20.5
Internal Link Dist (m)		81.7			308.1			305.7			270.1	
Turn Bay Length (m)	40.0			10.0			35.0			45.0		
Base Capacity (vph)	259	518	790	283	504		679	2306		118	967	564
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.24	0.17	0.62	0.07	0.20		0.79	0.52		0.10	0.85	0.46

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 36.6 Intersection LOS: D

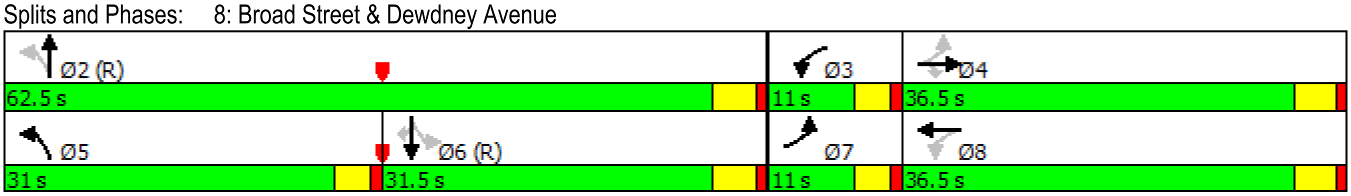
Intersection Capacity Utilization 85.9% ICU Level of Service E

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: 8: Broad Street & Dewdney Avenue



Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	1166	29	22	1400	23	8	2	77	6	1	118
Future Vol, veh/h	52	1166	29	22	1400	23	8	2	77	6	1	118
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	40	887	22	17	1065	18	6	2	59	5	1	90

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1083	0	0	909	0	0	1543	2093	455	1630	2095	541
Stage 1	-	-	-	-	-	-	977	977	-	1107	1107	-
Stage 2	-	-	-	-	-	-	566	1116	-	523	988	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	634	-	-	739	-	-	77	51	550	67	51	483
Stage 1	-	-	-	-	-	-	267	325	-	222	282	-
Stage 2	-	-	-	-	-	-	474	279	-	503	321	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	634	-	-	739	-	-	58	47	550	55	47	483
Mov Cap-2 Maneuver	-	-	-	-	-	-	58	47	-	55	47	-
Stage 1	-	-	-	-	-	-	250	304	-	208	276	-
Stage 2	-	-	-	-	-	-	376	273	-	419	301	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.2	20.2	18
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	58	433	634	-	-	739	-	-	55	448
HCM Lane V/C Ratio	0.105	0.139	0.062	-	-	0.023	-	-	0.083	0.202
HCM Control Delay (s)	74.2	14.7	11.1	-	-	10	-	-	76.3	15.1
HCM Lane LOS	F	B	B	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	0.3	0.5	0.2	-	-	0.1	-	-	0.3	0.7

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1165	9	0	1229	23	0	0	44	0	0	65
Future Vol, veh/h	0	1165	9	0	1229	23	0	0	44	0	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	200	-	-	200	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	886	7	0	935	18	0	0	33	0	0	49

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	886	-	-	935
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.23	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.327	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	342	0	0	320
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	342	-	-	320
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	16.7	18.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	342	-	-	-	-	320
HCM Lane V/C Ratio	0.098	-	-	-	-	0.155
HCM Control Delay (s)	16.7	-	-	-	-	18.3
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1152	57	0	1194	14	0	0	20	0	0	58
Future Vol, veh/h	0	1152	57	0	1194	14	0	0	20	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	200	-	-	200	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	877	43	0	908	11	0	0	15	0	0	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	877	-	-	908
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.23	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.327	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	346	0	0	332
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	346	-	-	332
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	15.9	17.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	346	-	-	-	-	332
HCM Lane V/C Ratio	0.044	-	-	-	-	0.133
HCM Control Delay (s)	15.9	-	-	-	-	17.5
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.5

Intersection						
Int Delay, s/veh	0.4					

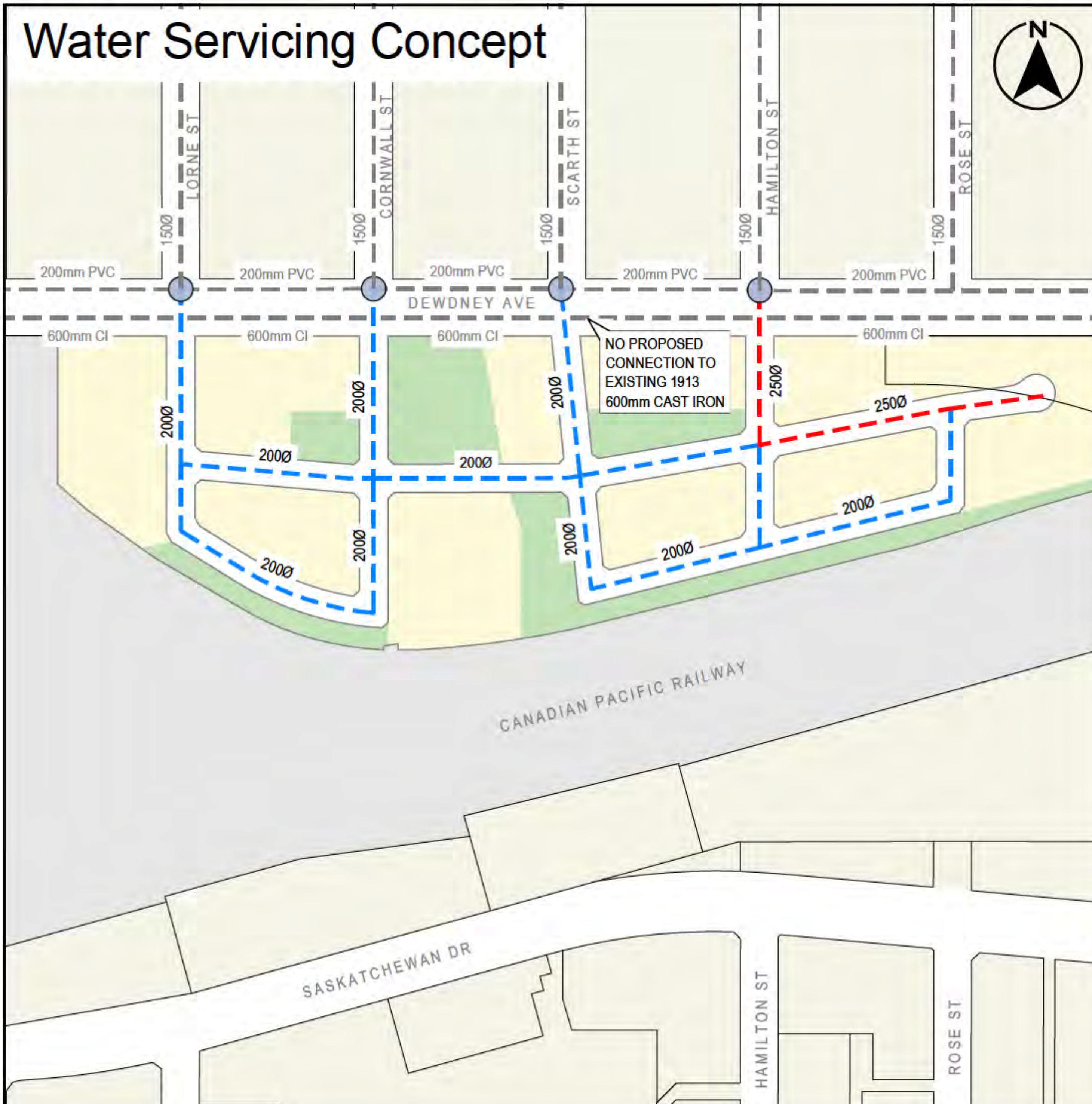
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1188	1141	22	0	63
Future Vol, veh/h	0	1188	1141	22	0	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	904	868	17	0	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	868
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	350
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	350
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	16.9
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	350
HCM Lane V/C Ratio	-	-	-	0.137
HCM Control Delay (s)	-	-	-	16.9
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.5

Water Servicing Concept



Legend

Existing Water

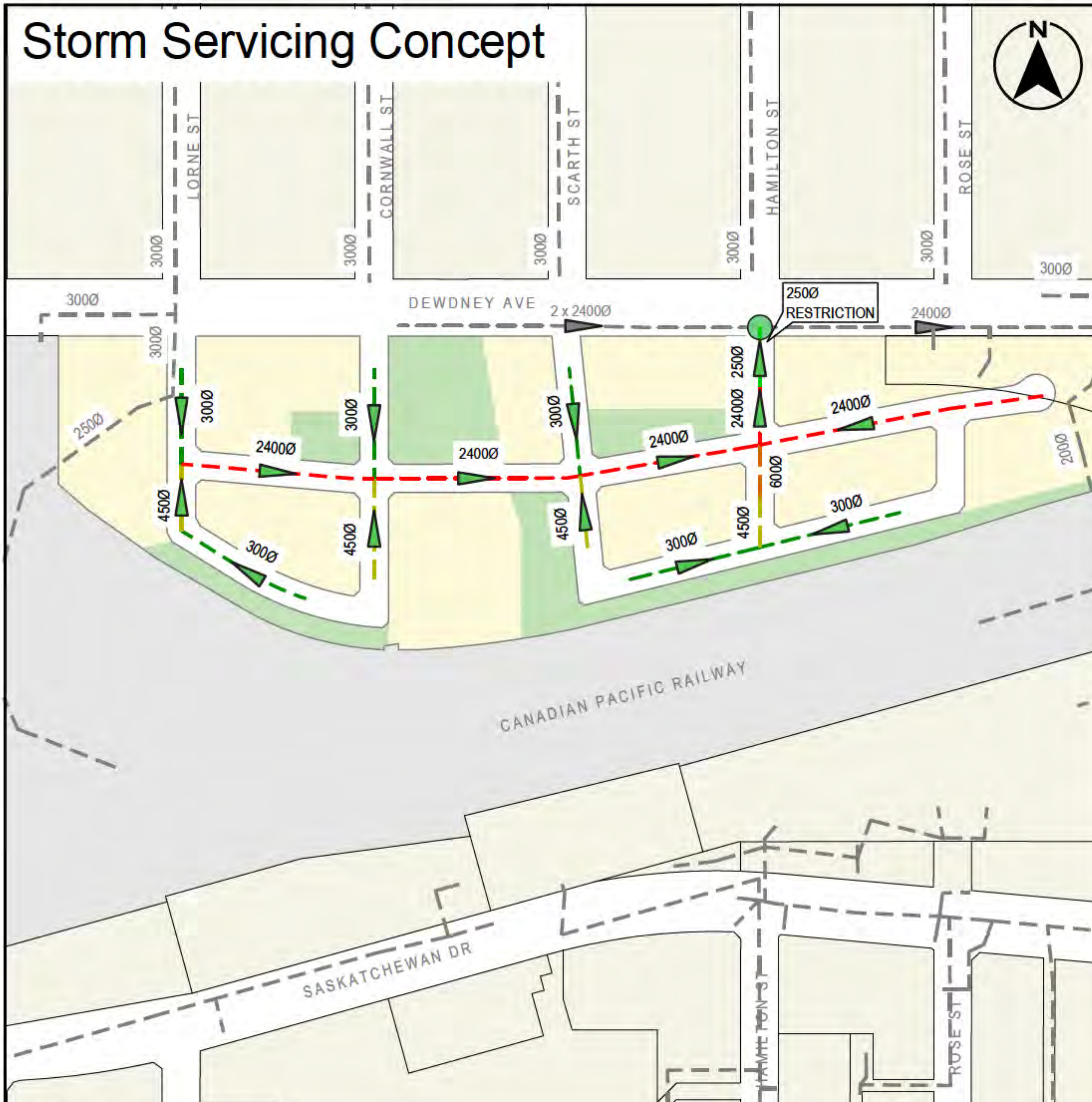
Proposed 200mm Water

Proposed 250mm Water

Connection to Existing

WSP

Storm Servicing Concept



Legend

Existing Water

Proposed 2400mm Storm

Proposed 600mm Storm

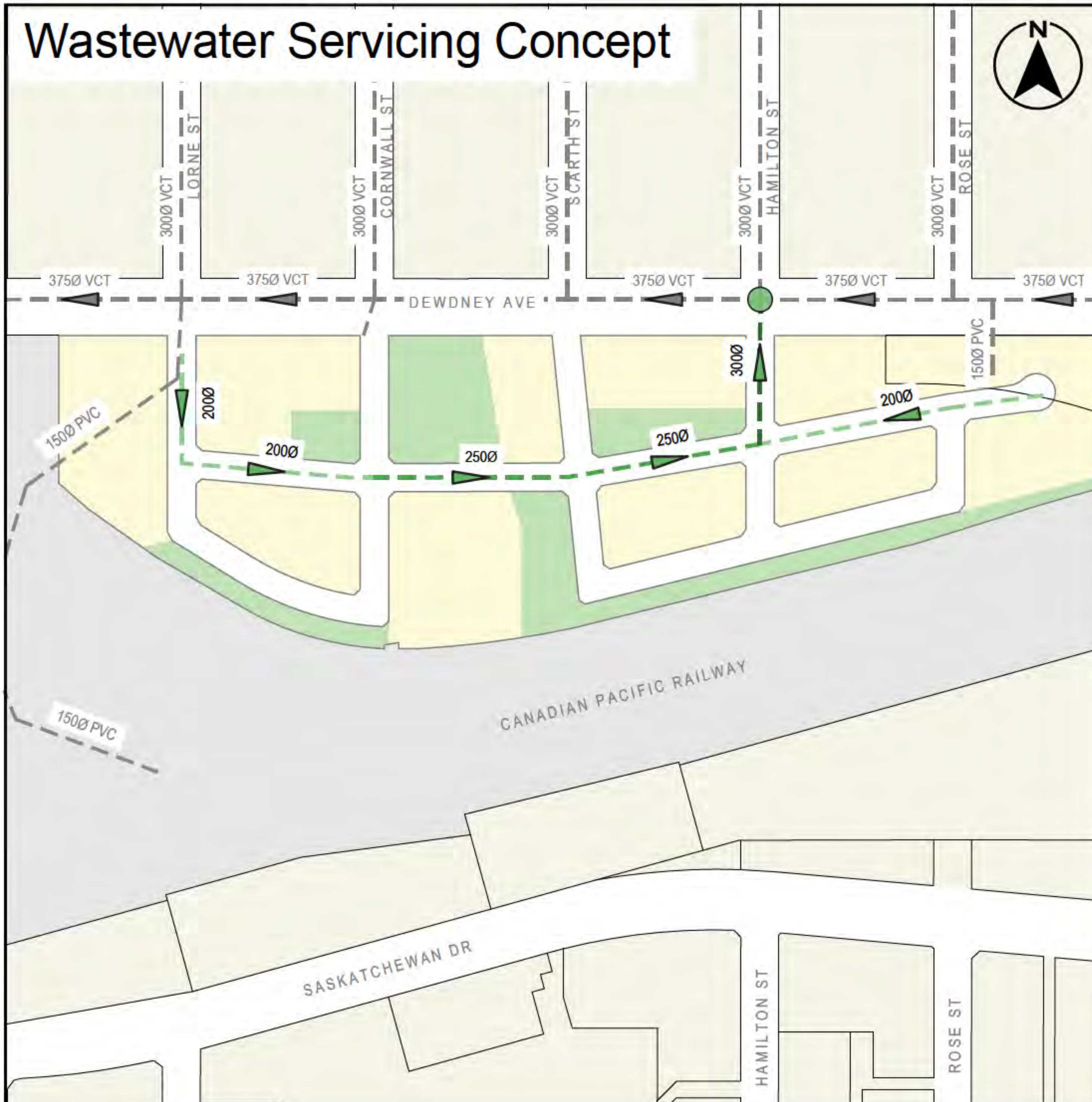
Proposed 450mm Storm

Proposed 300mm Storm

Proposed 250mm Storm

Connection to Existing

Wastewater Servicing Concept



Legend

Existing Water

Proposed 200mm Sanitary

Proposed 250mm Sanitary

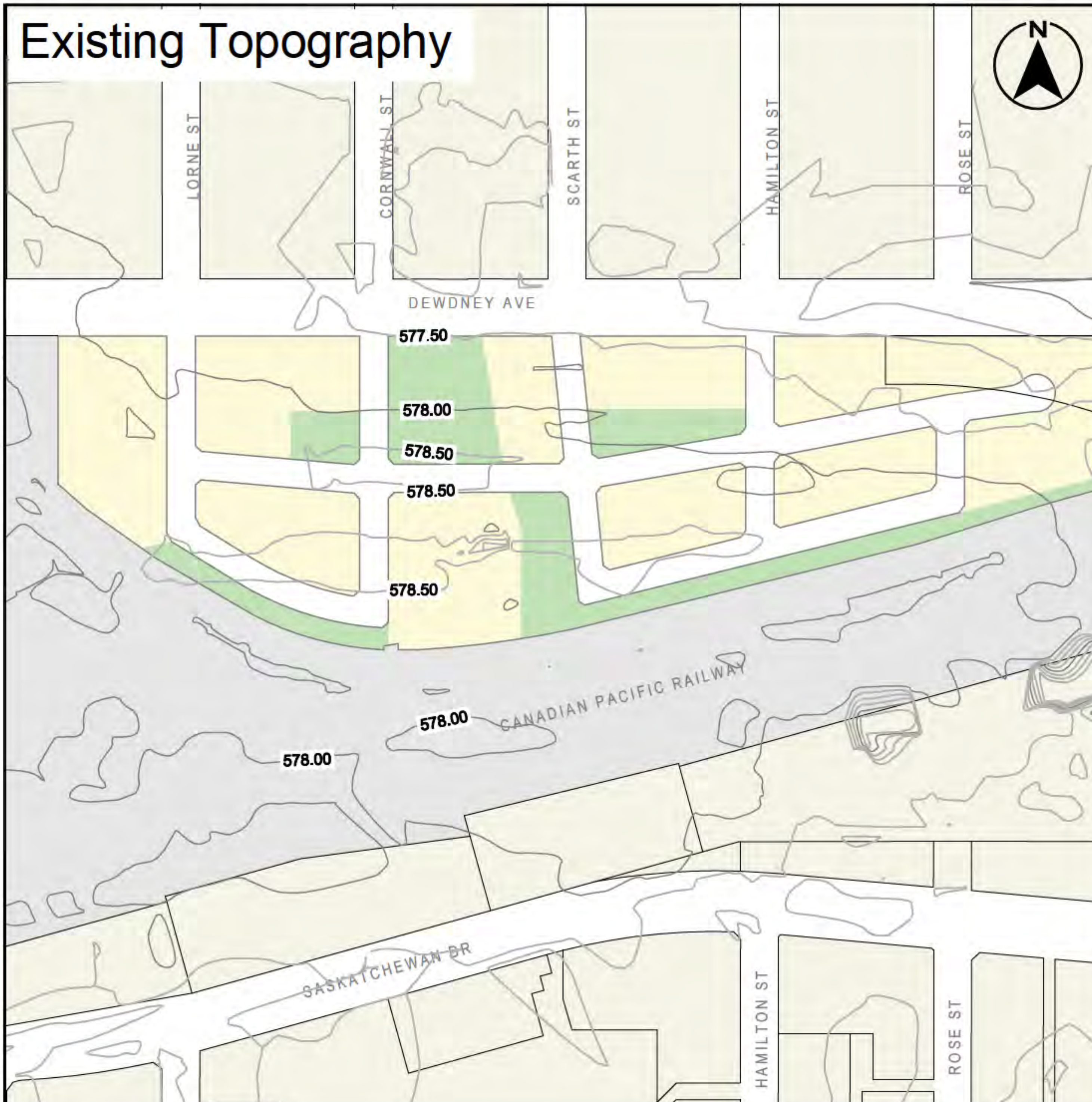
Proposed 300mm Sanitary

Direction of Flow

Connection to Existing

WSP

Existing Topography

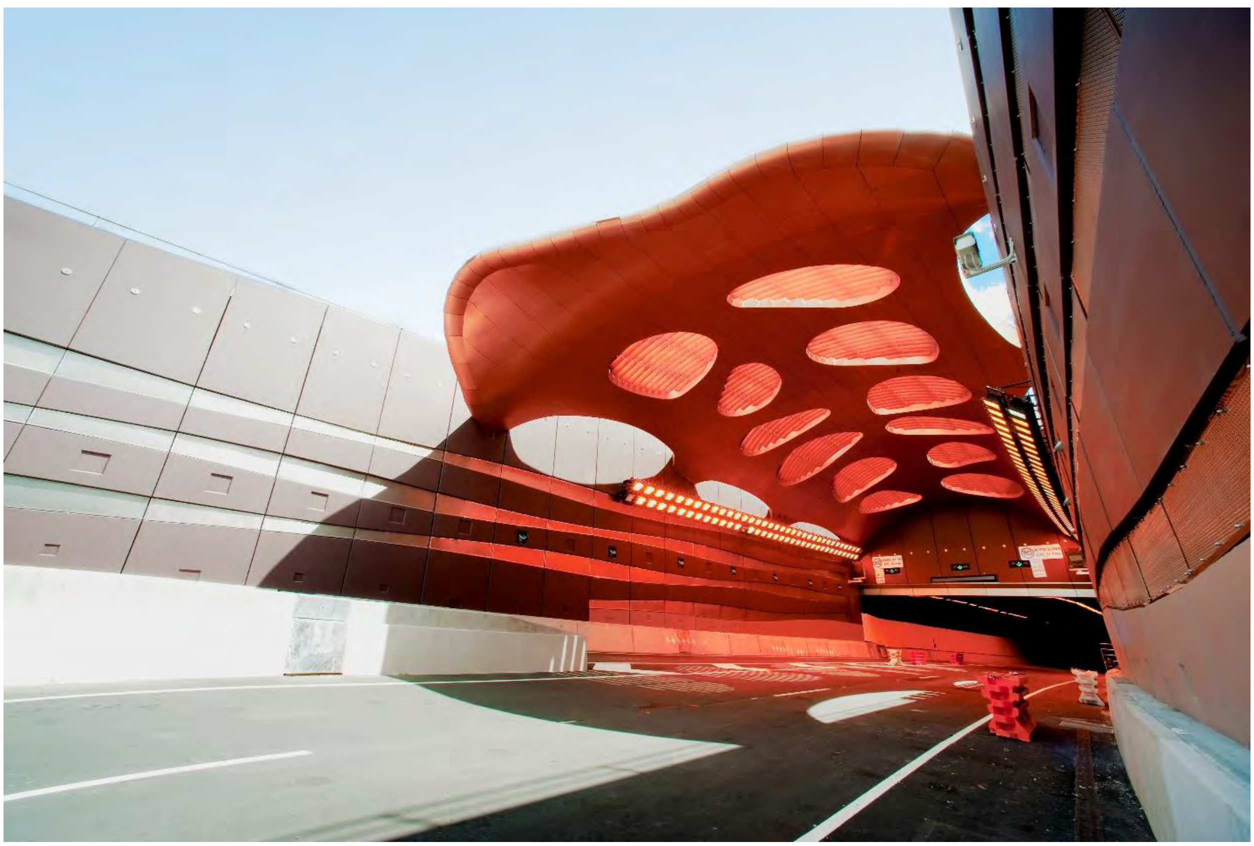


WSP

CITY OF REGINA

RRI - RAILYARD RENEWAL PROJECT

SERVICING REPORT



RRI - RAILYARD RENEWAL PROJECT

SERVICING REPORT

CITY OF REGINA

PROJECT NO.: 151-09273-00
DATE: FEBRUARY 2018

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WSP Canada Inc.

February 1, 2018

CITY OF REGINA
City of Regina
2476 Victoria Avenue
PO Box 1790
Regina, SK S4P 3C8

Attention: Mitchel Kolbeck, Coordinator, Regina Revitalization Initiative

Subject: RRI - Railyard Renewal Project - Servicing Report

We are pleased to present you our report regarding the proposed servicing of the lands encompassed within the Railyard Renewal Project, located in Regina, Saskatchewan.

If you have any questions regarding this report, please contact us.

Sincerely,

Jordan Stepan, E.I.T.
Design Engineer, Infrastructure

Bob Brockmeyer, P.Eng.
Director, Infrastructure

WSP ref.: 151-09273-00

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EXECUTIVE SUMMARY

WSP Canada Inc. was asked by the City of Regina to compile a Servicing Report for the Railyard Renewal Project to assist in the planning of the redevelopment of approximately 7 hectares of land in the centre of Regina. The Railyard Renewal project revolves around the redevelopment of a decommissioned railyard, previously owned by the Canadian Pacific Railway, into a multi-use area that will connect the Warehouse District to Downtown Regina. This report aims to provide concept servicing strategies for water, wastewater and stormwater servicing within the development while also outlining the potential impacts that the development will have on the existing level of service within the existing City of Regina networks.

Water Servicing

The City of Regina water network was modeled under both the current operating conditions, and the conditions presented when the demands required for the full buildout of the railyard lands were added to the model. The results of this analysis show that the entire extents of the railyard development can be serviced through existing City of Regina infrastructure without significantly impacting the existing serviceability of the surrounding area. The proposed development ties two 300mm services into the property from an existing 600mm watermain at the intersections of Dewdney Avenue and Lorne Street, and Dewdney Avenue and Hamilton Street. The remainder of the proposed water servicing system is a network of 250mm water mains that satisfy domestic consumption and fire flow demands throughout the development.

Wastewater Servicing

Currently there are no sanitary sewer mains within the proposed development area that are suitable to be tied into for servicing of the development. To service the development, a connection to the existing 375mm sanitary sewer main at the intersection of Hamilton Street and Dewdney Avenue can be made, in conjunction with the construction of the Railyard Renewal Project's internal sanitary sewer network. Existing topography, as well as the existing of invert elevations at the tie-in point of the existing 375 sanitary sewer main allow the entire extents of the Railyard Renewal Project to be service via gravity flow; there is no need for an internal lift station to service wastewater flows produced within the project area.

Storm Water Servicing

The proposed development was modelled under 1 in 5 and 1 in 25 year storm events to determine a storm water management strategy for the project area. To summarize, an internal underground network that ties into oversized in-line detention storage is proposed to service the development for both design storms. This system will discharge at a restricted release rate to existing underground detention storage for the existing Broad Street Lift Station running west to east along Dewdney Avenue. Existing topography, as well as the existing of invert elevations at the tie-in point of the existing storm main, allow the entire extents of the railyard development to be service via gravity flow; there is no need for an internal lift station to service storm water flows.

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1 SERVICING STRATEGY

1.1 INTRODUCTION

1.1.1 SITE CONTEXT

The Railyard Renewal Project revolves around the redevelopment of a 7 ha (hectare) concept plan area located in the heart of Regina. The land, obtained from the City of Regina in 2012 from Canadian Pacific Railway, is defined by Dewdney Avenue to the north, Broad Street to the east, and Canadian Pacific Railway owned land to the south and west. Refer to Figure 1 for further clarification on the extent of land to be developed. As outlined in the following report, all 7 ha of land can be sufficiently serviced by existing City of Regina infrastructure under the currently proposed development scheme.

The broader secondary area encompasses land to the south and west of the concept plan area outlined above. The secondary area is bound by Dewdney to the north, Broad Street to the east, the southern edge of the Canadian Pacific Railway Lands to the south and Albert Street to the west. The secondary area is outside of the scope of this report, and will require an additional servicing report should the decision be made to develop it further.

Figure 1: Site Area

1.2 WATER SERVICING

1.2.1 INTRODUCTION

The following outlines the proposed water servicing concept for the full buildout of the railyard lands under the current development scheme. The City of Regina water network was modeled under both the current operating conditions, and the conditions presented when the demands required for the full buildout of the railyard lands are added to the model. The results of this analysis, as outlined below, show that the entire extents of the railyard can be serviced through existing City of Regina infrastructure without significantly impacting the existing serviceability of the surrounding area.

1.2.2 EXISTING CONDITIONS

There are currently no water mains within the railyard development suitable for servicing connections. Water servicing for the proposed development is available via an existing 600mm cast iron water main. This main is located along Dewdney Avenue running west to east.

1.2.3 PROPOSED DEVELOPMENT

Water servicing may be provided to this development as shown in the water servicing concept shown in Figure 2. The following connections to the existing 600mm water main along Dewdney Avenue are proposed:

- 300 mm water main connected to the existing 600 mm water main at the intersection of Lorne Street and Dewdney Avenue
- 300 mm water main connected to the existing 600 mm water main at the intersection of Hamilton Street and Dewdney Avenue

Figure 2: Water Servicing Concept

1.2.4 WATERCAD ANALYSIS

The Railyard Renewal Project water distribution system was modelled in Bentley WaterCAD V8i SELECTseries 5. The model was integrated into the City of Regina base model 'CoR_WaterCAD_Scenario-2015_Version-2017', received from the City of Regina on June 14, 2017. The city water distribution system was modelled in WaterCAD under the Peak Day, Peak Hour, and Peak Day + Fire Flow scenarios. The system was modeled both before and after the additional demands of the railyard development were added to the model, in order to determine the effect that the railyard development will have on the level of service of the city system.

PEAK DAY DEMAND

Within the railyard lands, all nodes satisfy the Peak Day Demand requirements as defined by the City of Regina Development Standards Manual. Table 1: Peak Day Demand Summary, compares results from the pre-development and post-development scenarios modelled in WaterCAD.

Table 1: Peak Day Demand Summary

Peak Day Demand Summary			
	Pre-Development	Post-Development	Difference
Number of Nodes < 280 kPa	2/4634 (0.04%)	2/4647 (0.04%)	0/4647 (0.00%)
Number of Nodes with Pressure Drop > 17 kPa	N/A	0/13 (0%)	N/A
Maximum Pressure (kPa)	509.1 (J-13950)	509.1 (J-13950)	0.0
Minimum Pressure (kPa)	259.7 (J-9460)	259.7 (J-9460)	0.0

*Population projections calculated by multiplying concept floor areas provided by Urban Strategies by densities outlined in the City of Regina DSM (1 person/35 m² - Apartments, 1 person/23 m² - Commercial)

The addition of the demands imposed by the full buildout of the railyard under the current development scheme does not increase the amount of peak day demand deficiencies.

PEAK HOUR DEMAND

Within the railyard lands, all nodes satisfy the Peak Day Demand requirements as defined by the City of Regina Development Standards Manual. Table 2: Peak Hour Demand Summary, compares results from the pre-development and post-development scenarios modelled in WaterCAD.

Table 2: Peak Hour Demand Summary

Peak Hour Demand Summary			
	Pre-Development	Post-Development	Difference
Number of Nodes < 269.4 kPa	73/4634 (1.58%)	73/4647 (1.57%)	0/4647 (0.00%)
Number of Nodes with Pressure Drop > 27.6 kPa	N/A	0/13 (0%)	N/A
Maximum Pressure (kPa)	497.7 (J-13950)	493.8 (J-13950)	0.0
Minimum Pressure (kPa)	182.6 (J-9460)	182.5 (J-9460)	-0.1
Number of Pipes with Velocities > 1.5 m/s	11/6348 (0.25%)	11/6365 (0.25%)	0/6365 (0.00%)
Maximum Velocity (m/s)	2.98 (P-2115)	2.97 (P-2115)	-0.1

*Population projections calculated by multiplying concept floor areas provided by Urban Strategies by densities outlined in the City of Regina DSM (1 person/35 m² - Apartments, 1 person/23 m² - Commercial)

The addition of the railyards development to the City of Regina base WaterCAD model does not increase the amount of peak hour demand deficiencies.

PEAK DAY DEMAND + FIRE FLOW

Within the railyard development, all nodes satisfy the peak day demand + fire flow requirements outlined in the City of Regina Development Standards Manual. Level 3 fire flows of 250 L/s were applied to each node of the development in accordance with anticipated zoning and the requirements outlined in the City of Regina Development Standards Manual. The model was run with a velocity constraint of 3.2 m/s applied to all pipes within the system. Table 3: Peak Day Demand + Fire Flow Summary, compares results from the pre-development and post-development scenarios modelled in WaterCAD.

Table 3: Peak Day Demand + Fire Flow Summary

Peak Day Demand + Fire Flow Summary			
	Pre-Development	**Post-Development**	**Difference**
Number of PDD+FF Node Deficiencies	1062/4634 (22.92%)	1062/4647 (22.85%)	0/4647 (0.00%)
Number of Pipes with Velocities > 3.2 m/s	0/6348 (0.00%)	0/6365 (0.00%)	0/6365 (0.00%)
Maximum Velocity (m/s)	1.7 (P-18060)	1.7 (P-18060)	0.0

*Population projections calculated by multiplying concept floor areas provided by Urban Strategies by densities outlined in the City of Regina DSM (1 person/35 m² - Apartments, 1 person/23 m² - Commercial)

**Level 3 fire flows of 250 L/s applied to each node as outlined in the City of Regina DSM

The addition of the railyard development produced no additional fire flow deficiencies from pre-development conditions.

1.2.5 TIMING OF CAPITAL IMPROVEMENTS

No additional water mains or other water network infrastructure upgrades are needed to adequately service the full buildout of the railyard development. Construction of water servicing for the railyard development can begin by tying into the existing 600mm cast iron water main currently running along Dewdney Avenue, at the intersections outlined in Figure 2. Both 300mm tie-ins will be required for the first phase of the development. From there, the internal water distribution system may be constructed as required to service the additional phases and eventual full buildout of the railyard lands.

It is important to note that the existing 600mm cast iron watermain was constructed in 1913. Due to the pipes age, it is recommended that the City of Regina conducts an asset management review of the watermain and considers full replacement of the main while the south side of Dewdney Avenue is reconstructed to accommodate the proposed development. Also note that there is an existing 200mm asbestos cement service stubbing into the development from the existing 200mm PVC watermain running along the North side of Dewdney Avenue. This service stubs south from the intersection of Lorne Street and Dewdney Avenue. A WaterCAD analysis was run using this existing service and it was determined that neither it, or any additional services off of the existing 200mm PVC watermain running along the North side of Dewdney would provide sufficient fire flow throughout the development. With this being the case, the existing 200mm asbestos cement service should be cut and capped at the main at the time of construction of the proposed 300mm service at the same intersection.

1.3 WASTEWATER SERVICING

1.3.1 INTRODUCTION

The following outlines the proposed wastewater servicing concept for the full buildout of the railyard lands under the current development scheme. In conjunction with previously submitted City of Regina Strategic Sanitary Sewer Assessment conducted by Stantec in 2014, the following recommendations are proposed in order to adequately service the anticipated wastewater flows produced by the railyard development.

1.3.2 EXISTING CONDITIONS

Wastewater servicing near the proposed development site is available via an existing 1907 clay tile 375mm sanitary sewer main. This existing sewer main is located in Dewdney Avenue running east to west to the intersection of Dewdney Avenue and Albert Street. The wastewater then travels north via a clay tile 450mm sanitary sewer main, until it reaches the 7th Avenue Trunk.

CITY OF REGINA STRATEGIC SANITARY SEWER ASSESSMENT (STANTEC, 2014)

<u>Surcharge State Analysis - 25 Year Event</u>

The routing that leads to the 7th Avenue trunk, as well as the 7th Avenue trunk itself, currently experience backwater conditions. Backwater conditions are described as "Sewer surcharged – peak flow within free flow capacity of the sewer (i.e. under backwater conditions)". Additionally, certain portions of the routing and 7th Avenue trunk experience bottleneck conditions. Bottleneck conditions are described as "Sewer surcharged – peak flow greater than free flow capacity of the sewer (i.e. sewer is under capacity and causes bottleneck)".

<u>Hydraulic Grade Line Evaluation – 25 Year Event</u>

The majority of the routing that leads to the 7th Avenue trunk, as well as the 7th Avenue trunk itself, currently experience a hydraulic grade line that is located more than 2 meters below ground. Areas that have a hydraulic grade line that is located more than 2 meters below ground are areas where basement flooding is least likely to occur.

<u>Recommendations</u>

Further analysis that is outside of the scope of this report will be required to determine which, if any, of the following recommendations made in the 2014 City of Regina Strategic Sanitary Sewer Assessment will be required to ensure that the proposed Railyard Renewal Project doesn't impact the current level of service of the downstream system.

- Wascana Trunk – upgrade from 1200mm to 1350mm from the connection of the 7th Avenue Trunk to the junction with the South Trunk
- South Trunk – upgrade from 1250mm to 1800mm from the cross connection to the junction with the Wascana Trunk
- 7th Avenue Trunk – Upgrade from 750mm to 1200mm from Albert Street to the connection to the Wascana Trunk

1.3.3 PROPOSED DEVELOPMENT

The Railyard Renewal Project wastewater flows can be conveyed via a gravity collection system to the existing City of Regina 375mm sanitary sewer main, located along Dewdney Avenue. Wastewater servicing may be provided to this development as shown in the wastewater servicing concept illustrated in Figure 3. The following connection to the existing 375mm sanitary sewer main is proposed:

— 300 mm sanitary sewer main connected to the existing 375 mm sanitary sewer main at the intersection of Hamilton Street and Dewdney Avenue

Inflow from weeping tiles and foundation drains will be pumped to the surface, and not to the underground wastewater system. Wet weather inflows will be limited to the 21,000 L/ha/day allowance as stated in the City of Regina Development Standards Manual. Table 5 outlines anticipated the peak wastewater flows produced by the development.

Table 4: Peak Wastewater Flow Summary

Building	Gross Area* (ha)	Residential Population**	Commercial Population**	Gross Density	Average Flow*** (LPCD)	Peak Flow Factor	Infiltration **** (L/s)	Peak Flow (L/s)
1	0.67	97	230	488.06	386.07	4.06	0.16	6.10
2	0.74	400	178	781.08	295.52	3.94	0.18	7.97
3	0.80	0	178	222.50	454.00	4.17	0.19	4.09
4	0.66	323	253	872.73	325.59	3.94	0.16	8.72
5	0.28	174	134	1100.00	324.63	4.07	0.07	4.78
6	EXST	EXST	EXST	EXST	EXST	EXST	EXST	EXST
7	EXST	EXST	EXST	EXST	EXST	EXST	EXST	EXST
8	0.83	783	48	1001.20	238.23	3.85	0.20	9.02
9	0.97	0	352	362.89	454.00	4.05	0.24	7.72
10	0.70	623	48	958.57	241.38	3.91	0.17	7.49
11	0.81	606	0	748.15	225.00	3.93	0.20	6.40
12	0.50	197	0	394.00	225.00	4.15	0.12	2.25
Totals	**6.96**	**3203**	**1421**	-	-	-	-	**64.55**

*Gross areas include building footprint and surrounding lands

**Population projections calculated by multiplying concept floor areas provided by Urban Strategies by densities outlined in the City of Regina DSM (1 person/35 m² - Apartments, 1 person/23 m² - Commercial)

***Weighted average based on population type as outlined in the City of Regina DSM (225Lpcd - Residential, 454Lpcd - Other Uses)

****Limited to 21,000 L/ha/day as outlined in the City of Regina DSM

Figure 3: Sanitary Servicing Concept

1.3.4 TIMING OF CAPITAL IMPROVEMENTS

Currently there are no sanitary sewer mains within the proposed development area that are suitable to be tied into for servicing of the development. To service the development, a connection to the existing 375mm sanitary sewer main at the intersection of Hamilton Street and Dewdney Avenue can be made, in conjunction with the construction of the Railyard Renewal Project's internal sanitary sewer network. Existing topography, as well as the existing of invert elevations at the tie-in point of the existing 375 sanitary sewer main allow the entire extents of the Railyard Renewal Project to be service via gravity flow; there is no need for an internal lift station to service wastewater flows produced within the project area. Further analysis that is outside of the scope of this report will be required to determine what, if any, of the recommendations made in the 2014 City of Regina Strategic Sanitary Sewer Assessment will be required to ensure that the current level of service of the downstream system is not impacted by the buildout of the Railyard Renewal Project.

It is important to note that there is an existing 150mm sanitary line constructed in 2001 that cuts through the Railyard property from the intersection of Lorne Street and Dewdney Avenue to the Canadian Pacific Railway lands to the southwest. This line is likely to conflict with the development of the Railyard lands, and consequently will need to be relocated if it is still active.

1.4 STORMWATER SERVICING

1.4.1 INTRODUCTION

The following outlines the proposed storm water servicing concept for the full buildout of the railyard lands under the current development scheme. The project area was modelled in PCSWMM Professional 2D under both 1:5 year and 1:25 year storm events. As is outlined below, the entire extents of the railyard lands can be serviced via gravity flow to existing City of Regina storm infrastructure located along Dewdney Avenue.

1.4.2 EXISTING CONDITIONS

The plan area was formerly occupied by a railway intermodal facility, which has now been decommissioned. The general topography is such that a gentle slope exists from the west to east portion of the site. A small localized hill exists at the southcentral boundary of the site. The existing contours of the proposed development are shown in Figure 4.

The Broad Street underpass is located immediately to the east of the proposed development site. A storm water pump station is located at the underpass which services the area to the south, and the proposed development site. A 2400mm CSP is located along the south edge of the Dewdney Avenue right of way between Cornwall Street and Broad Street, providing detention for the Broad Street Pump Station.

CITY OF REGINA DRAINAGE MASTERPLAN REPORT (KGS GROUP, 2009)

Storm Water Drainage System within Regina

The Railyard Renewal Project is located in the Central Regina Area -Master Plan Area 1. This area consists of a minor system that drains into Wascana Creek at various outfall locations. The Central Regina Area does not have an overall grade pattern that forms a major system for storm water drainage. This results in storm water ponding at low spots, which eventually drain into the minor system, as minor system capacity becomes available. The east quadrant of the Central Regina Area has a relief trunk that carries excess minor system flow to the North Storm Channel.

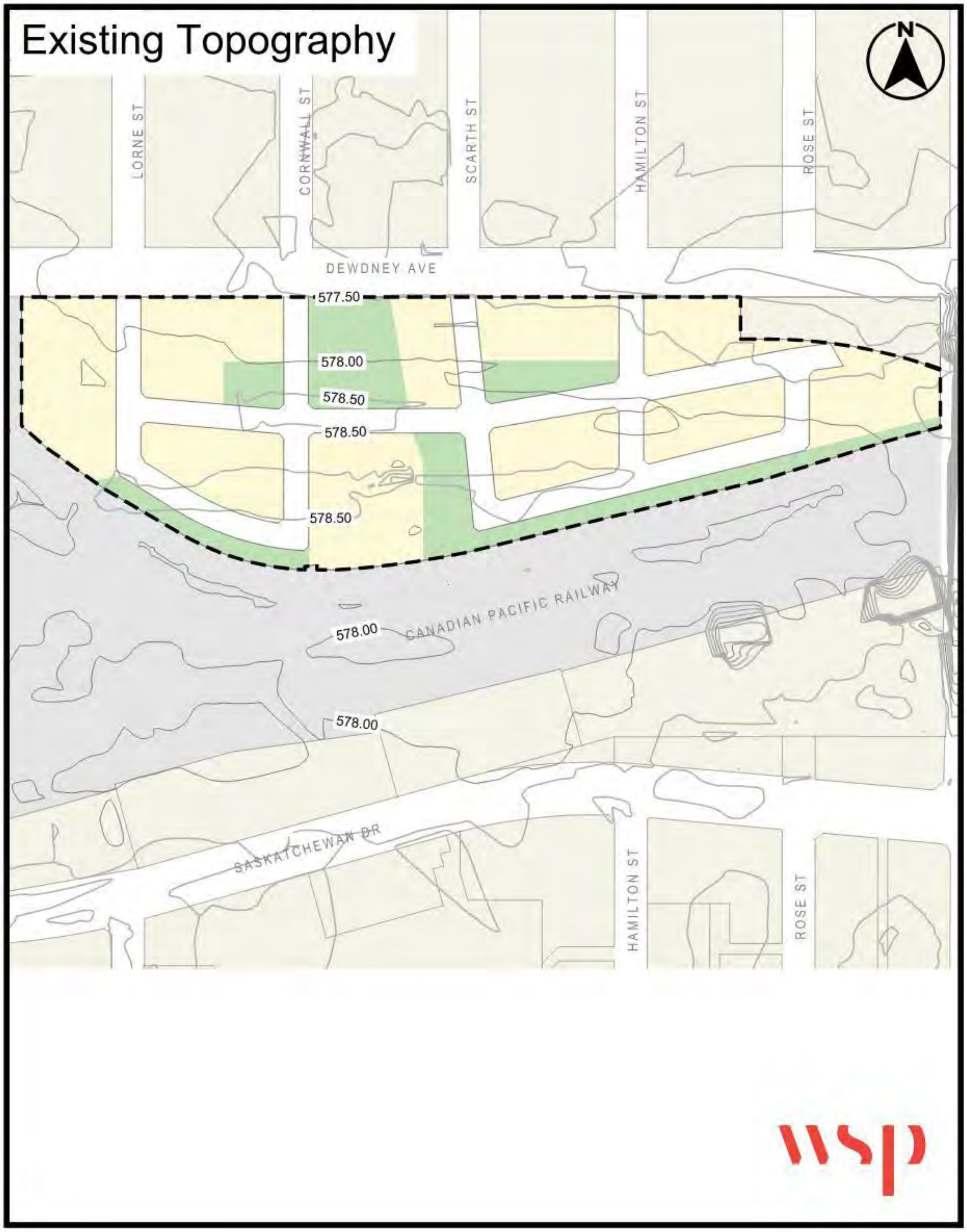

Figure 4: Existing Topography

1.4.3 PROPOSED DEVELOPMENT

The City of Regina's storm water management strategy follows the urban dual drainage concept whereby the minor (piped) system conveys flows generated by the 1:5 year storm event, and the major (surface) system manages flows generated by the 1:25 year event, for an infill development. The City of Regina requires that the storm water management system be designed to manage flows generated by the 24 hour 1:25 year design storm. Storm water flows for this development were modelled using PCSWMM Professional 2D and the 1:25 year 24 hour City of Regina design storm. Based on these simulations, the post development 24 hour 1 in 25 year runoff volume is 5,900 m^3.

Storm water storage that is available for the proposed development site to manage the 5,900 m^3 24 hour 1 in 25 year runoff volume is as follows:

- Pipe storage – 2,250 m^3
- Roadway ponded area storage – 1,150 m^3
- 'City of Regina Standard for Drainage from Building site and Parking Lot Developments' requirement of 50mm storage depth over the individual site - 2,550 m^3

The proposed storm water servicing concept is outlined in Figure 5. In order to provide the required storage, while also minimizing impacts on existing storm water network, the following connection to existing storm water infrastructure is proposed:

— 250 mm storm water restrictor connected to the existing 2400mm storm water CSP at the intersection of Hamilton Street and Dewdney Avenue

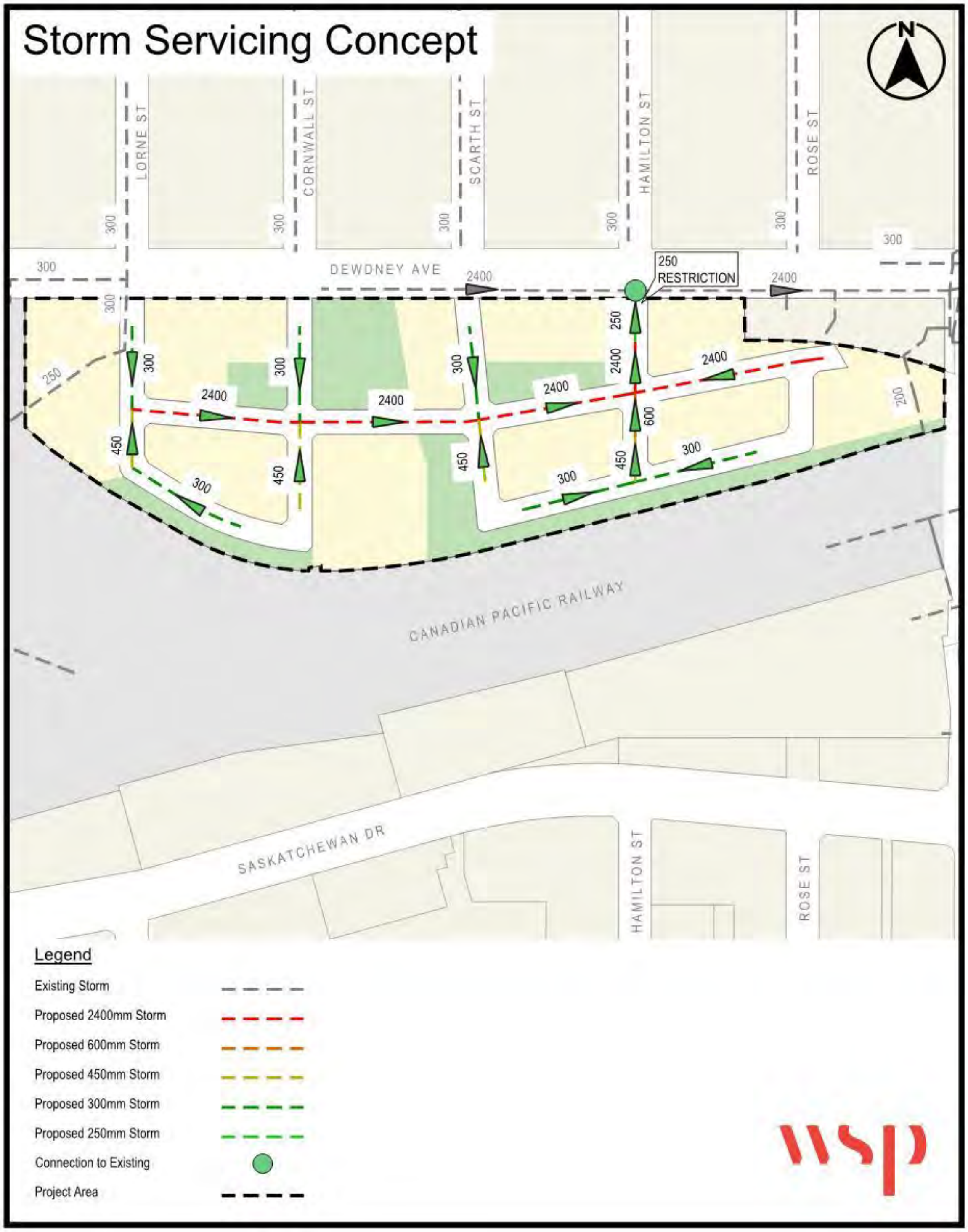

Figure 5: Storm Water Servicing Concept

1.4.4 TIMING OF CAPITAL IMPROVEMENTS

Currently there are no storm sewer mains within the proposed development suitable to be connected to. The restricted connection to the existing 2400mm storm water sewer is required to be constructed in conjunction with the railyard project internal minor system. Existing topography, as well as the existing of invert elevations at the tie-in point of the existing 2400 storm main, allow the entire extents of the railyard development to be service via gravity flow; there is no need for an internal lift station to service storm water flows. Further analysis that is outside of the scope of this report may be needed to ensure that the additional flows produced by this development can be handled by the existing capacity of the Broad Street Lift Station. It is anticipated, however, that the use of onsite storage and a restricted outfall that the additional flows produced by this development will not affect the current level of service of the lift station.

It is important to note that there are existing 250mm and 300mm storm lines that cut through the Railyard property from the intersection of Lorne Street and Dewdney Avenue to the Canadian Pacific Railway lands to the southwest. These lines are likely to conflict with the development of the Railyard lands, and consequently will need to be relocated if they are still active. Similarly, there is an existing 200mm storm line at the East end of the property that will likely need to be decommissioned and removed to accommodate the construction of Building 12 in the current concept plan.

SHALLOW UTILITY SERVICING

1.4.5 ELECTRICAL SERVICING

SaskPower infrastructure currently does not exist within the Railyard Renewal Project site. The proposed development could potentially be serviced from existing infrastructure located at the intersection of Broad Street and Dewdney Avenue. Once a proposed plan of subdivision is created for the Railyard Renewal Project, it will be forwarded to the utility corporations for their use in detailed design of the infrastructure needed to service the proposed development.

1.4.6 NATURAL GAS SERVICING

SaskEnergy infrastructure currently exists within the Railyard Renewal Project site. Once a proposed plan of subdivision is created for the Railyard Renewal Project, it will be forwarded to the utility corporations for their use in detailed design of the infrastructure needed to service the proposed development.

BIBLIOGRAPHY

KGS Group. (December, 2009). Regina Drainage Master Pan Report – Final Report.

Stantec. (2014). City of Regina Strategic Sanitary Sewer Assessment.

TECHNICAL MEMO

TO: City of Regina

FROM: WSP Canada Inc.

SUBJECT: **RRI Railyard Renewal Project Servicing Report – Large Footprint Building**

DATE: **May 17, 2019**

The following technical memo is presented in response to the City of Regina's request to determine how the servicing requirements change for the RRI Railyard Site with the alteration of the site layout to accommodate a large footprint building. For the purposes of this assessment it was assumed the large footprint building would be a 10,000-seat arena. This memo is intended to be an Appendix to the original Servicing Report dated February 2018. In collaboration with the City, a revised site layout was achieved to fit a 130m x 100m arena in the northwest corner of the site with limited onsite parking surrounding it. To accommodate the arena and adjacent parking, Building's 1, 2 and 8 from the original concept site layout were removed from the site plan. The updated site plan is illustrated in Figure 1.

The revised site layout was analyzed for water, storm water and wastewater servicing requirements in alignment with the criteria outlined in the City of Regina Development Standards Manual (DSM) 2010.

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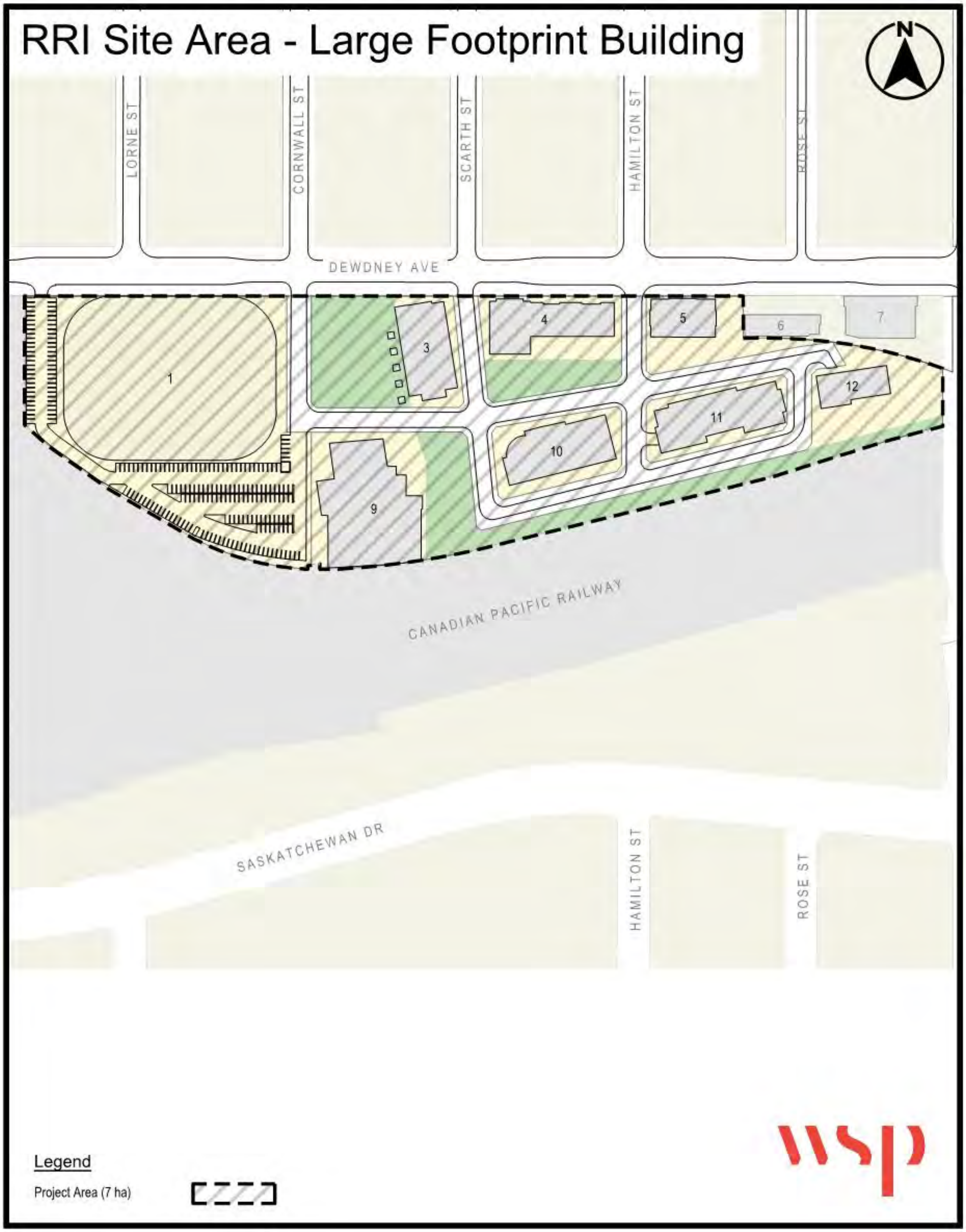

Figure 1: Large Footprint Building Site Layout

WATER SERVICING

The following section outlines the proposed water servicing concept for the full buildout of the railyard lands under the revised large footprint building site layout. The Citywide water network was modelled in WaterCAD to determine the effect that the proposed development would have on the existing network. Similar to the original proposed site layout, and as outlined below, the revised large footprint building site layout can be serviced by existing City of Regina infrastructure without significantly impacting the existing serviceability of the surrounding area.

ANALYSIS

The Railyard Renewal Project water distribution system was modelled in Bentley WaterCAD CONNECT Edition. The model was integrated into the City of Regina base model 'CoR_WaterCAD_Scenario-2015_Version-2017', received from the City of Regina on June 14, 2017. The city water distribution system was modelled in WaterCAD under the Peak Day, Peak Hour, and Peak Day + Fire Flow scenarios in alignment with criteria outlined in the City of Regina Development Standards Manual (DSM). The system was modeled both before and after the additional demands of the railyard development were added to the model to determine the effect the railyard development will have on the level of service of the city system. Figure 2 outlines the updated WaterCAD Network within the railyard lands.

Figure 2: WaterCAD Network - Large Footprint Building Site Layout

Similar to the analysis done for the original site layout, design populations were calculated by multiplying the projected floor use of each building provided by Urban Strategies by the following criteria as outlined in the City of Regina DSM:

- Residential (Apartments) - 1 person/ 35m^2
- Commercial – 1 person/ 23m^2

A design population of 10,000 persons was provided by the City for the large footprint building. These populations were evenly applied as per capita unit demands to nodes adjacent to each building within the WaterCAD model, based on the differing uses.

PEAK DAY DEMAND

The City of Regina DSM requires the following criteria to be satisfied under the Peak Day Demand Scenario:

Minimum Allowable Pressure……………..≥ 280.0 kPa
Maximum Allowable Pressure Drop………≤ 17 kPa

The model was run under the Peak Day Demand Scenario for anticipated conditions at full buildout of the revised railyard site plan. As summarized in Table 1, the addition of the development does not increase the Peak Day Demand deficiencies within the existing City system. Refer to Appendix A for full details on Peak Day Demand results.

Table 1: Peak Day Demand Summary

Peak Day Demand Summary			
	Pre-Development	**Post-Development**	**Difference**
Number of Nodes < 280 kPa	2/4634 (0.04%)	2/4647 (0.04%)	0/4647 (0.00%)
Number of Nodes with Pressure Drop > 17 kPa	N/A	0/12 (0%)	N/A
Maximum Pressure (kPa)	509.1 (J-13950)	509.1 (J-13950)	0.0
Minimum Pressure (kPa)	259.7 (J-9460)	259.5 (J-9460)	-0.2

*Population projections calculated by multiplying concept floor areas provided by Urban Strategies by densities outlined in the City of Regina DSM (1 person/35 m² - Apartments, 1 person/23 m² - Commercial)

PEAK HOUR DEMAND

The City of Regina DSM requires the following criteria to be satisfied under the Peak Hour Demand Scenario:

Minimum Allowable Pressure……………..≥ 269.4 kPa
Maximum Allowable Pressure Drop………≤ 27.6 kPa
Maximum Allowable Pipe Velocity……….≤ 1.5 m/s

The model was run under the Peak Hour Demand Scenario for anticipated conditions at full buildout of the revised railyard site plan. As summarized in Table 2, pressures and velocities reported at all nodes and pipes satisfy the above criteria. the addition of the development does not increase the Peak Hour Demand deficiencies within the existing City system. Refer to Appendix B for full details on Peak Hour Demand results.

Table 2: Peak Hour Demand Summary

Peak Hour Demand Summary			
	Pre-Development	**Post-Development**	**Difference**
Number of Nodes < 269.4 kPa	73/4634 (1.58%)	73/4647 (1.57%)	0/4647 (0.00%)
Number of Nodes with Pressure Drop > 27.6 kPa	N/A	0/12 (0%)	N/A
Maximum Pressure (kPa)	497.7 (J-13950)	497.7 (J-13950)	0.0
Minimum Pressure (kPa)	182.6 (J-9460)	182.2 (J-9460)	-0.4
Number of Pipes with Velocities > 1.5 m/s	11/6348 (0.25%)	11/6364 (0.03%)	0/6364 (0.00%)
Maximum Velocity (m/s)	2.98 (P-2115)	3.00 (P-2115)	0.02

*Population projections calculated by multiplying concept floor areas provided by Urban Strategies by densities outlined in the City of Regina DSM (1 person/35 m² - Apartments, 1 person/23 m² - Commercial)

PEAK DAY DEMAND + FIRE FLOW

The City of Regina DSM requires the following criteria to be satisfied under the Peak Day Demand + Fire Flow Scenario for the anticipated zoning for the railyard lands:

Fire Flow at Each Node…...........................≥ 250 L/s
Maximum Allowable Pipe Velocity………≤ 3.2 m/s

The model was run under the Peak Day Demand + Fire Flow Scenario for anticipated conditions at full buildout of the revised railyard site plan. The fire flow simulation was run with a maximum velocity constraint of 3.2 m/s applied to every pipe within the model. As summarized in Table 3, the addition of the development does not increase the Peak Day Demand + Fire Flow deficiencies within the existing City system. Refer to Appendix C for full details on Peak Day Demand + Fire Flow results.

Table 3: Peak Day Demand + Fire Flow Summary

Peak Day Demand + Fire Flow Summary			
	Pre-Development	**Post-Development**	**Difference**
Number of PDD+FF Node Deficiencies	1062/4634 (22.92%)	1062/4647 (22.85%)	0/4647 (0.00%)
Number of Pipes with Velocities > 3.2 m/s	0/6348 (0.00%)	0/6364 (0.00%)	0/6364 (0.00%)
Maximum Velocity (m/s)	1.7 (P-18060)	1.7 (P-18060)	0.0

*Population projections calculated by multiplying concept floor areas provided by Urban Strategies by densities outlined in the City of Regina DSM (1 person/35 m² - Apartments, 1 person/23 m² - Commercial)

**Level 3 fire flows of 250 L/s applied to each node as outlined in the City of Regina DSM

PROPOSED DEVELOPMENT

Water servicing may be provided to this development as shown in the water servicing concept shown in Figure 3. The following connections to the existing 600mm water main along Dewdney Avenue are proposed:

- 300 mm water main connected to the existing 600 mm water main at the western extents of the railyard lands along Dewdney Avenue
- 300 mm water main connected to the existing 600 mm water main at the intersection of Hamilton Street and Dewdney Avenue

The original concept showed a 300 mm watermain connection at the intersection of Lorne Street and Dewdney Avenue. Due to the location of the building, the proposed connection would be made along the western extents of the development; west of the Lorne Street and Dewdney Avenue intersection.

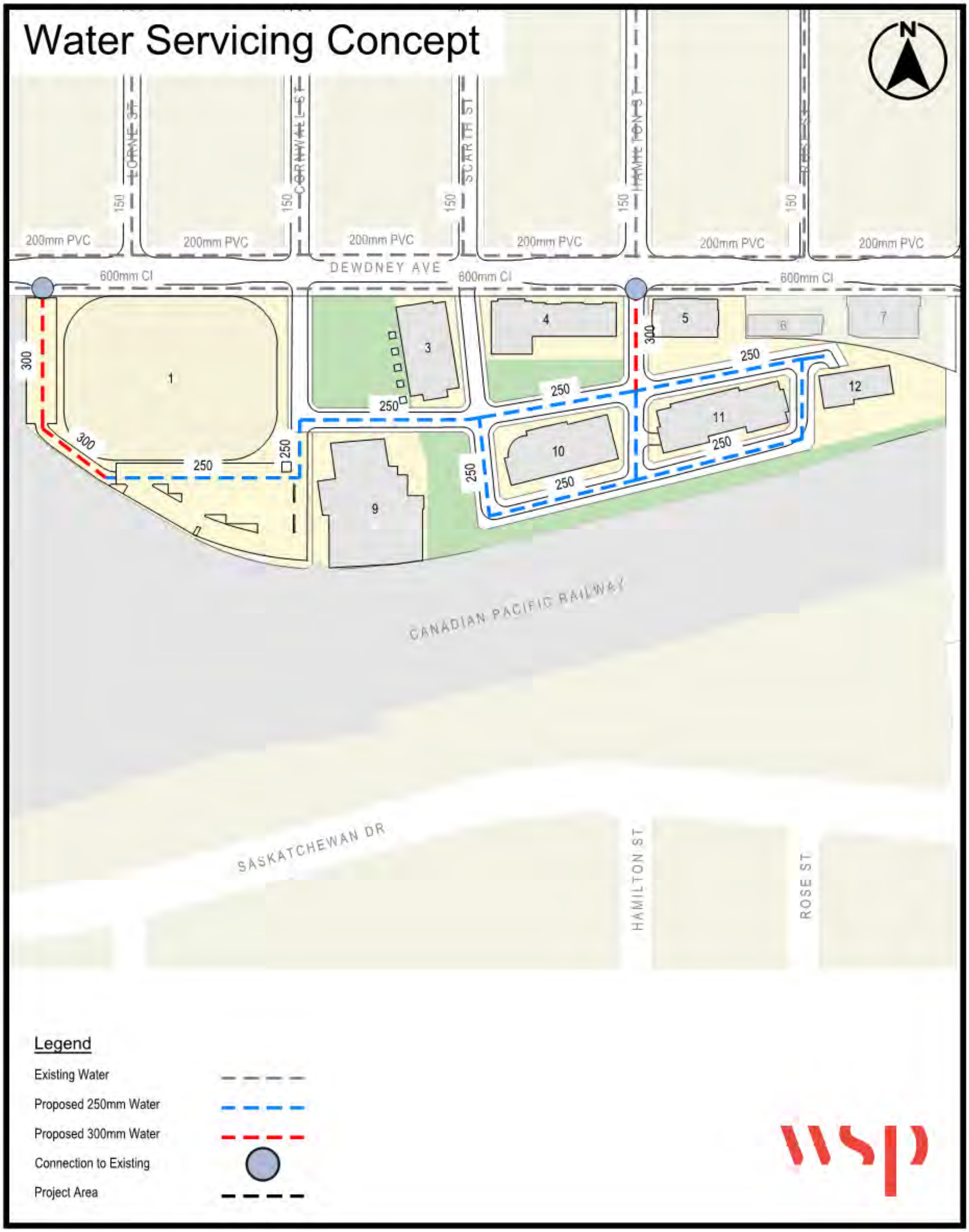

Figure 3: Water Servicing Concept

WATER SERVICING SUMMARY

No additional water mains or other water network infrastructure upgrades are needed to adequately service the full buildout of the railyard development. Construction of water servicing for the railyard development can begin by tying into the existing 600mm cast iron water main currently running along Dewdney Avenue, at the intersections outlined in Figure 3. Both 300mm tie-ins will be required for the first phase of the development. From there, the internal water distribution system may be constructed as required to service the additional phases and eventual full buildout of the railyard lands.

It is important to note that the existing 600mm cast iron watermain was constructed in 1913. Due to the pipes age, it is recommended that the City of Regina complete an asset management review of the watermain and considers full replacement of the main while the south side of Dewdney Avenue is reconstructed to accommodate the proposed development. Also note that there is an existing 200mm asbestos cement service stubbing into the development from the existing 200mm PVC watermain running along the North side of Dewdney Avenue. This service stubs south from the intersection of Lorne Street and Dewdney Avenue. A WaterCAD analysis was run using this existing service and it was determined that neither it, or any additional services off of the existing 200mm PVC watermain running along the North side of Dewdney would provide sufficient fire flow throughout the development. With this being the case, the existing 200mm asbestos cement service should be cut and capped at the main at the time of construction of the proposed 300mm service at the same intersection.

WASTEWATER SERVCING

The following outlines the proposed wastewater servicing concept for the full buildout of the railyard lands under the revised large footprint building site layout.

ANALYSIS

Similar to the analysis for the original site layout, design wastewater flows were calculated using the Harmon Method as outlined in the City of Regina DSM. Inflow from weeping tiles and foundation drains will be pumped to the surface, and not to the underground wastewater system resulting in wet weather inflows limited to the 21,000 L/ha/day allowance outlined in the DSM.

Derivation of the design average wastewater flows for the large footprint building are based off the following assumptions in alignment with the National Plumbing Code:

- 10,000 Occupants (50% Male, 50% Female) – A3 Occupancy
- 10 Concessions
- 10 Janitor Rooms
- 10 Hose Bibs for General Water Use
- 6 Dressing Rooms (Each with 1 urinal, 1 toilet and 4 showers)

Table 4 outlines the design fixture summary based on the above assumptions. Using these fixtures, the average wastewater flow projections at a full occupancy of 10,000 is 270USGPM (147.18Lpcd).

Table 4: Large Footprint Building Design Fixture Summary

Water Closets	80
Urinals	30
Lavatories	60
General use sinks	10
Dishwashers/Dishwashing sinks	10
Janitor Sinks	10
Showers	36
Hose Bibbs	10

Table 5 outlines anticipated the peak wastewater flows produced by the development.

Table 5: Design Wastewater Flow Summary

Building	Gross Area* (ha)	Residential Population**	Commercial Population**	Gross Density	Average Flow*** (LPCD)	Peak Flow Factor	Infiltration**** (L/s)	Peak Flow (L/s)
1 (LFPB)	2.24	0	10000	4464.29	147.18	2.95	0.54	50.88
3	0.80	0	178	222.50	454.00	4.17	0.19	4.09
4	0.66	323	253	872.73	325.59	3.94	0.16	8.72
5	0.28	174	134	1100.00	324.63	4.07	0.07	4.78
6	EXST	EXST	EXST	EXST	EXST	EXST	EXST	EXST
7	EXST	EXST	EXST	EXST	EXST	EXST	EXST	EXST
9	0.97	0	352	362.89	454.00	4.05	0.24	7.72
10	0.70	623	48	958.57	241.38	3.91	0.17	7.49
11	0.81	606	0	748.15	225.00	3.93	0.20	6.40
12	0.50	197	0	394.00	225.00	4.15	0.12	2.25
Totals	**6.96**	**1923**	**10965**	**-**	**-**	**-**	**-**	**92.33**

*Gross areas include building footprint and surrounding lands

**Population projections calculated by multiplying concept floor areas provided by Urban Strategies by densities outlined in the City of Regina DSM (1 person/35 m² - Apartments, 1 person/23 m² - Commercial)

***Weighted average based on population type as outlined in the City of Regina DSM (225Lpcd - Residential, 454Lpcd - Other Uses). Large Footprint Building (BLD 1) average flow based off the assumptions outlined above.

****Limited to 21,000 L/ha/day as outlined in the City of Regina DSM

PROPOSED DEVELOPMENT

The Railyard Renewal Project wastewater flows can be conveyed via a gravity collection system to the existing City of Regina 375mm sanitary sewer main, located along Dewdney Avenue. Wastewater servicing may be provided to this development as shown in the wastewater servicing concept illustrated in Figure 4. The following connections to the existing 375mm sanitary sewer main are proposed:

- 250 mm sanitary sewer main connected to the existing 375 mm sanitary sewer main at the intersection of Hamilton Street and Dewdney Avenue
- 300 mm sanitary sewer main connected to the existing 375 mm sanitary sewer main at the western extents of the railyard lands along Dewdney Avenue

The original concept has all sewage flows conveyed to a central point and discharging to the 375 mm VCT sewer pipe on Dewdney Avenue at Hamilton Street. Due to the land use changes created by the large footprint building, it is more economical to service the large footprint building directly from the 375 mm VCT sewer on Dewdney Avenue. Two connections to the Dewdney Avenue sewer are proposed.

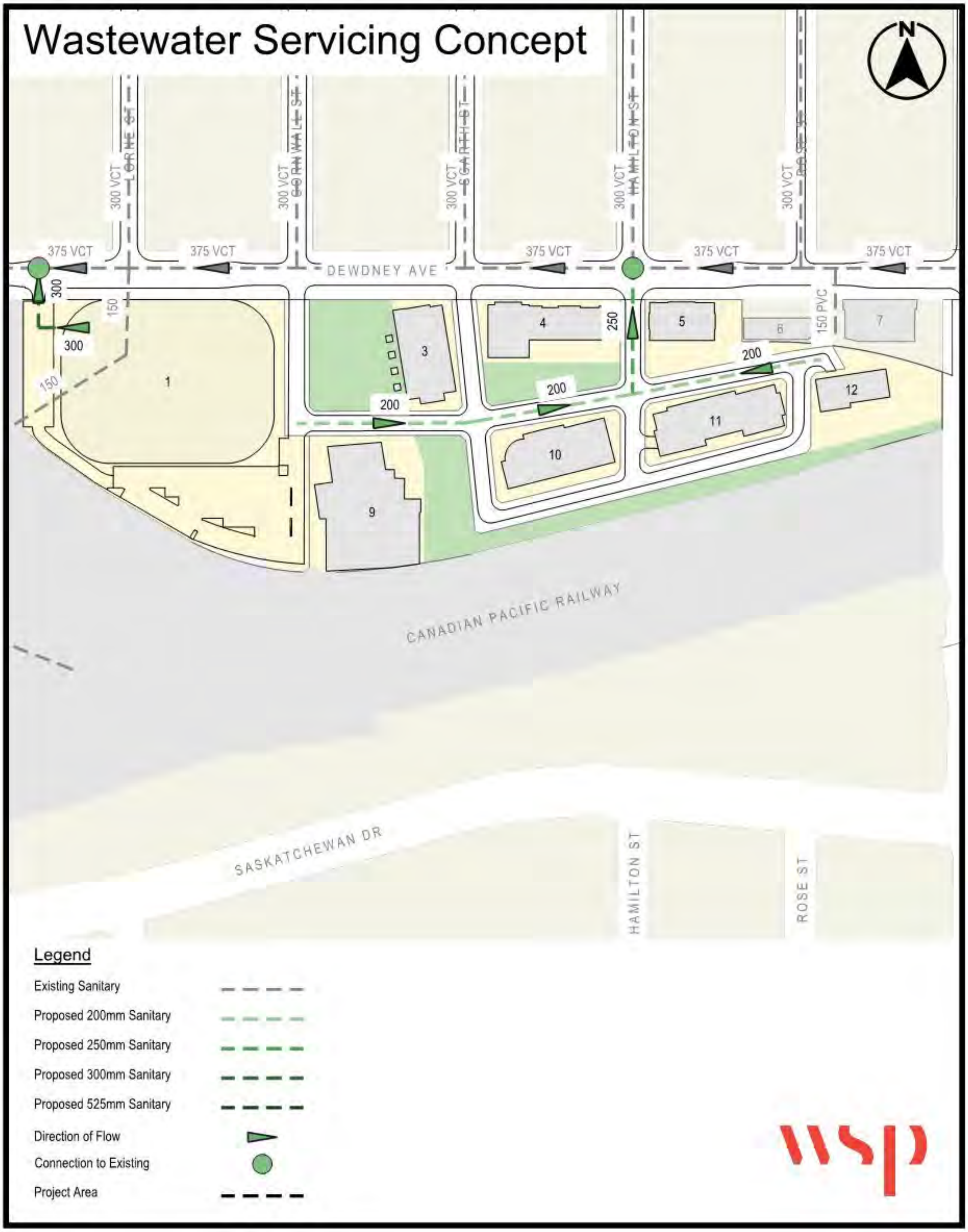

Figure 4: Wastewater Servicing Concept

WASTEWATER SERVICING SUMMARY

Currently there are no sanitary sewer mains within the proposed development area that are suitable to be tied into for servicing of the development. To service the development, connections to the existing 375mm sanitary sewer main along Dewdney Avenue can be made, in conjunction with the construction of the Railyard Renewal Project's internal sanitary sewer network. Existing topography, as well as the existing of invert elevations at the tie-in points of the existing 375 sanitary sewer main allow the entire extents of the Railyard Renewal Project to be service via gravity flow; there is no need for an internal lift station to service wastewater flows produced within the project area.

It is important to note that there is an existing 150mm sanitary line constructed in 2001 that cuts through the Railyard property from the intersection of Lorne Street and Dewdney Avenue to the Canadian Pacific Railway lands to the southwest. This line is likely to conflict with the development of the Railyard lands, and consequently will need to be relocated if it is still active.

Computer modelling, that is outside the scope of this report, will need to be done during detailed design to determine the full impact that the additional wastewater flows will have on the surrounding sanitary sewer infrastructure. On-site storage may be required to attenuate peak wet weather sanitary flows entering the existing City system.

STORM WATER SERVICING

The following outlines the proposed storm water servicing concept for the full buildout of the railyard lands under the revised large footprint building site layout. The City of Regina's storm water management strategy follows the urban dual drainage concept whereby the minor (piped) system conveys flows generated by the 1:5 year storm event, and the major (surface) system manages flows generated by the 1:25 year event, for an infill development. As is outlined below, the entire extents of the revised layout for the railyard lands can be serviced via gravity flow to existing City of Regina storm infrastructure located along Dewdney Avenue.

ANALYSIS

In order to minimize impact on the existing storm water system, on-site storm water management is required to detain flows produced by a 24-hour 1:25 year event. Storm water flows for this development were modelled using PCSWMM 2017 Professional 2D. City of Regina design 1:25 year 24-hour storm event was input into the model based on design storm data outlined in KGS's City of Regina Drainage Masterplan Report (2009). Refer to Appendix D for details on design storm data.

With the updated site layout, average projected percent imperviousness increased from 80.0% to 86.2% for the extents of the site in comparison to the original site. This increased imperviousness resulted 1:25 year 24-hour storm runoff increasing from 5,900m^3 to 6,200m^3 within the PCSWMM Model. Additional on-site storage is required to detain the additional runoff. A summary of the on-site storage available to detain the required 6,200m^3 is as follows:

- Pipe Storage – 2,490m^3
- Roadway ponded area storage – 1,000 m^3
- 'City of Regina Standard for Drainage from Building site and Parking Lot Developments' requirement of 50mm storage depth over the individual site - 2,800 m^3

The majority of the surface of the existing site consists of a granular material with some vegetation growing through. The predevelopment imperviousness of the site was assumed to be 70% based on these conditions. Existing grading of the site directs sheet flows from the site to Dewdney Avenue where they are serviced by the existing major and minor systems along the roadway corridor. This minor and major system directs these flows to the North. Based on the above assumptions, the modelled peak predevelopment flow rates discharged from the site during a 1:25 year storm event are 310L/s/Ha.

The post development average site imperviousness based on the updated concept site plan is 86.2%. The resulting peak post-development flows produced by the site are 326L/s/Ha. As stated above, the majority of these flows will be stored on site, with a restricted minor system outfall discharging flows to the existing minor system at rates equivalent to flows produced by a 1:5 year storm event. The proposed minor system discharge point, as outlined below, is to the existing 2400mm detention pipe running west to east along Dewdney Avenue directly upstream of the Broad Street Lift Station.

PROPOSED DEVELOPMENT

The proposed storm water servicing concept is outlined in Figure 5. Similar to the proposed storm water servicing for the original site layout, to provide the required storage while also minimizing impacts on existing storm water network, the following connection to existing storm water infrastructure is proposed:

- 250 mm storm water restrictor connected to the existing 2400mm storm water CSP at the intersection of Hamilton Street and Dewdney Avenue.

Changes made relative to the storm water servicing concept for the original site layout are as follows:

- Underground inline storage updated to 2400mm x 2400mm box sections from the 2400mm diameter circular section to increase underground inline storage.
- Alignment and sizing of west most undergrounds updated to service runoff captured within the parking fields adjacent to the large footprint building.

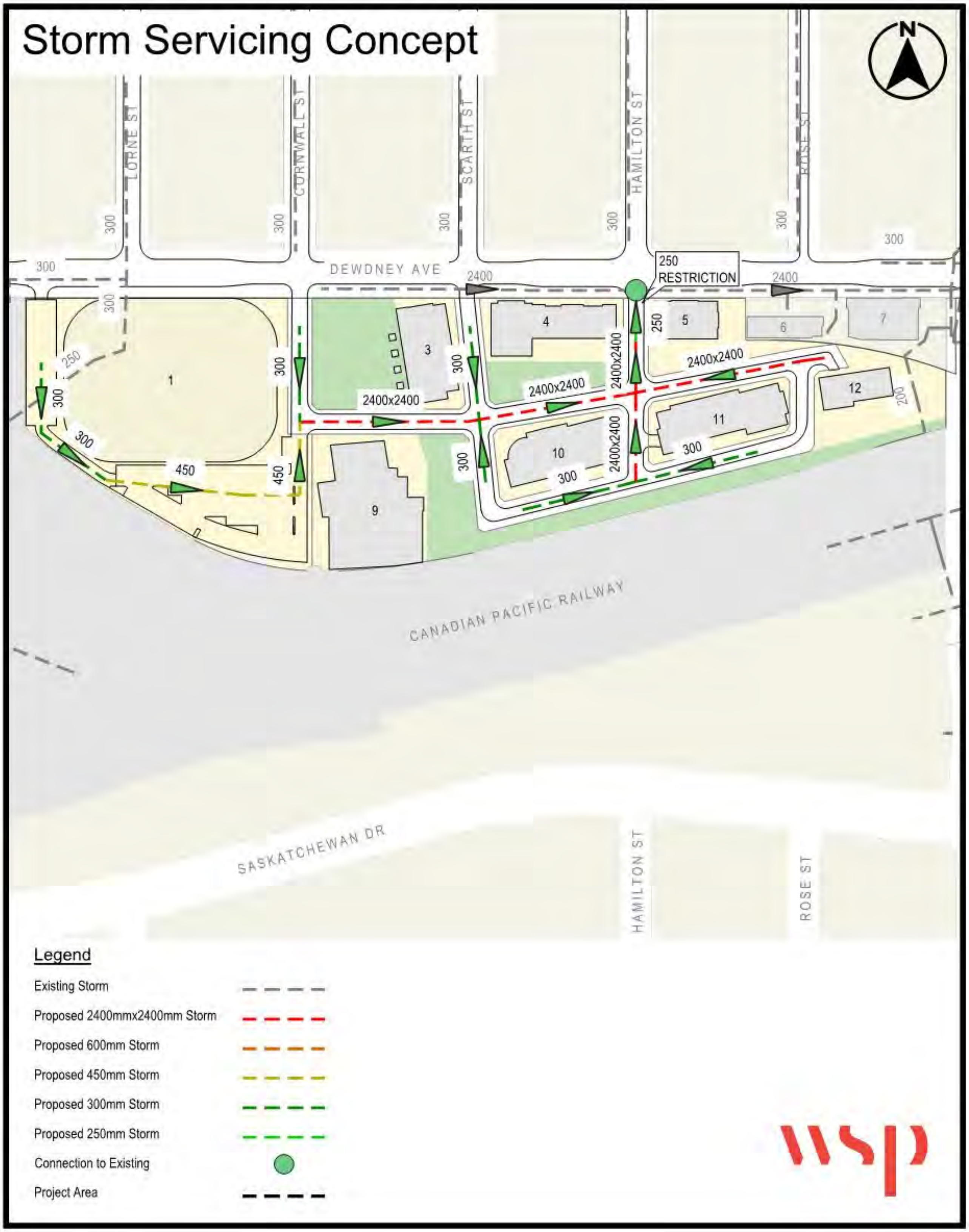

Figure 5: Storm Water Servicing Concept

STORMWATER SERVICING SUMMARY

To summarize, with regards to the storm water servicing concept, no dramatic changes are necessary to accommodate the large footprint building site layout. Between the combination of on-site inline underground storage, individual on-site parcel storage, and additional surface storage within the internal roadways, there is enough detention storage to accommodate the 1:25 year 24-hour storm detention requirement outlined in the City of Regina DSM.

Currently there are no storm sewer mains within the proposed development suitable to be connected to. The restricted connection to the existing 2400mm storm water sewer is required to be constructed in conjunction with the railyard project internal minor system. Existing topography, as well as the existing of invert elevations at the tie-in point of the existing 2400 storm main, allow the entire extents of the railyard development to be service via gravity flow; there is no need for an internal lift station to service storm water flows. Further analysis that is outside of the scope of this report may be needed to ensure that the additional flows produced by this development can be handled by the existing capacity of the Broad Street Lift Station. It is anticipated, however, that the use of onsite storage and a restricted outfall that release flows at rates equivalent to a 1:5 year storm event, that the current level of service of the lift station will not be impacted by this development.

It is important to note that there are existing 250mm and 300mm storm lines that cut through the Railyard property from the intersection of Lorne Street and Dewdney Avenue to the Canadian Pacific Railway lands to the southwest. These lines are likely to conflict with the development of the Railyard lands, and consequently will need to be relocated if they are still active. Similarly, there is an existing 200mm storm line at the East end of the property that will likely need to be decommissioned and removed to accommodate the construction of Building 12 in the current concept plan.

CONCLUSION

The revised site plan updated to accommodate a large footprint building does not significantly impact the serviceability of the railyard lands for water, wastewater and storm water perspective. Preliminary concept servicing schematics for water, wastewater and storm water servicing are shown on Figures 3, 4 and 5 respectively.

Water servicing will require:

- 300 mm water main connected to the existing 600 mm water main at the western extents of the railyard lands along Dewdney Avenue.
- 300 mm water main connected to the existing 600 mm water main at the intersection of Hamilton Street and Dewdney Avenue.

Wastewater Servicing will require:

- 250 mm sanitary sewer main connected to the existing 375 mm sanitary sewer main at the intersection of Hamilton Street and Dewdney Avenue.
- 300 mm sanitary sewer main connected to the existing 375 mm sanitary sewer main at the western extents of the railyard lands along Dewdney Avenue.

Storm Water Servicing will require:

- Underground inline storage updated to 2400mm x 2400mm box sections from the 2400mm diameter circular section to increase underground inline storage.
- Alignment and sizing of west most undergrounds updated to service runoff captured within the parking fields adjacent to the large footprint building.
- A restricted outlet at Dewdney Avenue to control storm water flows during major rain events.

All three adequately service the proposed development with respect to the criteria outlined in the City of Regina DSM. Refer to the accompanying information presented throughout the Appendices for further detail on modelling results.

ADDITIONAL ANALYSIS

This amendment was prepared to evaluate the relative impact a large footprint building would have on the proposed Railyard Lands development for infrastructure planning purposes. Additional analysis is required during detailed design once land uses are finalized. The full scope of the analysis is to be determined by the Engineer at the time of detailed design; however, the following is recommended as a minimum:

- Analyse the existing sewage flows during wet weather events within the 375 mm VCT sanitary sewer on Dewdney Avenue with respect to the sewage flows generated by this development.
- Analyse the existing storm water flows in the existing 2400 mm sewer on Dewdney Avenue with respect to the additional flows generated by this development.
- Verify the capacity of the Broad Street Storm Water Lift Station to verify existing and future capacity of this development.

If you have any questions about the information presented in this memo, please don't hesitate to contact me.

Jordan Stepan, P.Eng. Engineer, Land Development	Chad Bialobzyski, P.Eng. Manager, Infrastructure