



TRAFFIC IMPACT STUDY

QUIKTRIP 4201

Commerce City, CO

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TABLE OF CONTENTS

Executive Summary	5
Site Location and Study Area	5
Description of Proposed Development	5
Conclusions and Recommendations	5
Conclusions.....	5
Recommendations	5
I. Introduction	6
Overview	6
Site Location and Study Area	6
Site Description and Access	7
Figure 1-1 Site Location.....	8
Figure 1-2 Site Plan	9
Figure 1-3 Existing Zoning.....	10
II. Background Information.....	11
Study Area	11
Study Assumptions	11
Study Methodology	11
Existing Roadway Network	11
Crash Data.....	12
Figure 2-1 Existing Lane Use and Traffic Control.....	13
III. Analysis of Existing Conditions	14
Traffic Volumes	14
Operational Analysis	14
Existing Intersection Queues	14
Figure 3-1 Existing Volumes.....	15
Figure 3-2 Existing LOS.....	16
Table 3-1 Existing LOS	17
Table 3-2 Existing Queues.....	18
IV. Analysis of Future Conditions without Site Development.....	19
Methodology.....	19
Regional Growth	19
Background Traffic Forecasts	19
Background Future Levels of Service	19
Background Future Queueing.....	19

Figure 4-1 Background Growth 2025.....	20
Figure 4-2 Background Growth 2045.....	21
Figure 4-3 Background Future Forecasts 2025	22
Figure 4-4 Background Future Forecasts 2045	23
Figure 4-5 Background Future Levels of Service 2025	24
Figure 4-6 Background Future Levels of Service 2045	25
Table 4-1 Background Levels of Service	26
Table 4-2 Background Queues	27
V. Site Analysis	28
Overview	28
Proposed Site Access	28
Trip Generation	28
Figure 5-1 Total Future Lane Use and Traffic Control	30
Figure 5-2 Pass-by Trips.....	31
Figure 5-3 Site Trips.....	32
Table 5-1 Site Trip Generation.....	33
VI. Analysis of Future Conditions with Site Development.....	34
Total Future Traffic Forecasts.....	34
Total Future Levels of Service with Proposed Development	34
Total Future Queuing	34
Auxiliary Lanes.....	34
Figure 6-1 Total Future Forecasts 2025	36
Figure 6-2 Total Future Forecasts 2045	37
Figure 6-3 Total Future Levels of Service 2025.....	38
Figure 6-4 Total Future Levels of Service 2045.....	39
Table 6-1 Future Levels of Service	40
Table 6-2 Future Queues.....	41
VII. Conclusions and Recommendations	42
Conclusions.....	42
Recommendations	42

Appendices:

- A. Full Sized Conceptual Site Plan
- B. LOS Descriptions
- C. Crash Data & Traffic Counts
- D. Existing Synchro Outputs
- E. Background (without site development) Synchro Outputs
- F. Future (with site development) Synchro Outputs

Executive Summary

Site Location and Study Area

The property that comprises the application area for the proposed development is approximately 2.4 acres in size and is identified as Adams County Parcel Number 0172128300113. It is located north of the CO-2/Quebec Parkway/Rosemary Street intersection in Commerce City, CO. It is zoned Agricultural District (AG) and is currently occupied by a residential building.

The study area is generally bounded by CO-2 to the east, Rosemary Street to the west and south, and property lines to the north. The study area for the project includes those intersections identified by Staff that could be affected by the proposed development:

- CO-2/Quebec Parkway/Rosemary Street
- 80th Avenue/Rosemary Street
- Proposed site accesses

Description of Proposed Development

The Applicant, QuikTrip, seeks to develop the property with a gas station with convenience store use. Site access is proposed via one right-in/right-out (RIRO) access and one full movement access on Rosemary Street.

Conclusions and Recommendations

Conclusions

Based on the results of this traffic impact study, the following may be concluded:

- Under existing traffic conditions, the intersections within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours, and queues remain within their respective storage lengths.
- Under background future 2025 and 2045 traffic conditions, without the development of the subject site, delays would increase slightly at study intersections due to regional traffic growth. The intersections are still forecasted to operate at LOS “D” or better.
- In the background future 2045 scenario, the SBL queue at the CO-2/Quebec Parkway/Rosemary Street intersection is expected to exceed its storage length during the AM peak hour.
- The proposed site development would generate, upon completion and full occupancy, 104 net new weekday AM and 91 net new weekday PM peak hour vehicle trips as well as 1,029 net new weekday daily trips.
- Under total future 2025 and 2045 traffic conditions with development of the site, the intersections within the study area would operate consistent with background conditions.

Recommendations

- It is recommended that the Applicant provide access consistent with the site plan contained herein.

I. Introduction

Overview

This report presents the results of a Traffic Impact Study (TIS) conducted in support of a site plan to develop a gas station with convenience store use in Commerce City, CO. Currently the site vacant.

Per the requirements of the City of Commerce City Engineering Construction Standards and Specifications, a Transportation Impact Study is required to support the proposed development.

Site Location and Study Area

The property that comprises the application area for the proposed development is approximately 2.4 acres in size and is identified as Adams County Parcel Number 0172128300113. It is located north of the CO-2/Quebec Parkway/Rosemary Street intersection in Commerce City, CO, as shown on Figure 1-1. It is zoned Agricultural District (AG) and is currently occupied by a residential building. Site access is proposed via one right-in/right-out (RIRO) access and one full movement access on Rosemary Street.

The Applicant, QuikTrip, seeks to develop the property with a gas station with convenience store use. A reduction of the Applicant's proposed conceptual site plan is provided on Figure 1-2. A full-size copy of the plan is provided in Appendix A.

The study area is generally bounded by CO-2 to the east, Rosemary Street to the west and south, and property lines to the north

Tasks undertaken in the course of this study included the following:

1. Reviewed the Applicant's proposed development plans and other background data.
2. Conducted a virtual field reconnaissance of existing roadway and intersection geometries, traffic controls, and speed limits.
3. Conducted peak hour turning movement counts at the key intersections.
4. Analyzed existing levels of service at each of the key study intersections based on the methodologies set forth in the Highway Capacity Guidelines (HCM) 6th Edition as reported by Synchro version 11.
5. Forecasted background future traffic volumes based on baseline traffic counts and regional traffic growth for 2025 (build-out) and 2045 (long-range) conditions.
6. Calculated background levels of service at each of the key study intersections for the projected build-out years based on background future traffic forecasts, and the existing lane use and traffic controls.
7. Estimated the number of AM and PM peak hour trips that would be generated by the proposed use based on the Institute of Transportation Engineers (ITE) Trip Generation 11th Edition rates/equations and methodologies
8. Prepared AM and PM peak hour total future traffic forecasts based on background traffic forecasts plus site traffic assignments for the 2025 (build-out), as well as 2045 (long-range) conditions.

9. Calculated total future levels of service for each of the key study intersections based on projected total future traffic forecasts, existing/future traffic controls and intersection geometries.
10. Identified roadway improvements required to accommodate future traffic volumes as necessary.

Sources of data for this analysis included the Institute of Transportation Engineers (ITE), Trip Generation, 11th edition, the Highway Capacity Guidelines HCM 6th, QuikTrip, City of Commerce City, Colorado and the files/library of Galloway.

Site Description and Access

Site Conditions

The terrain proximate to and surrounding the site is generally classified as “level”.

Hazardous Conditions

Based on the field reconnaissance in the vicinity of the subject site, no hazardous features or constraints were identified.

Proposed Site Access

Access to the site is being proposed via one right-in/right-out (RIRO) access and one full movement access on Rosemary Street.

Existing Zoning

The subject site is currently zoned Agricultural District (AG) and is currently occupied by a residential building. Figure 1-3 depicts the existing zoning associated with the subject property, as well as neighboring properties as shown on the City of Commerce City zoning map.

Nearby Uses

The properties surrounding the subject site are generally developed with a mix of industrial and commercial uses.



FIGURE 1-1
SITE LOCATION



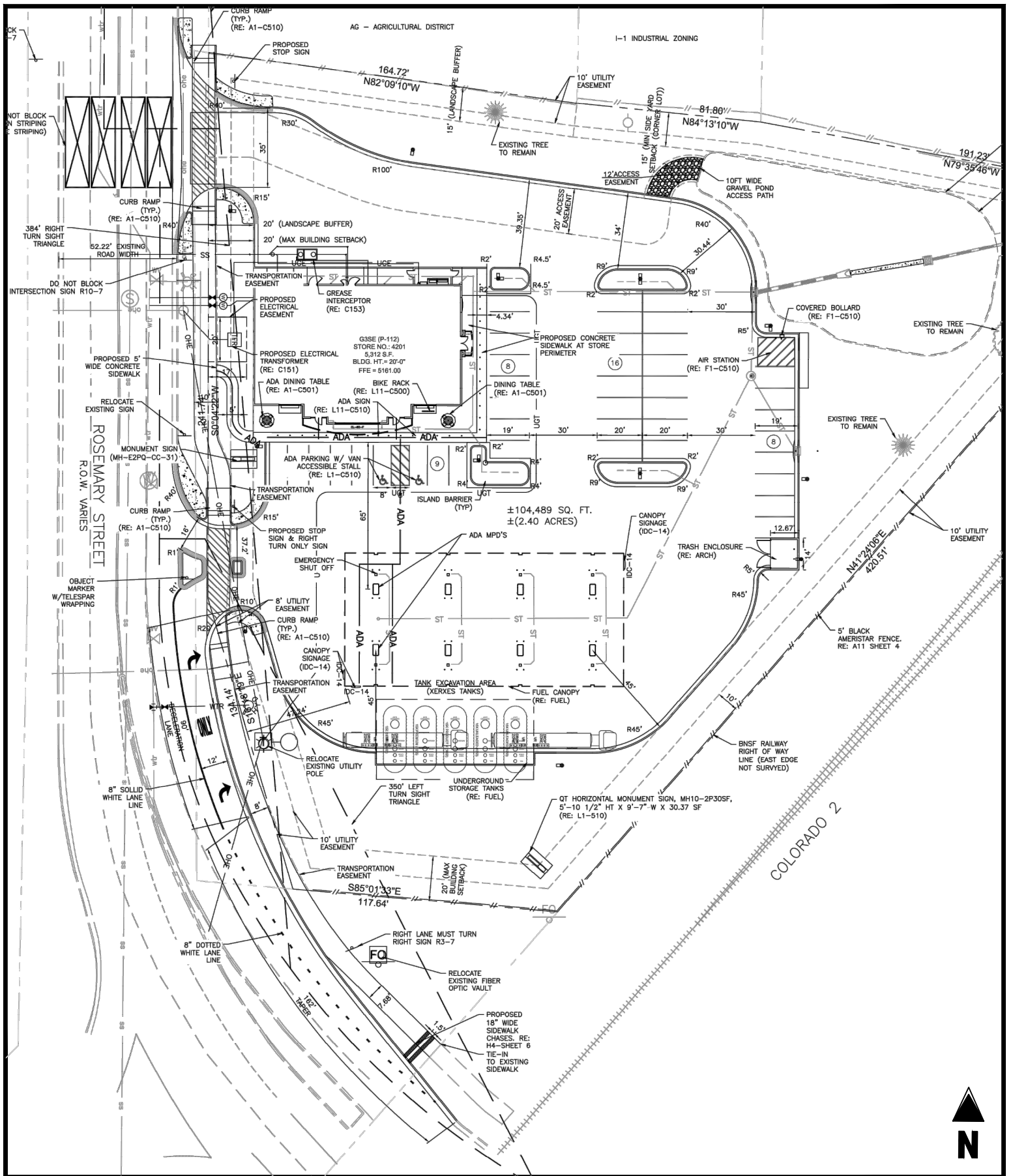


FIGURE 1-2
SITE PLAN



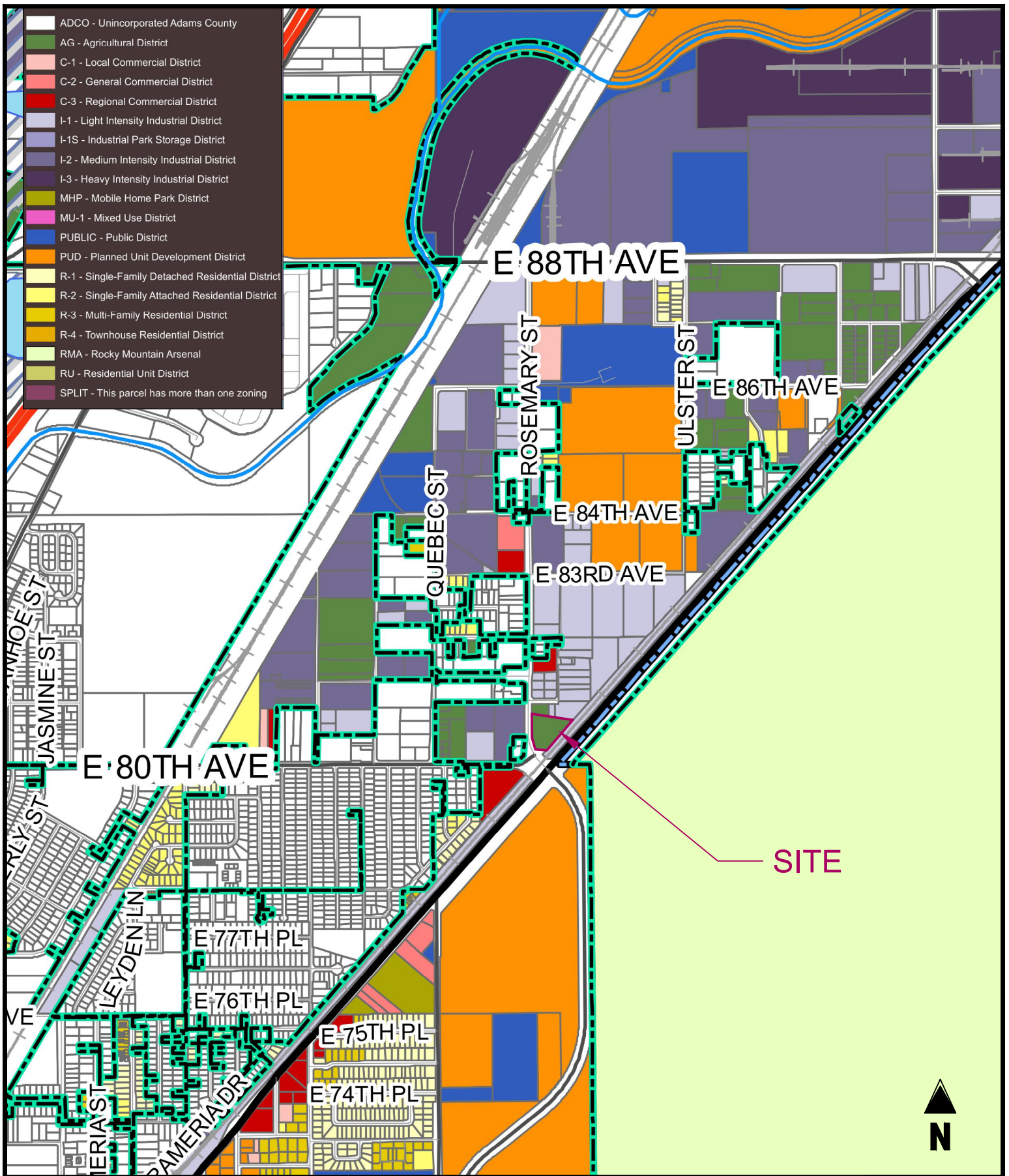


FIGURE 1-3
EXISTING ZONING



II. Background Information

Study Area

The study area was determined by a review of intersections that would experience a significant portion of turning movement volumes generated by the site. As such, the traffic study focuses primarily on the following intersections:

Study Intersections

- CO-2/Quebec Parkway/Rosemary Street
- 80th Avenue/Rosemary Street
- Proposed site accesses

Study Assumptions

For purposes of this analysis only, the proposed uses are assumed to be built and occupied in one distinct phase. It was assumed that the use would be built and operational in study year 2025. A long-term analysis of 2045 is also provided.

Study Methodology

Synchro software version 11 was used to evaluate levels of service at each of the study intersections during the weekday AM and PM peak hours. Synchro is a macroscopic model used for optimizing traffic signal timing and performing capacity analyses. The software can model existing traffic signal timings or optimize splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network. Synchro allows the user to evaluate the effects of changing intersection geometrics, traffic demands, traffic control, and/or traffic signal settings as well as optimize traffic signal timings.

The levels of service reported for the signalized and unsignalized intersections analyzed herein were taken from the Highway Capacity Manual (HCM) 6th reports generated by Synchro 11. Level of service descriptions are included in Appendix B.

In order to maintain a conservative analysis a default percent heavy vehicle (%HV) factor of 6% was used for all movements in the study area consistent with collected data.

Existing Roadway Network

Regional access to the subject site is provided via CO-2 and Quebec Parkway, and local access is provided via Rosemary Street. Figure 2-1 depicts existing lane use and traffic controls in the vicinity of the subject site. The following provides a description of each of the roadways within the study network.

CO-2

CO-2 is constructed as an east/west four-lane highway with turn lanes at major intersections and a posted speed limit of 45 mph in the vicinity of the subject site. The City of Commerce City classifies the road as a Principal Arterial. The intersection with the Quebec Parkway/Rosemary Street operates under signalized control.

Quebec Parkway

Quebec Parkway is constructed as a north/south four-lane divided section with turn lanes at major intersections and a posted speed limit of 45 mph in the vicinity of the subject site. The City of Commerce City classifies the road as a Principal Arterial. The intersection with the CO-2/Rosemary Street operates under signalized control.

Rosemary Street

Rosemary Street is constructed as a north/south four-lane divided section with a posted speed limit of 35 mph in the vicinity of the subject site. The City of Commerce City classifies the road as a Major Collector. The intersection with the CO-2/Quebec Parkway operates under signalized control.

Crash Data

Crash data for traffic incidents that occurred between 2018-2022 in the vicinity of the subject site were obtained from the City. The data shows a total of 74 crashes reported at or near the CO-2/Quebec Parkway/Rosemary Street intersection and 63 crashes reported at various location along Rosemary Street over the 5 year period.

# of Crashes: (2018-2022)	CO-2/Quebec Parkway/Rosemary Street:
45	At Intersection/Intersection Related
29	Non-Intersection
74	TOTAL

This represents 9 at intersection crashes per year.

The provided data reports a total of 63 crashes at the following locations along Rosemary Street:

# of Crashes: (2018-2022)	Location:
2	80 th Avenue/Rosemary Street
12	81 st Avenue/Rosemary Street
4	82 nd Avenue/Rosemary Street
2	83 rd Avenue/Rosemary Street
20	84 th Avenue/Rosemary Street
19	86 th Avenue/Rosemary Street
4	Rosemary Street
63	TOTAL

This represents an average of 1.8 crashes per year at each intersection.

No specific safety issue was identified related to the reported crash data. Reduced data set provided within Appendix C.

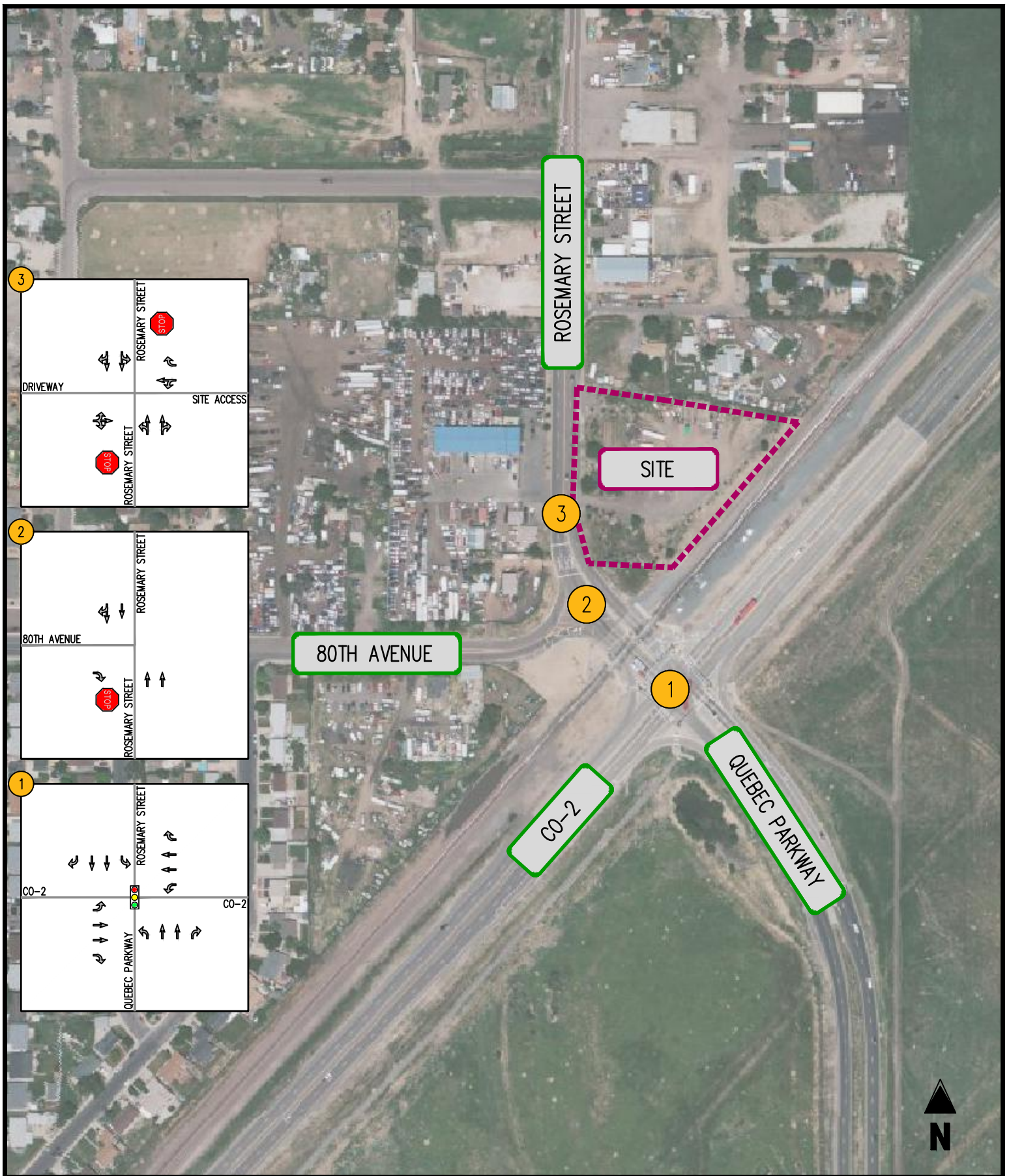


FIGURE 2-1
EXISTING LANE USE AND TRAFFIC CONTROL



III. Analysis of Existing Conditions

Traffic Volumes

Weekday AM and PM peak hour traffic volumes counts were conducted on Wednesday November 02, 2022 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM at the study intersections by IDAX Data Solutions.

For purposes of this study, peak hour of the network was selected based on a review of the intersection volumes. These volumes were balanced to the greatest volumes observed to provide a conservative analysis.

The existing volumes are summarized on Figure 3-1. Copies of traffic counts are included in Appendix C. Existing peak hour factors (PHF) were also computed by approach from the traffic counts and applied to the analysis with a minimum of 0.85 and a maximum of 0.92.

Operational Analysis

Capacity/level of service (LOS) analyses were conducted at the study intersections based on the existing lane use and traffic controls shown on Figure 2-1 and existing baseline vehicular traffic volumes shown on Figure 3-1. The capacity analysis results are presented in Appendix D and summarized in Table 3-1 and on Figure 3-2.

As shown in Table 3-1, the signalized intersections in the study area currently operate at overall acceptable levels of service (LOS) "C" or better during the weekday peak hours. The stop control intersections operate at LOS "B" or better during the weekday peak hours.

Existing Intersection Queues

An analysis of intersection 95th-percentile queues was performed at key locations. The results of the queuing analysis, as reported by Synchro, are summarized in Table 3-2. As shown in the table, queues are contained within their effective storage.

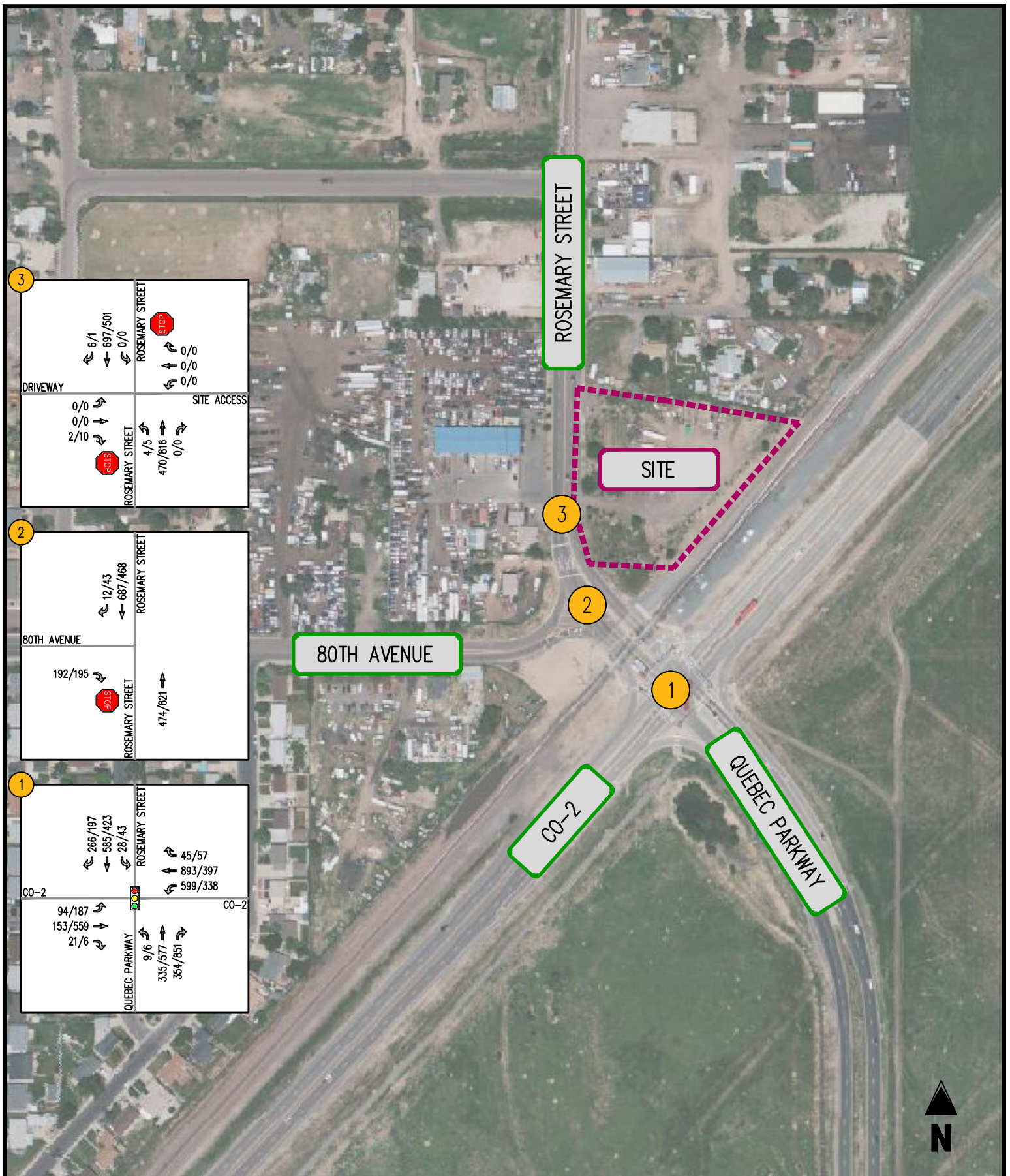


FIGURE 3-1
EXISTING VOLUMES

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- ⚠️ YIELD SIGN



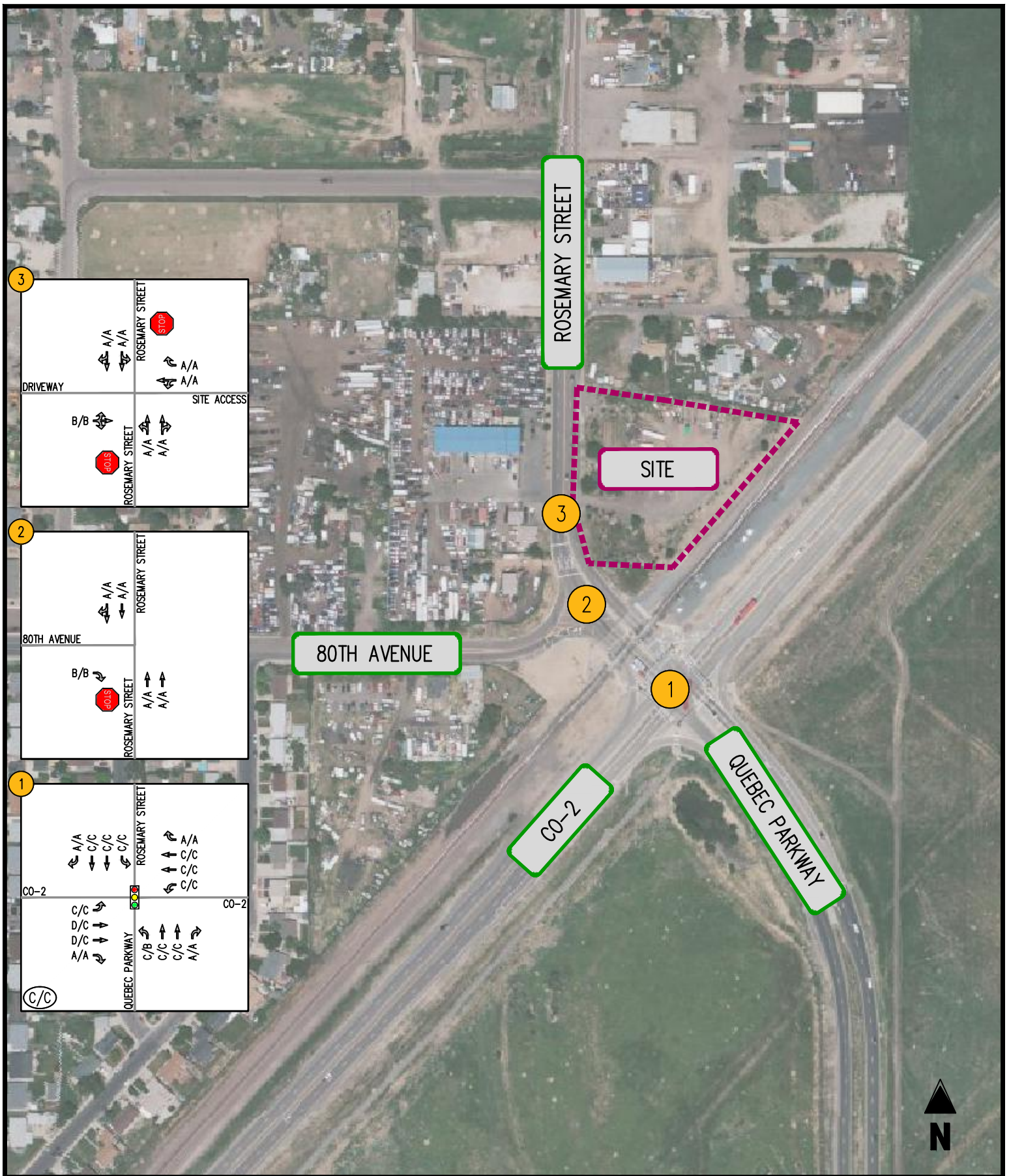


FIGURE 3-2
EXISTING LOS

QUIKTRIP 4201
COMMERCE CITY, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



Table 3-1
 QuikTrip 4201 - Commerce City, CO
 Existing Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2022	
				AM Peak Hour	PM Peak Hour
1 Rosemary Street/Quebec Parkway/CO-2	SIGNAL	Rosemary Street	EBL	C (23.4)	C (21.9)
			EBT	D (37.0)	C (27.6)
			EBR	A (0.0)	A (0.0)
		Quebec Parkway	WBL	C (24.0)	C (20.4)
			WBT	C (30.1)	C (30.1)
			WBR	A (0.0)	A (0.0)
			NBL	C (27.3)	B (20.0)
		CO-2	NBT	C (31.6)	C (30.0)
			NBR	A (0.0)	A (0.0)
			SBL	C (35.0)	C (29.2)
		CO-2	SBT	C (24.0)	C (22.9)
			SBR	<u>A (0.0)</u>	<u>A (0.0)</u>
		Overall			C (30.5)
2 80th Avenue/Rosemary Street	STOP	80th Avenue	EBR	B [14.3]	B [12.3]
			NBT	A [0.0]	A [0.0]
		Rosemary Street	SBTR	A [0.0]	A [0.0]
3 Site Access/Rosemary Street	STOP	Driveway	EBLR	B [11.0]	B [10.3]
			WBR	A [0.0]	A [0.0]
		Site Access	NBLT	A [9.4]	A [8.8]
		Rosemary Street	NBTR	A [0.0]	A [0.0]
		Rosemary Street	SBTR	A [0.0]	A [0.0]

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 3-2
 QuikTrip 4201 - Commerce City, CO
 Existing Intersection Queueing Summary (1)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2022	
					AM Peak Hour	PM Peak Hour
1 Rosemary Street/Quebec Parkway/CO-2 ⁽¹⁾	SIGNAL	Rosemary Street	EBL	250	38	42
			EBT	-	342	184
			EBR	150	74	53
		Quebec Parkway	WBL	550	18	12
			WBT	-	181	264
			WBR	400	0	0
		CO-2	NBL	400	58	133
			NBT	-	73	256
			NBR	550	0	0
		CO-2	SBL	650	568	384
			SBT	-	385	178
			SBR	450	0	0
2 80th Avenue/Rosemary Street ⁽¹⁾	STOP	80th Avenue	EBR	-	42.5	32.5
			NBT	-	0	0
		Rosemary Street	SBTR	-	0	0
3 Site Access/Rosemary Street ⁽¹⁾	STOP	Driveway	EBLR	-	0	2.5
			WBR	-	0	0
		Site Access	NBLT	-	0	0
			NBTR	-	0	0
		Rosemary Street	SBTR	-	0	0

Notes : (1) Queue length is based on the 95th percentile queue as reported by Synchro, Version 11.

IV. Analysis of Future Conditions without Site Development

Methodology

The future traffic forecasts, without the proposed new use, were developed for 2025 and 2045 conditions based on a composite of existing baseline traffic volumes and regional traffic. A 1.0% growth factor per year was applied to existing traffic on CO-2 and Quebec Parkway.

Regional Growth

Increases in traffic associated with regional growth were estimated at 1.0 percent per year compounded for movements along CO-2 and Quebec Parkway up to 2025 as well as to 2045. This growth accounts for increases in traffic resulting from influences outside of the immediate study area. The resulting increases in volumes within the study area are reflected on Figure 4-1 for 2025 conditions and Figure 4-2 for 2045 conditions.

Background Traffic Forecasts

The existing traffic forecasts depicted on Figure 3-1 and the regional growth shown on Figure 4-1 (2025) and Figure 4-2 (2045) were added together to yield the background future traffic forecasts shown on Figure 4-3 for 2025 conditions and Figure 4-4 for 2045 conditions.

Background Future Levels of Service

Capacity analyses of 2025 and 2045 future traffic conditions without the proposed development are provided in Appendix F and summarized in Table 4-2. The forecasted levels of service are also depicted graphically on Figure 4-5 for 2025 conditions and Figure 4-6 for 2045 conditions.

As shown on Table 4-1, the intersections within the study area would continue to operate at overall acceptable LOS "D" or better during the AM and PM peak hours for background future conditions.

Background Future Queueing

An analysis of intersection queues was performed at key locations under background future traffic conditions. The results of the queuing analysis are summarized in Table 4-3.

As shown in the table, queues within the study network will increase due to regional traffic growth. Forecasted queues are consistent with existing conditions. All queues are expected to be contained in their effective storage with the exception of the SBL movement at the CO-2/Quebec Parkway/Rosemary Street intersection during the AM peak hour under 2045 future traffic conditions.

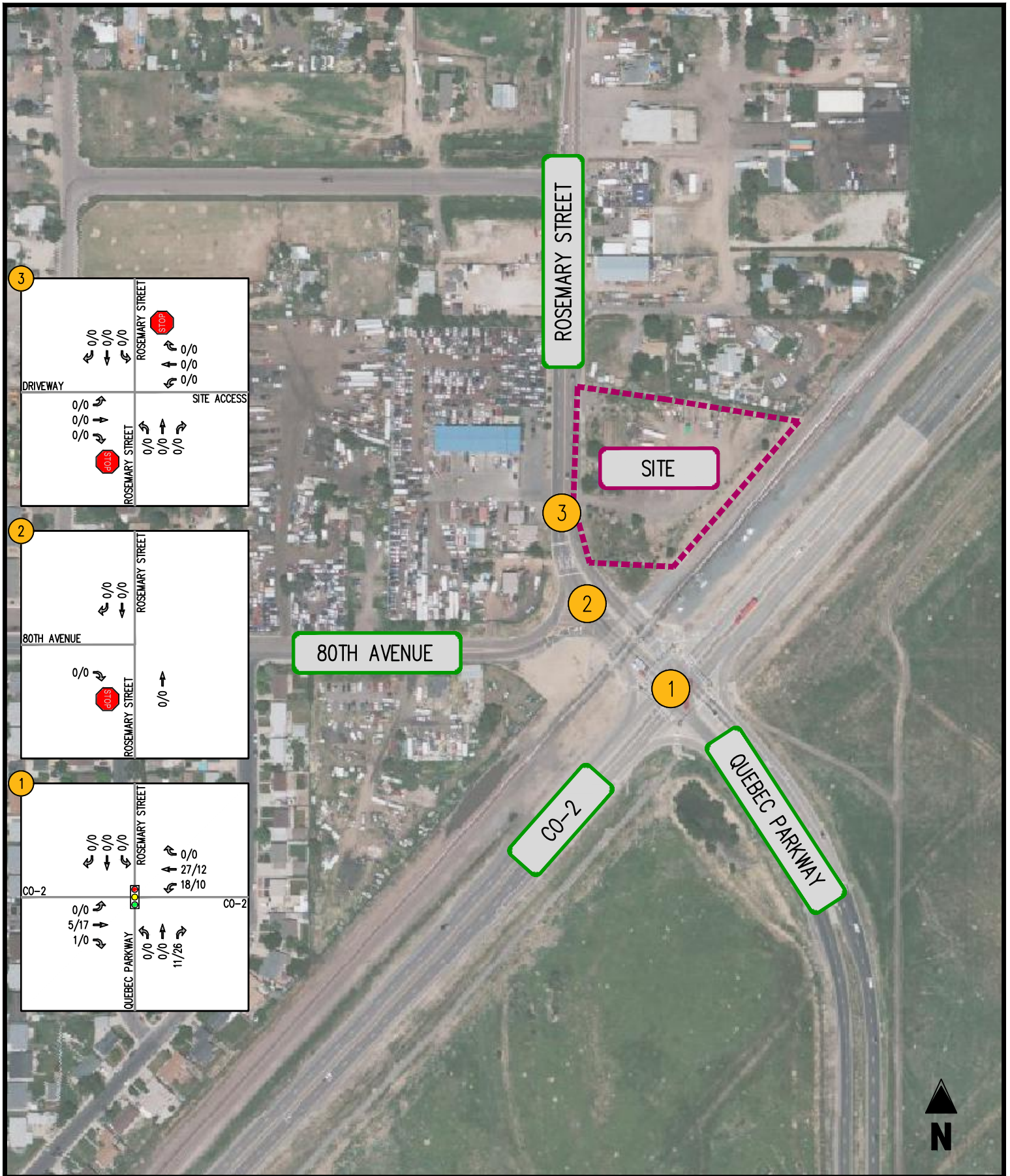


FIGURE 4-1
BACKGROUND 2025 GROWTH

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



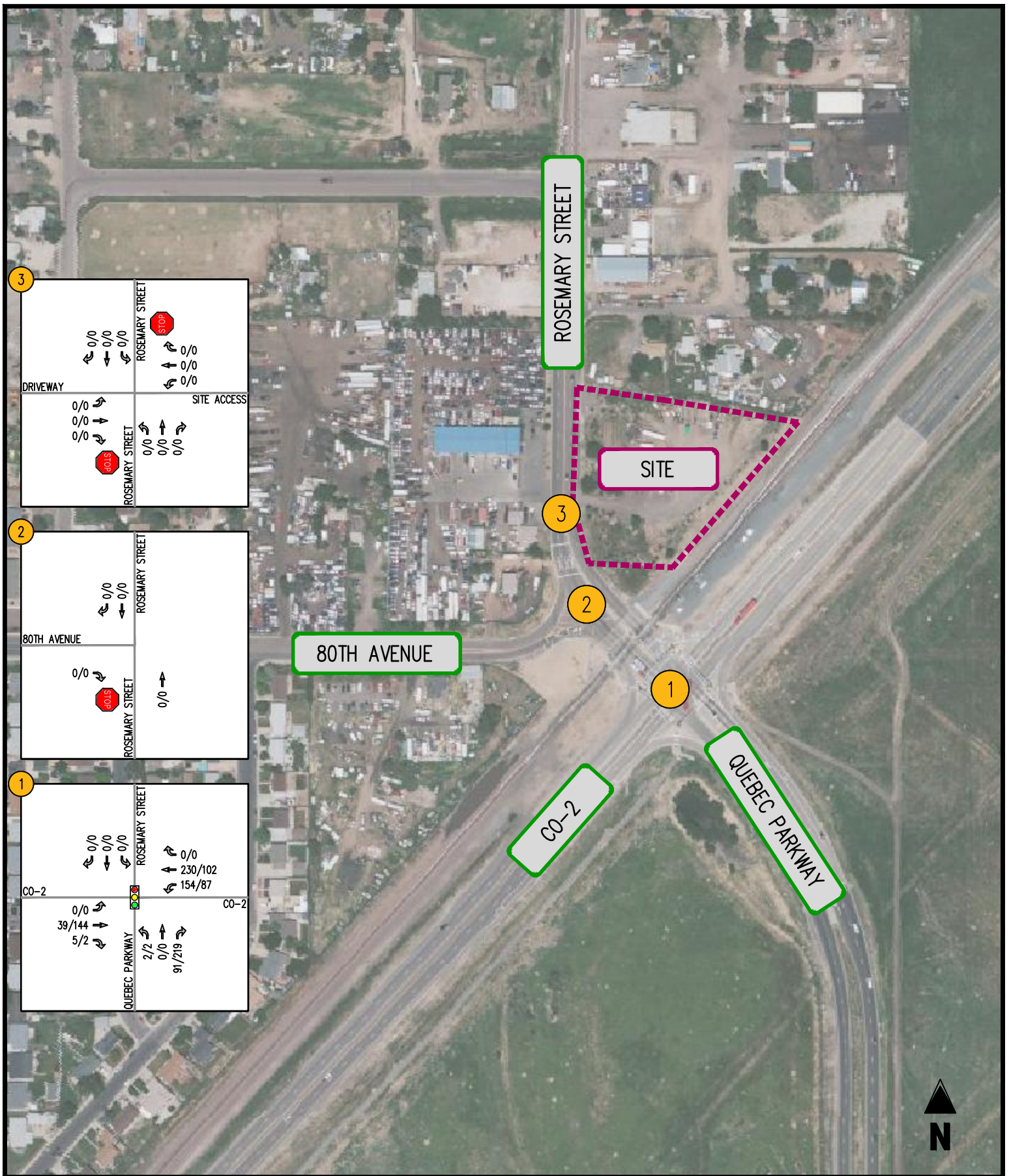


FIGURE 4-2
BACKGROUND 2045 GROWTH

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



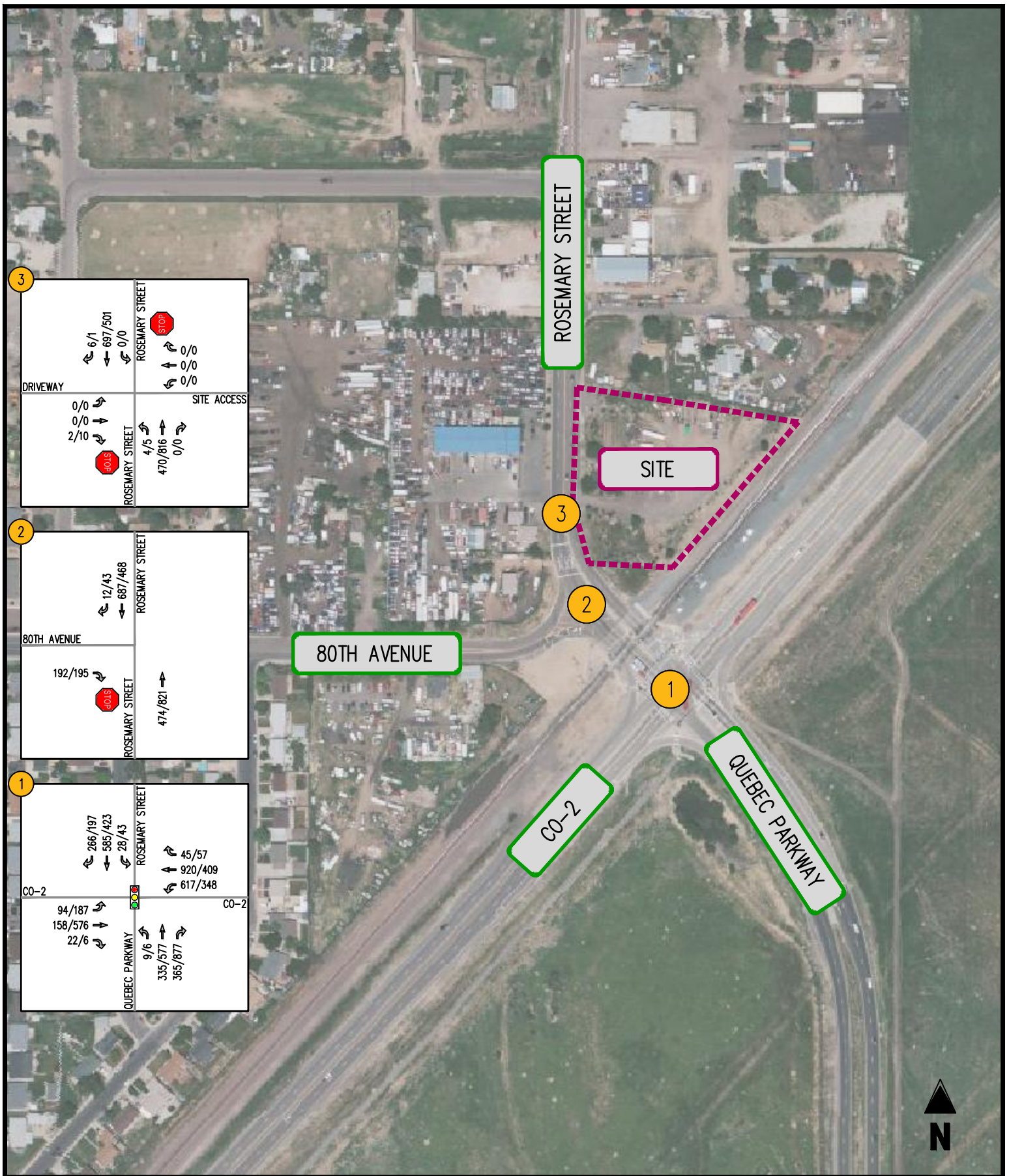


FIGURE 4-3
BACKGROUND 2025 FORECASTS

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- ⚠️ YIELD SIGN



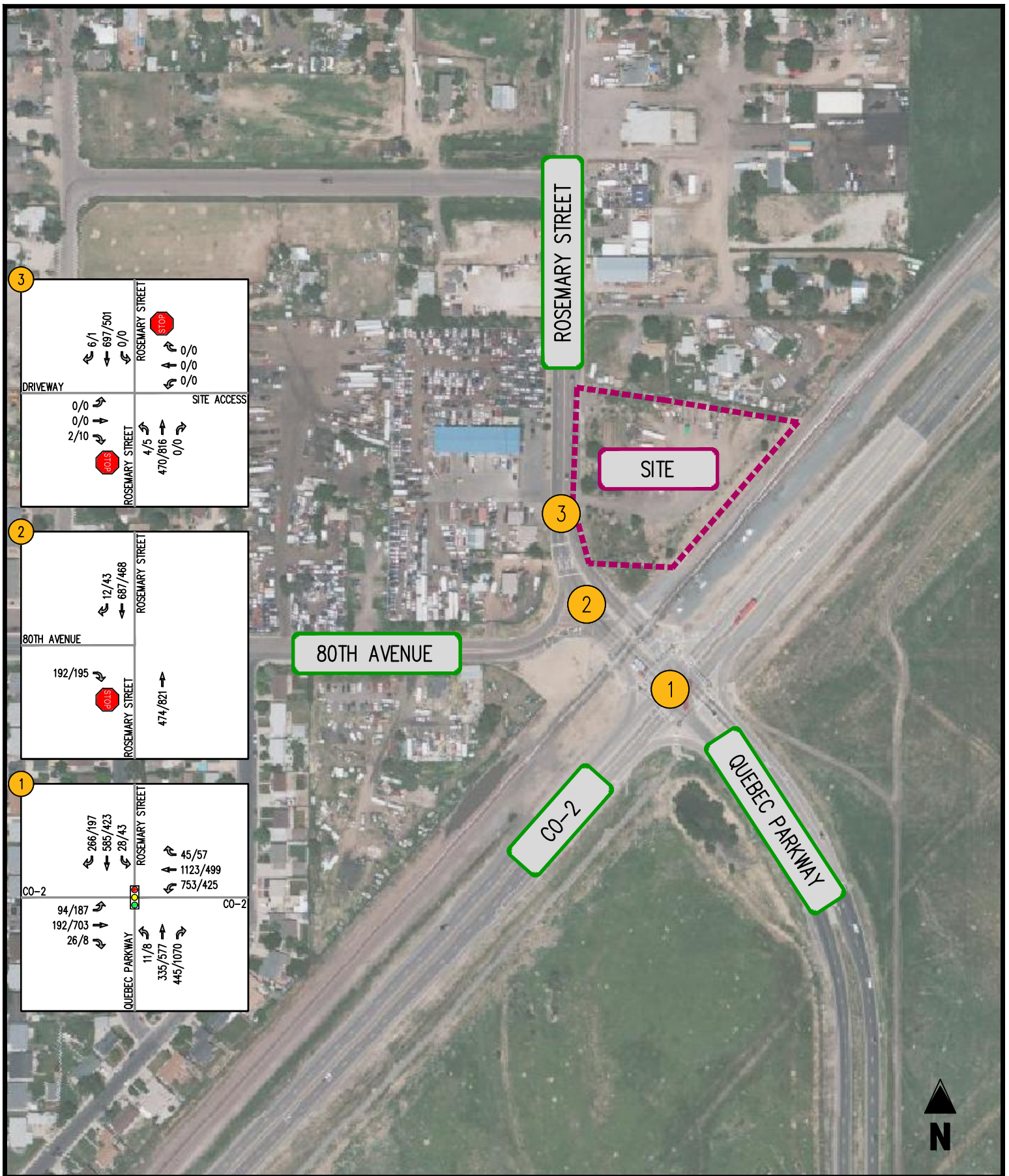


FIGURE 4-4
BACKGROUND 2045 FORECASTS

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- ⚠️ YIELD SIGN



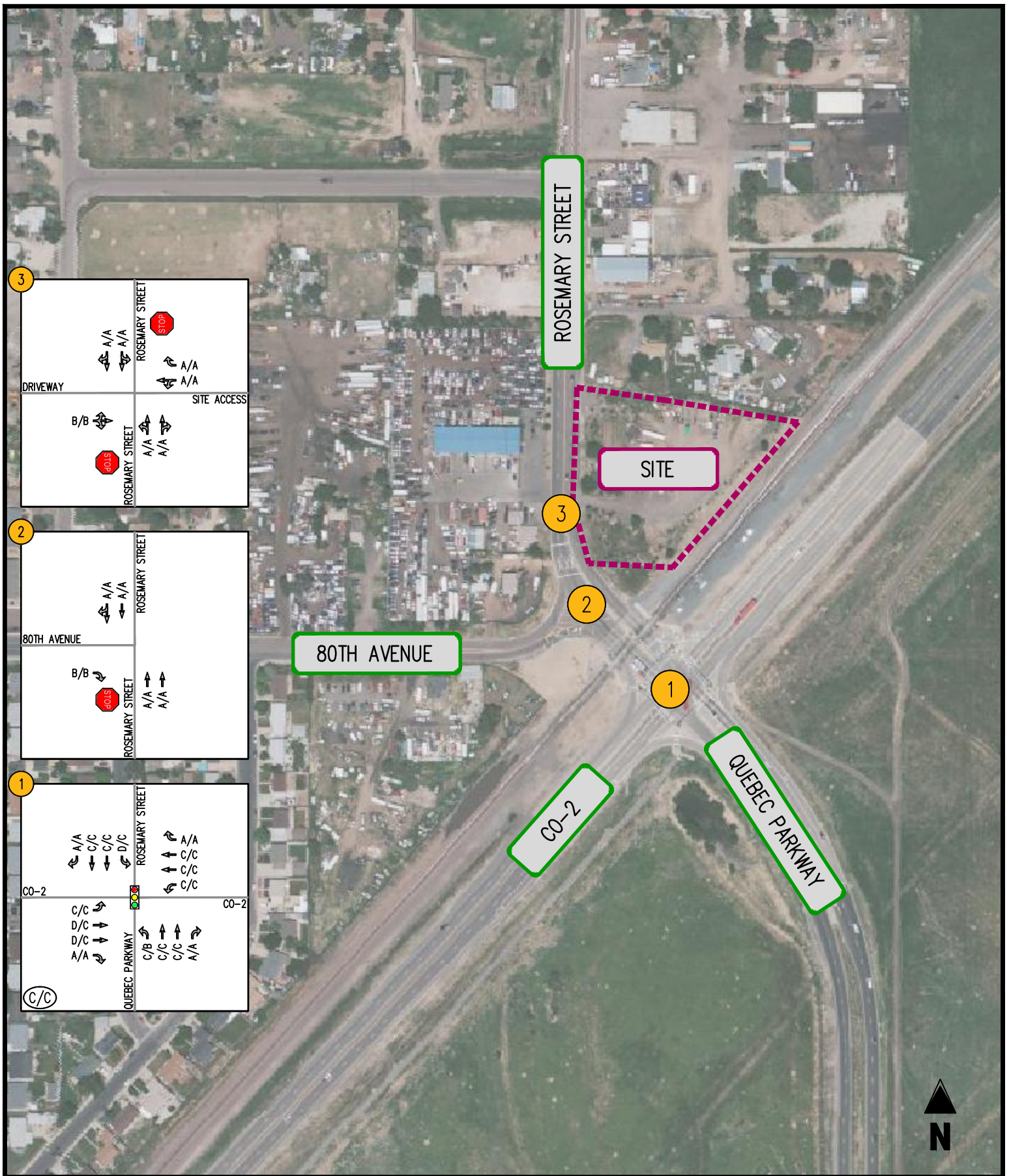


FIGURE 4-5
BACKGROUND 2025 LOS

QUIKTRIP 4201
COMMERCE CITY, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- ⚠️ YIELD SIGN



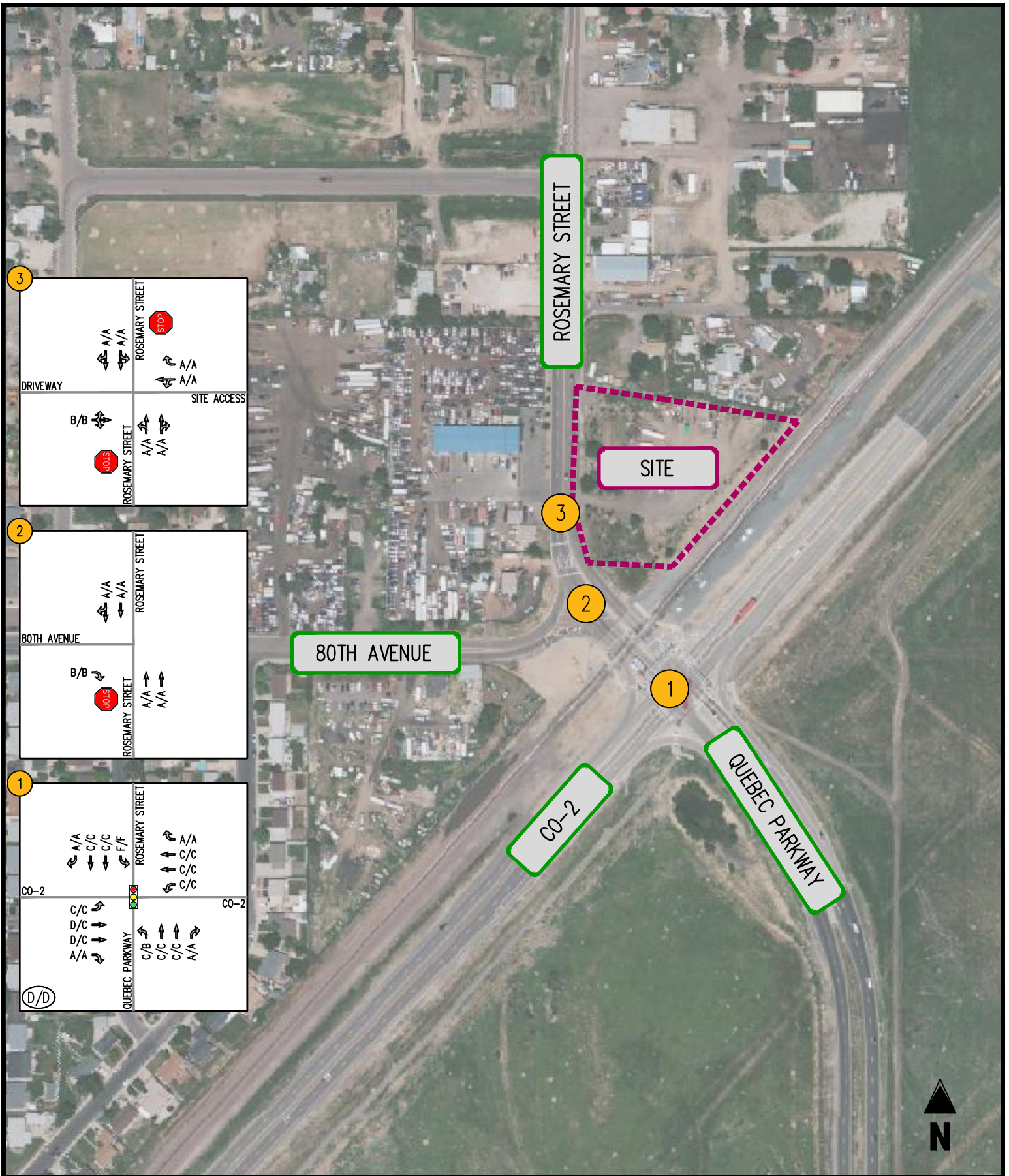


FIGURE 4-6
BACKGROUND 2045 LOS

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)




← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



Table 4-1
 QuikTrip 4201 - Commerce City, CO
 Background Future Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/Movement	Existing 2022		Background 2025		Background 2045	
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Rosemary Street/Quebec Parkway/CO-2	SIGNAL	Rosemary Street	EBL	C (23.4)	C (21.9)	C (23.3)	C (22.2)	C (26.4)	C (24.5)
			EBT	D (37.0)	C (27.6)	D (37.0)	C (28.0)	D (42.8)	C (30.4)
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		Quebec Parkway	WBL	C (24.0)	C (20.4)	C (24.0)	C (20.7)	C (27.2)	C (22.8)
			WBT	C (30.1)	C (30.1)	C (29.7)	C (30.5)	C (33.1)	C (33.2)
			WBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		CO-2	NBL	C (27.3)	B (20.0)	C (27.4)	B (20.0)	C (27.2)	B (19.5)
			NBT	C (31.6)	C (30.0)	C (31.7)	C (30.1)	C (30.2)	C (30.6)
			NBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		CO-2	SBL	C (35.0)	C (29.2)	D (40.2)	C (32.0)	F (97.6)	F (95.1)
			SBR	C (24.0)	C (22.9)	C (24.4)	C (22.9)	C (27.8)	C (23.0)
Overall				<u>A (0.0)</u> C (30.5)	<u>A (0.0)</u> C (27.5)	<u>A (0.0)</u> C (31.8)	<u>A (0.0)</u> C (28.1)	<u>A (0.0)</u> D (48.1)	<u>A (0.0)</u> D (38.5)
2 80th Avenue/Rosemary Street	STOP	80th Avenue	EBR	B [14.3]	B [12.3]	B [13.9]	B [11.9]	B [13.9]	B [11.9]
			NBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			SBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
3 Site Access/Rosemary Street	STOP	Driveway	EBLR	B [11.0]	B [10.3]	B [11.0]	B [10.1]	B [11.0]	B [10.1]
			WBR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		Site Access	NBLT	A [9.4]	A [8.8]	A [9.4]	A [8.6]	A [9.4]	A [8.6]
			NBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		Rosemary Street	SBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 4-2
 QuikTrip 4201 - Commerce City, CO
 Background Future Intersection Queueing Summary (1)

Intersection	Operating Condition	Street Name	Approach/Movement	Available Storage	Existing 2022		Background 2025		Background 2045	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Rosemary Street/Quebec Parkway/CO-2 ⁽¹⁾	SIGNAL	Rosemary Street	EBL	250	38	42	39	43	39	47
			EBT	-	342	184	356	186	363	203
			EBR	150	74	53	75	54	76	56
		Quebec Parkway	WBL	550	18	12	18	12	21	15
			WBT	-	181	264	182	267	185	290
			WBR	400	0	0	0	0	0	0
		CO-2	NBL	400	58	133	57	133	57	134
			NBT	-	73	256	75	266	89	336
			NBR	550	0	0	0	0	0	0
		CO-2	SBL	650	568	384	604	410	976	627
			SBT	-	385	178	398	184	534	228
		SBR	450	0	0	0	0	0	0	
2 80th Avenue/Rosemary Street ⁽¹⁾	STOP	80th Avenue	EBR	-	42.5	32.5	37.5	30	37.5	30
		Rosemary Street	NBT	-	0	0	0	0	0	0
		Rosemary Street	SBTR	-	0	0	0	0	0	0
3 Site Access/Rosemary Street ⁽¹⁾	STOP	Driveway	EBLR	-	0	2.5	0	0	0	0
		Site Access	WBR	-	0	0	0	0	0	0
		Rosemary Street	NBLT	-	0	0	0	0	0	0
		Rosemary Street	NBTR	-	0	0	0	0	0	0
		Rosemary Street	SBTR	-	0	0	0	0	0	0

Notes : (1) Queue length is based on the 95th percentile queue as reported by Synchro, Version 11.

V. Site Analysis

Overview

The Applicant is proposing to develop the approximately 2.4 acre site with a gas station with convenience store use. For purposes of this study, the site will be developed in one phase. For analysis purposes it was assumed that the development would be complete and occupied in 2025. The following use and development program was analyzed:

Proposed:

16 FP Gas Station with Convenience Store

Proposed Site Access

As shown on the Applicant's conceptual plan (Figure 1-2), access to the development is being proposed via on right-in/right-out (RIRO) access and one full movement access on Rosemary Street. Proposed lane use and traffic control is provided on Figure 5-1.

Trip Generation

Overview

Trip generation estimates for the weekday AM and PM peak hours, as well as the weekday average daily traffic (ADT), were derived from the standard Institute of Transportation Engineers (ITE) Trip Generation Manual rates/equations, as published in the 11th edition. The trip generation analysis is presented in Table 5-1.

Pass-by Trips

According to ITE, in some cases the driveway volumes at a particular land use are different from the amount of traffic added to the adjacent street system. Uses such as retail establishments attract a portion of their trips from traffic that is already present on the road network. Pass-by trip are those trips which are made as intermediate stops on the way to a primary destination. An example of a pass-by trip would be one in which a driver stops at a gas station on his/her way home from work.

The proposed use would experience pass-by trips consistent with the primary uses located on site. In recognition of this phenomenon and consistent with ITE published data, the following pass-by reductions were applied to the trip generation analysis:

- Gas Station with convenience store: 76% AM/ 75% PM

As shown in Table 5-1, the site in total is anticipated to generate 329 weekday AM, and 273 weekday PM peak hour pass-by trips. Therefore, these trips would be drawn from the existing road network and assigned to the future site entrances accordingly. Pass-by trip assignments at key study intersections are shown on Figure 5-2.

Net Site Trips

The vehicle trips that would be generated by the proposed development plan are summarized in Table 5-1. As shown in Table 5-1, the site would generate upon completion and full occupancy 104 net new weekday AM and 91 net new weekday PM peak hour vehicle trips, as well as 1,029 net new weekday daily trips.

Site Trip Distributions

The distribution of the anticipated trips generated by the completion of the proposed development was based on an examination of existing traffic counts and local knowledge. Existing travel patterns indicate the following distribution is appropriate in the forecasting of future site traffic:

- To/from the east on CO-2: 20%
- To/from the west on CO-2: 20%
- To/from the south on Quebec Street: 35%
- To/from the north on Rosemary Street: 25%

Site Trip Assignments

The assignment of the new vehicle trips generated upon the future build-out of the development project was based on the above distribution. The trips assignments are depicted on Figure 5-3.

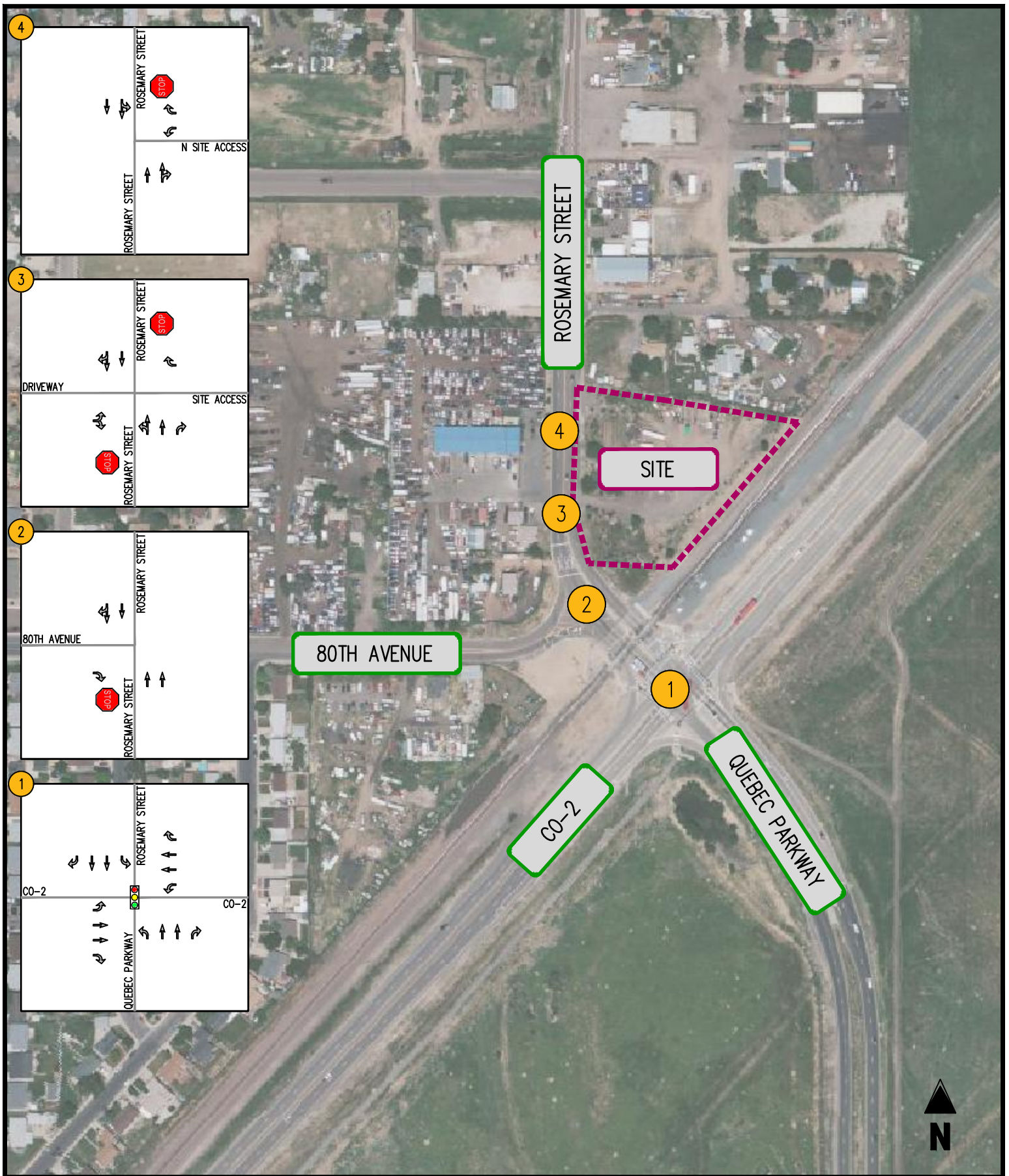


FIGURE 5-1
TOTAL FUTURE LANE USE AND TRAFFIC CONTROL



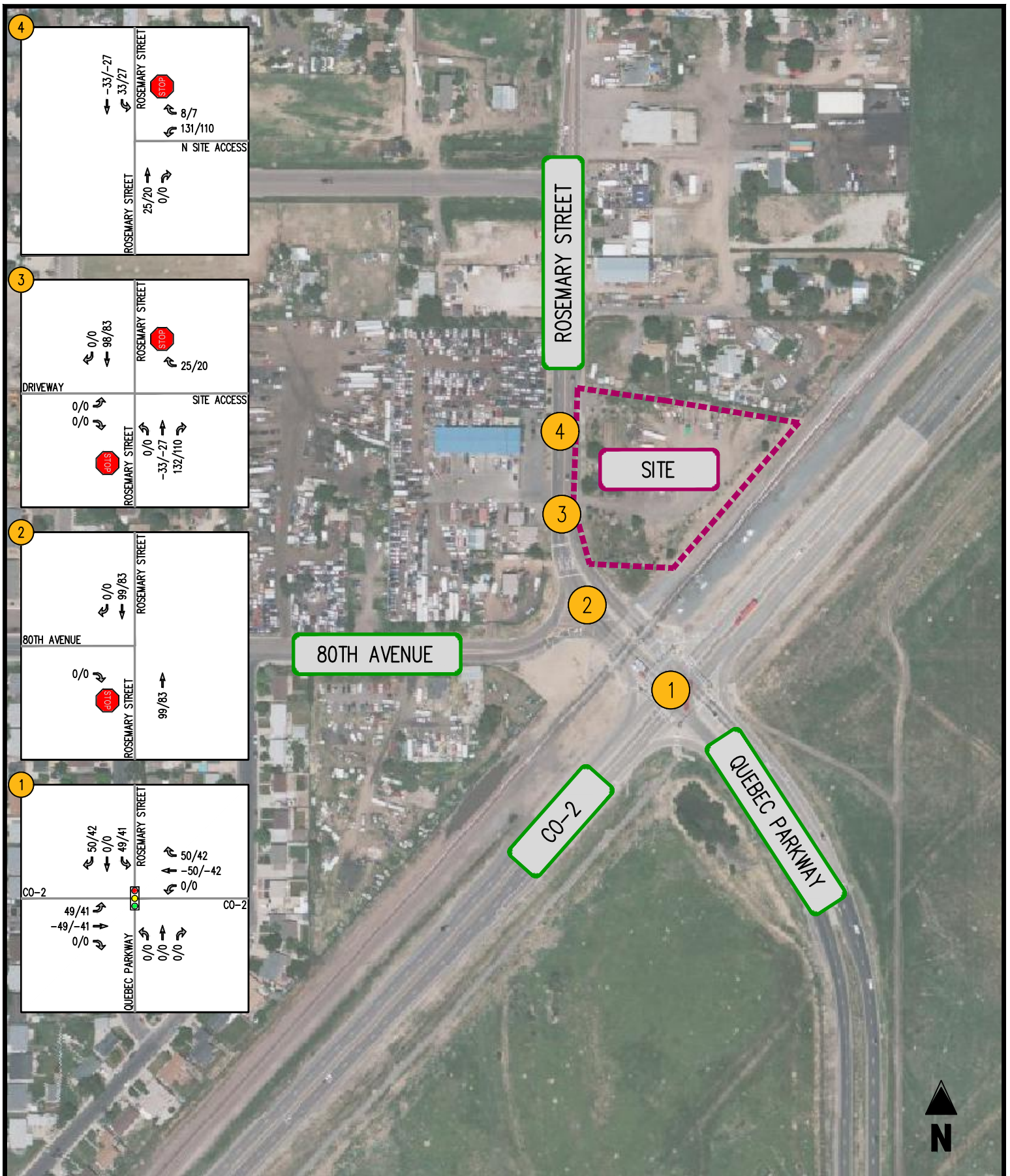


FIGURE 5-2
PASS-BY TRIPS

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



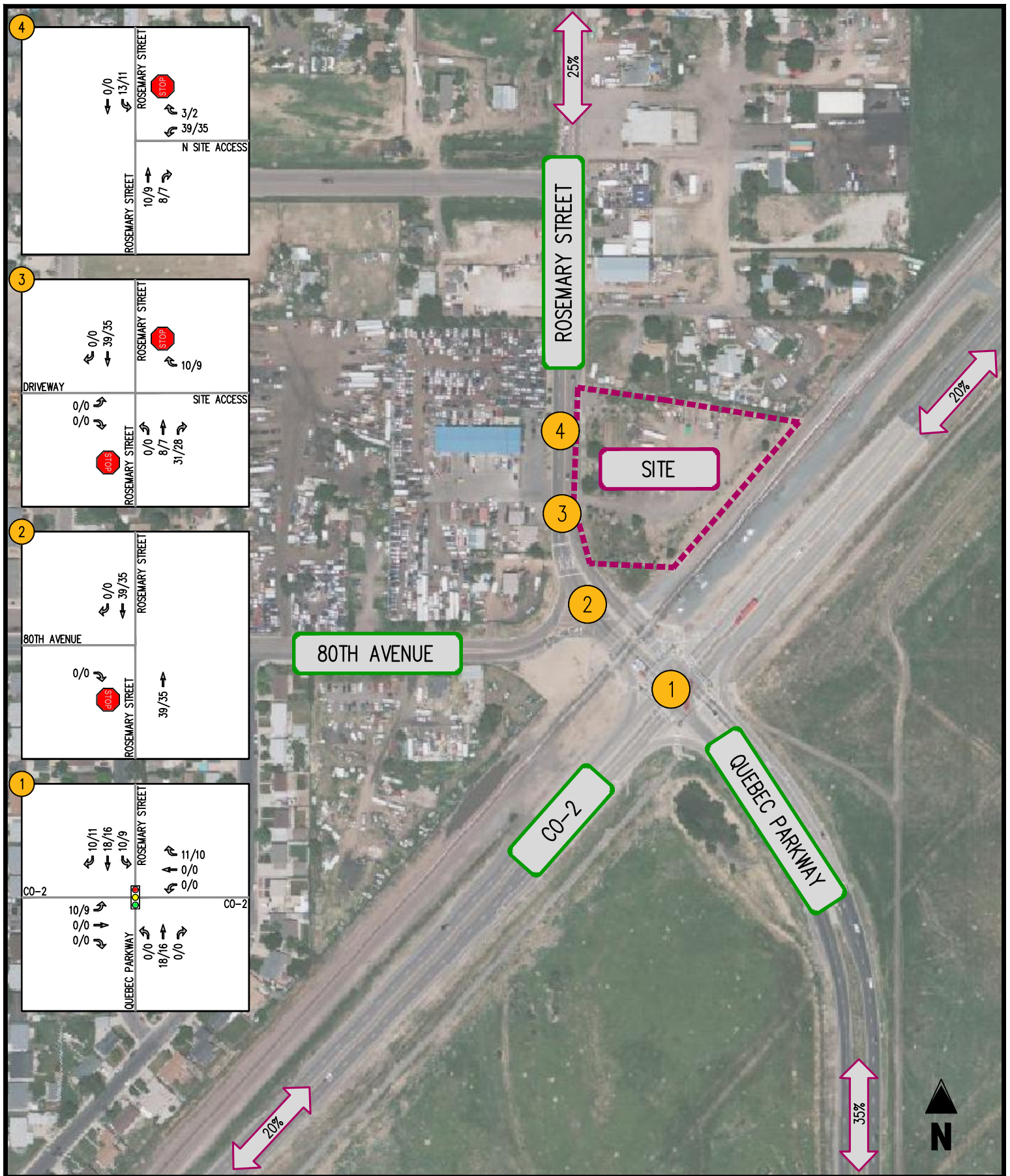


FIGURE 5-3
SITE TRIPS

QUIKTRIP 4201
COMMERCE CITY, CO

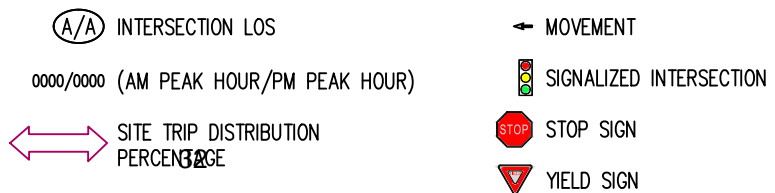


Table 5-1

QuikTrip 4201 - Commerce City, CO

Site Trip Generation

Land Use	Land Use Code	Amount	Units	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
<i>Proposed ⁽¹⁾</i>										
Convenience Store/Gas Station	945	16	FP	217	216	433	182	182	364	4,114
				<i>(165)</i>	<i>(164)</i>	<i>(329)</i>	<i>(137)</i>	<i>(137)</i>	<i>(273)</i>	<i>(3,086)</i>
Net New Trips				52	52	104	46	46	91	1,029

Note(s):

(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 11th Edition

VI. Analysis of Future Conditions with Site Development

Total Future Traffic Forecasts

The 2025 and 2045 total future traffic forecasts associated with the proposed development were developed by combining the background future forecasts shown on Figure 4-3 (2025) and Figure 4-4 (2045), the pass-by trips shown on Figure 5-2, and the site trip assignments shown on Figure 5-3. The resulting total future traffic forecasts are provided on Figure 6-1 for 2025 (build-out), Figure 6-2 for 2045 (long-range) conditions.

Total Future Levels of Service with Proposed Development

Future levels of service with the proposed development plan were estimated at key study intersections based on the future traffic volumes shown on Figures 6-1 and Figure 6-2, the future lane use on Figure 5-1, and the HCM 6th methodologies for signalized and unsignalized intersections. The results of these analyses are provided in Appendix H and presented in Table 6-1. Total future levels of service are also presented graphically on Figure 6-3 (2025) and Figure 6-4 (2045).

As shown in Table 6-1, levels of service under future site development conditions would remain generally consistent with future background conditions (i.e., without site development). Overall delays would experience minor increase due to site trips. The signalized intersections within the study area would continue to operate at acceptable overall LOS “D” or better in the AM and PM peak hours in all future scenarios, consistent with background future conditions.

The proposed site entrances are forecasted to operate at LOS “B” or better during the AM and PM peak hours, with the exception of the WB left movement at the North Site Access. Synchro, a macrosimulation, does not take into account platooning effects from nearby signals such as the signal south of the site at the CO-2/Quebec Parkway/Rosemary Street intersection, which would provide platoons in traffic and create gaps for the WB left turning movements. SimTraffic is a microsimulation software that more realistically models traffic through a network including platooning from nearby signals. Utilizing SimTraffic, the WB left movement at the North Site Access is forecasted to operate at acceptable LOS “D” during the AM and PM peak hours.

The majority of site generated traffic is assumed to access the site from the CO-2/Quebec Parkway/Rosemary Street intersection. This requires a left turn out of the site to re-enter the CO-2/Quebec Parkway/Rosemary Street intersection. Restricting access to RIRO only would result in an increase of out of direction travel and illegal U-turns for vehicles heading back to CO-2 and Quebec Parkway. As shown in the next section, no queuing issues are expected along Rosemary Street.

Total Future Queuing

Total future queues were forecasted using Synchro/SimTraffic software. The results of the queuing analysis are summarized in Table 6-2. The forecasted queues are expected to remain consistent with background conditions.

Auxiliary Lanes

The City of Commerce City Department of Public Works Engineering Construction Standards and Specifications (Standards) was referenced to determine the need for a right-turn deceleration lanes for the proposed Site Accesses along Rosemary Street.

With a forecasted right turn volume of 163 vehicles per hour in the AM peak hour, the southern RIRO site access warrants a right-turn deceleration lane for northbound right turning movements into the site.

TABLE 3-6 RIGHT-TURN DECELERATION LANES

	Minimum # of Major Street Right Turns to Require Right-Turn Deceleration Lane on Major Street (vph)	Deceleration Lane Length (ft)	Taper Rate	Taper Length (ft) for 12' Lane
Principal Arterial	15	185	18.5:1	222
Minor/Multimodal Arterial	20	135	15:1	180
Major Collector	25	90	13.5:1	162
Minor Collector	30	50	12:1	144

As Rosemary Street is classified as a Major Collector, per Table 3-6. Right-Turn Deceleration Lanes of the Standards, the deceleration lane should provide a deceleration distance of 90 feet and 162 foot taper.

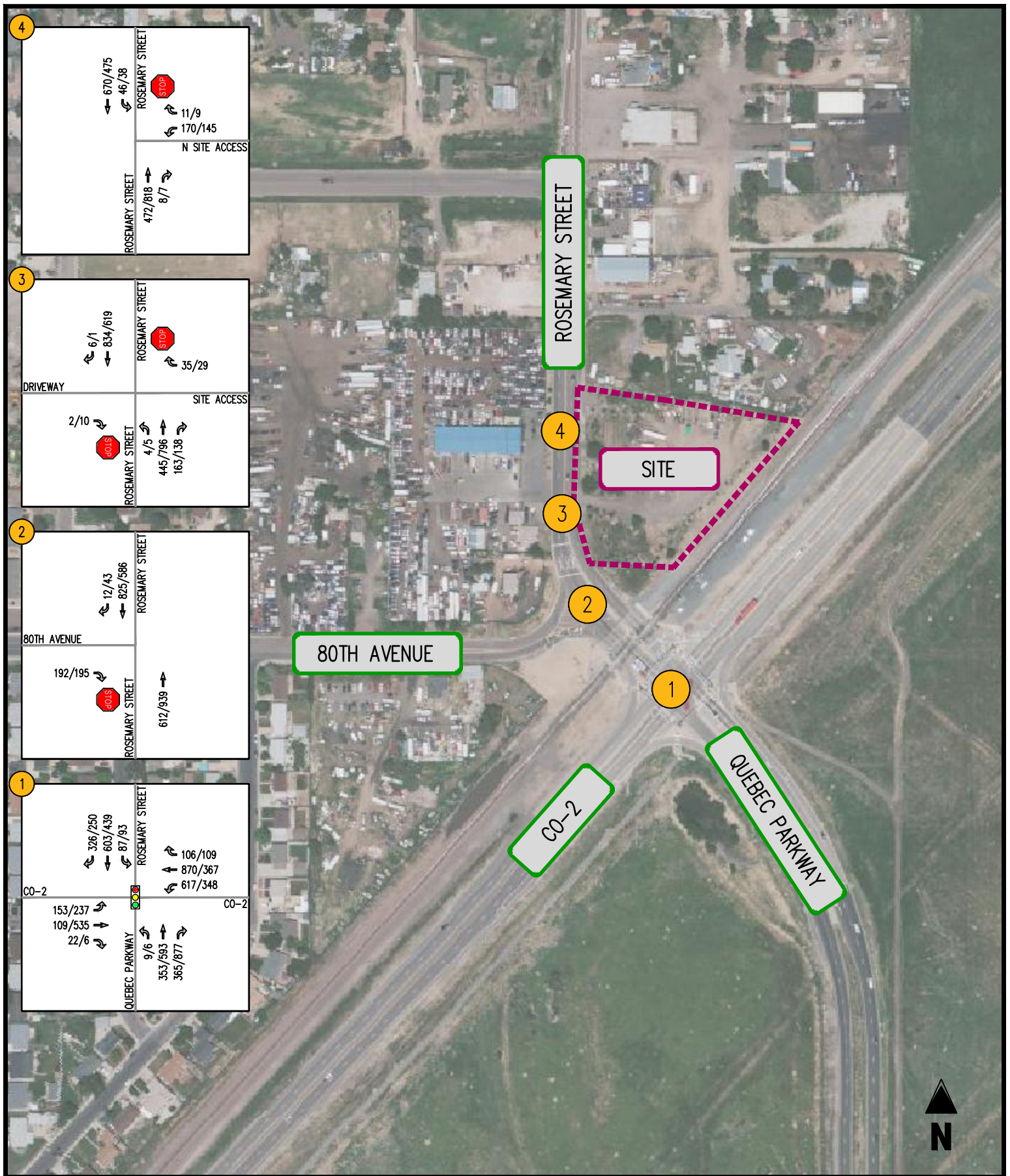


FIGURE 6-1
TOTAL FUTURE 2025 FORECASTS

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- Signalized Intersection
- STOP SIGN
- YIELD SIGN



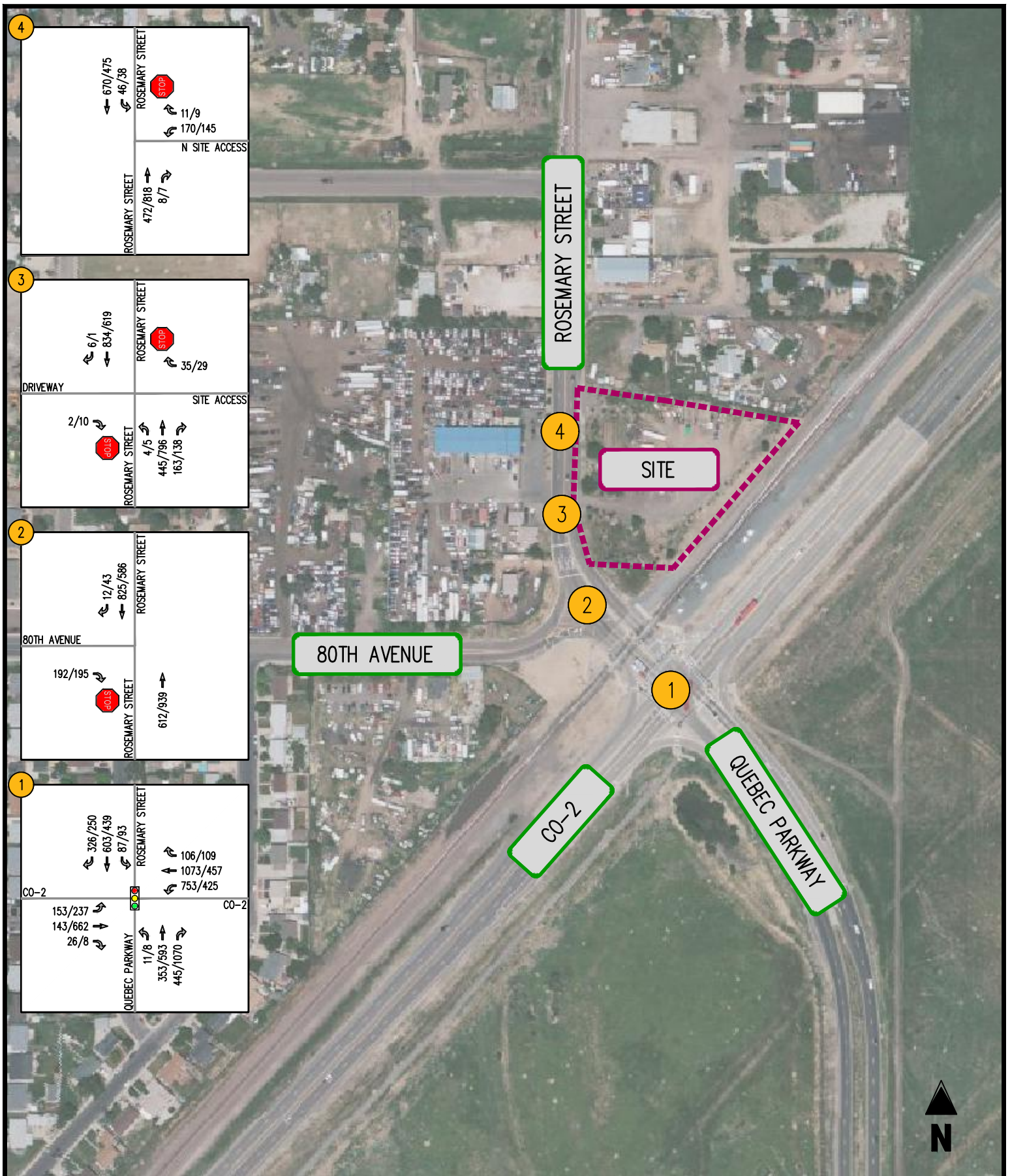


FIGURE 6-2
TOTAL FUTURE 2045 FORECASTS

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- ⚠️ YIELD SIGN



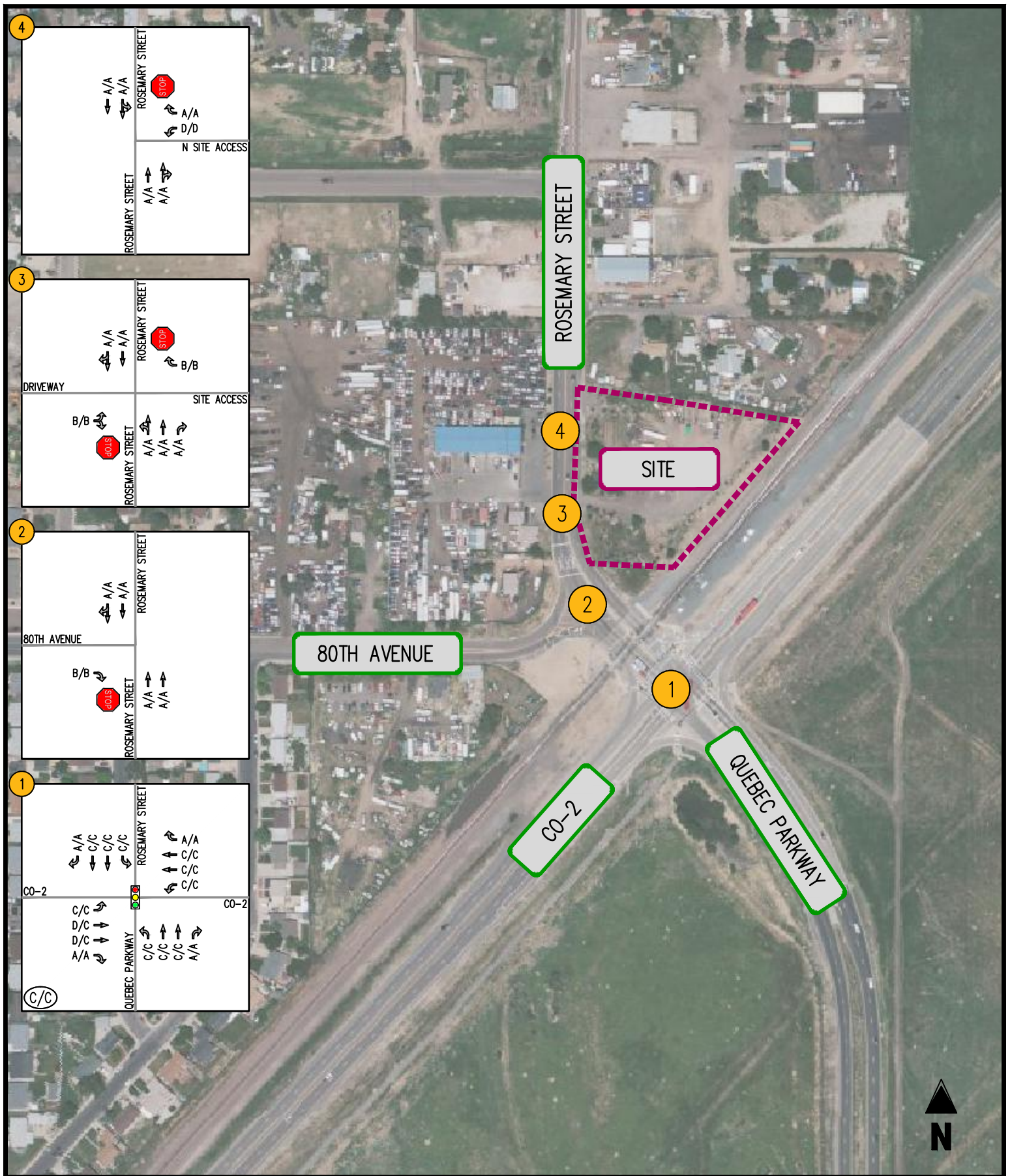


FIGURE 6-3
TOTAL FUTURE 2025 LOS

QUIKTRIP 4201
COMMERCE CITY, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



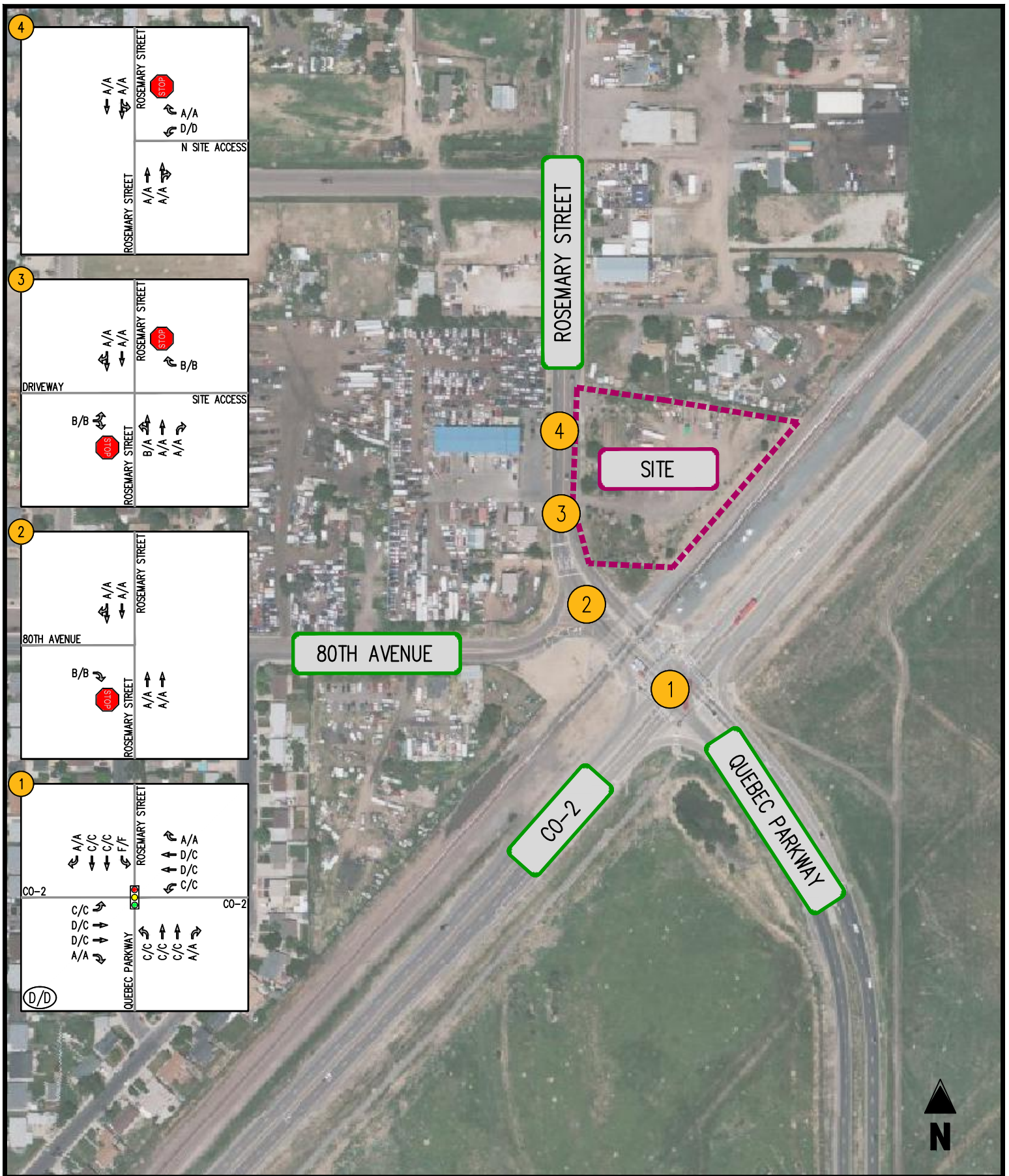


FIGURE 6-4
TOTAL FUTURE 2045 LOS

QUIKTRIP 4201
COMMERCE CITY, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



Table 6-1
 QuikTrip 4201 - Commerce City, CO
 Total Future Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Background 2025		Background 2045		Total Future 2025		Total Future 2045	
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Rosemary Street/Quebec Parkway/CO-2	SIGNAL	Rosemary Street	EBL	C (23.3)	C (22.2)	C (26.4)	C (24.5)	C (24.6)	C (22.8)	C (28.9)	C (25.2)
			EBT	D (37.0)	C (28.0)	D (42.8)	C (30.4)	D (36.7)	C (27.1)	D (45.8)	C (29.4)
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		Quebec Parkway	WBL	C (24.0)	C (20.7)	C (27.2)	C (22.8)	C (24.3)	C (20.3)	C (28.8)	C (22.5)
			WBT	C (29.7)	C (30.5)	C (33.1)	C (33.2)	C (30.3)	C (30.1)	D (35.4)	C (33.0)
			WBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		CO-2	NBL	C (27.4)	B (20.0)	C (27.2)	B (19.5)	C (26.8)	C (20.3)	C (27.5)	C (20.2)
			NBT	C (31.7)	C (30.1)	C (30.2)	C (30.6)	C (31.0)	C (30.7)	C (29.3)	C (31.1)
			NBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		CO-2	SBL	D (40.2)	C (32.0)	F (97.6)	F (95.1)	C (31.0)	C (33.1)	F (81.8)	F (97.8)
			SBT	C (24.4)	C (22.9)	C (27.8)	C (23.0)	C (25.7)	C (25.2)	C (29.7)	C (25.4)
			SBR	<u>A (0.0)</u>	<u>A (0.0)</u>	<u>A (0.0)</u>	<u>A (0.0)</u>	<u>A (0.0)</u>	<u>A (0.0)</u>	<u>A (0.0)</u>	<u>A (0.0)</u>
Overall				C (31.8)	C (28.1)	D (48.1)	D (38.5)	C (30.1)	C (28.3)	D (45.6)	D (39.0)
2 80th Avenue/Rosemary Street	STOP	80th Avenue	EBR	B [13.9]	B [11.9]	B [13.9]	B [11.9]	C [15.3]	B [12.9]	C [15.6]	B [12.9]
		Rosemary Street	NBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		Rosemary Street	SBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
3 Site Access/Rosemary Street	STOP	Driveway	EBLR	B [11.0]	B [10.1]	B [11.0]	B [10.1]	N/A	N/A	N/A	N/A
		Site Access	WBR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	N/A	N/A	N/A	N/A
		Rosemary Street	NBLT	A [9.4]	A [8.6]	A [9.4]	A [8.6]	N/A	N/A	N/A	N/A
		Rosemary Street	NBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	N/A	N/A	N/A	N/A
		Rosemary Street	SBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	N/A	N/A	N/A	N/A
		<i>NB right deceleration lane added</i>									
	STOP	Driveway	EBLR	N/A	N/A	N/A	N/A	B [11.6]	B [10.7]	B [11.7]	B [10.7]
		Site Access	WBR	N/A	N/A	N/A	N/A	B [10.1]	B [11.8]	B [10.1]	B [11.8]
		Rosemary Street	NBLT	N/A	N/A	N/A	N/A	A [9.9]	A [9.1]	B [10.1]	A [9.1]
		Rosemary Street	NBT	N/A	N/A	N/A	N/A	A [0.0]	A [0.1]	A [0.0]	A [0.1]
		Rosemary Street	NBR	N/A	N/A	N/A	N/A	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		Rosemary Street	SBTR	N/A	N/A	N/A	N/A	A [0.0]	A [0.0]	A [0.0]	A [0.0]
4 N Site Access/Rosemary Street	STOP	N Site Access	WBL	N/A	N/A	N/A	N/A	<i>D [30.1]</i>	<i>D [30.6]</i>	<i>D [33.1]</i>	<i>D [31.4]</i>
		Rosemary Street	WBR	N/A	N/A	N/A	N/A	<i>A [7.8]</i>	<i>A [8.2]</i>	<i>A [8.0]</i>	<i>A [8.0]</i>
		Rosemary Street	NBTR	N/A	N/A	N/A	N/A	<i>A [0.4]</i>	<i>A [0.6]</i>	<i>A [0.4]</i>	<i>A [0.6]</i>
		Rosemary Street	SBLT	N/A	N/A	N/A	N/A	<i>A [2.3]</i>	<i>A [3.9]</i>	<i>A [3.7]</i>	<i>A [4.4]</i>
		Rosemary Street	SBT	N/A	N/A	N/A	N/A	<i>A [0.9]</i>	<i>A [0.6]</i>	<i>A [0.9]</i>	<i>A [0.6]</i>

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.
 (3) Numbers in *italics* represent delay as reported by SimTraffic, Version 11

Table 6-2
 QuikTrip 4201 - Commerce City, CO
 Total Future Intersection Queueing Summary (1)

Intersection	Operating Condition	Street Name	Approach/Movement	Available Storage	Background 2025		Background 2045		Total Future 2025		Total Future 2045		
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
1 Rosemary Street/Quebec Parkway/CO-2 ⁽¹⁾	SIGNAL	Rosemary Street	EBL	250	39	43	39	47	91	75	96	85	
			EBT	-	356	186	363	203	346	186	375	204	
			EBR	150	75	54	76	56	80	57	84	61	
		Quebec Parkway	WBL	550	18	12	21	15	18	11	21	14	
			WBT	-	182	267	185	290	186	265	195	290	
			WBR	400	0	0	0	0	0	0	0	0	
		CO-2	NBL	400	57	133	57	134	88	170	124	172	
			NBT	-	75	266	89	336	54	245	69	315	
			NBR	550	0	0	0	0	0	0	0	0	
		CO-2	SBL	650	604	410	976	627	539	392	966	608	
			SBT	-	398	184	534	228	367	166	503	209	
SBR	450		0	0	0	0	30	38	29	37			
2 80th Avenue/Rosemary Street ⁽¹⁾	STOP	80th Avenue	EBR	-	37.5	30	37.5	30	42.5	35	45	35	
			NBT	-	0	0	0	0	0	0	0	0	
			SBTR	-	0	0	0	0	0	0	0	0	
3 Site Access/Rosemary Street ⁽¹⁾	STOP	Driveway	EBLR	-	0	0	0	0	N/A	N/A	N/A	N/A	
			WBR	-	0	0	0	0	N/A	N/A	N/A	N/A	
		Site Access	NBLT	-	0	0	0	0	N/A	N/A	N/A	N/A	
			NBTR	-	0	0	0	0	N/A	N/A	N/A	N/A	
		Rosemary Street	SBTR	-	0	0	0	0	N/A	N/A	N/A	N/A	
	<i>NB right deceleration lane added</i>	STOP	Driveway	EBLR	-	N/A	N/A	N/A	N/A	0	2.5	0	2.5
				WBR	-	N/A	N/A	N/A	N/A	5	5	5	5
			Site Access	NBLT	-	N/A	N/A	N/A	N/A	0	0	0	0
				NBTR	-	N/A	N/A	N/A	N/A	0	0	0	0
			Rosemary Street	NBR	-	N/A	N/A	N/A	N/A	0	0	0	0
				SBTR	-	N/A	N/A	N/A	N/A	0	0	0	0
4 N Site Access/Rosemary Street ⁽²⁾	STOP	N Site Access	WBL	-	N/A	N/A	N/A	N/A	161	148	163	144	
			WBR	-	N/A	N/A	N/A	N/A	42	39	42	37	
		Rosemary Street	NBTR	-	N/A	N/A	N/A	N/A	7	5	4	12	
			SBLT	-	N/A	N/A	N/A	N/A	42	48	51	56	
		Rosemary Street	SBT	-	N/A	N/A	N/A	N/A	0	8	5	0	

Notes : (1) Queue length is based on the 95th percentile queue as reported by Synchro, Version 11.
 (2) Queue length is based on the 95th percentile queue as reported by SimTraffic, Version 11.

VII. Conclusions and Recommendations

Conclusions

Based on the results of this traffic impact study, the following may be concluded:

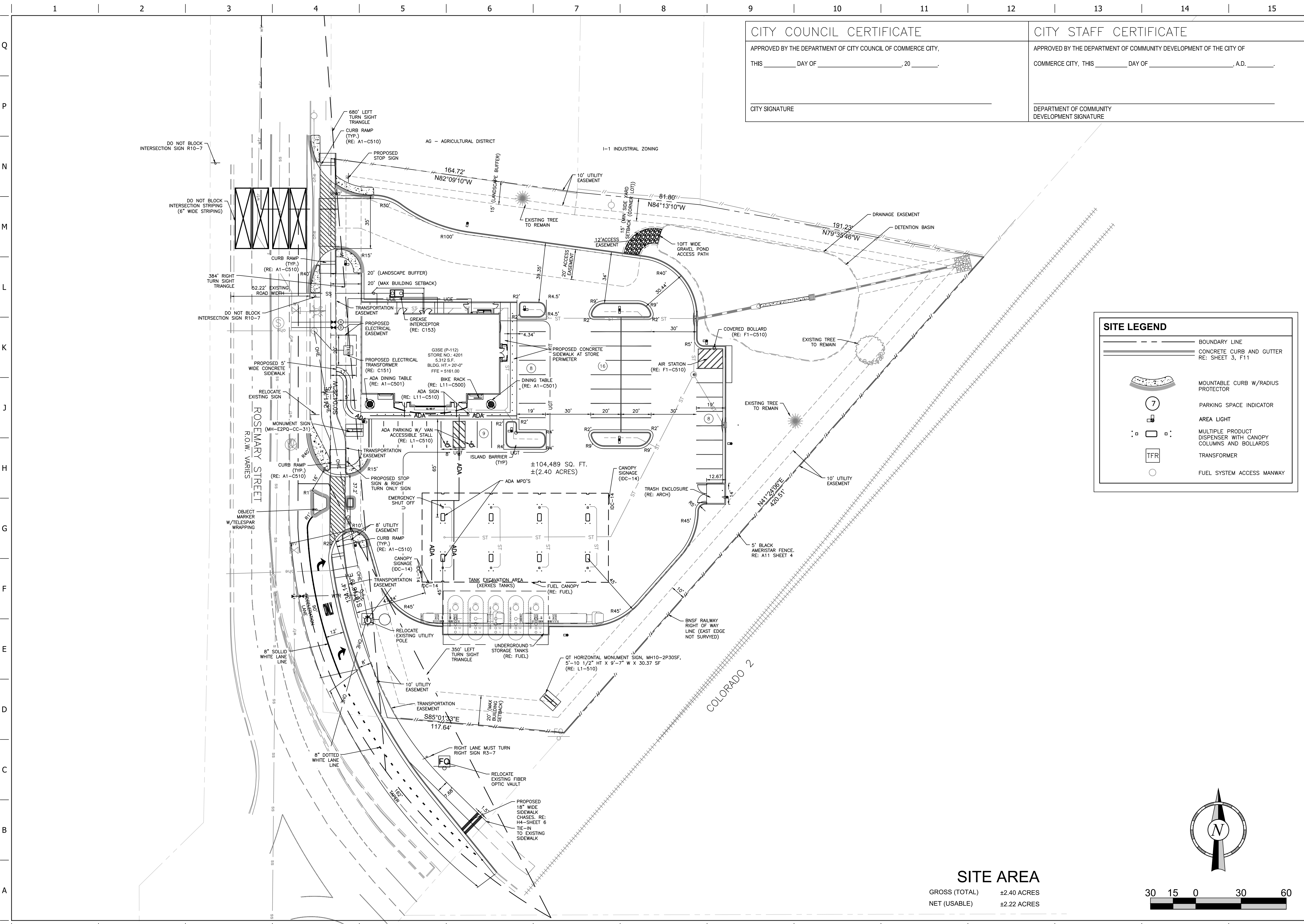
- Under existing traffic conditions, the intersections within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours, and queues remain within their respective storage lengths.
- Under background future 2025 and 2045 traffic conditions, without the development of the subject site, delays would increase slightly at study intersections due to regional traffic growth. The intersections are still forecasted to operate at LOS “D” or better.
- In the background future 2045 scenario, the SBL queue at the CO-2/Quebec Parkway/Rosemary Street intersection is expected to exceed their storage length during the AM peak hour.
- The proposed site development would generate, upon completion and full occupancy, 104 net new weekday AM and 91 net new weekday PM peak hour vehicle trips as well as 1,029 net new weekday daily trips.
- Under total future 2025 and 2045 traffic conditions with development of the site, the intersections within the study area would operate consistent with background conditions.

Recommendations

- It is recommended that the Applicant provide access consistent with the site plan contained herein.

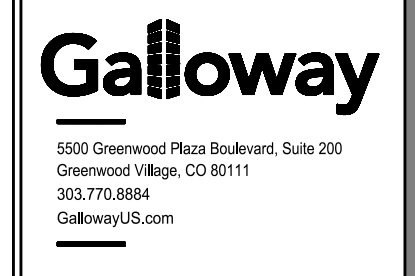
APPENDIX A – Full Sized Conceptual Plan

FILE LOCATION: \\H:\QuikTrip\QK4201-Commerce City, CO\001\2-Plan\QK4201_Civil.dwg TAB NAME: Site Plan (DP) USER: Stephen_Crebocky SAVED: 1/3/2024 3:59 PM PLOTTED: 1/3/2024 4:21 PM

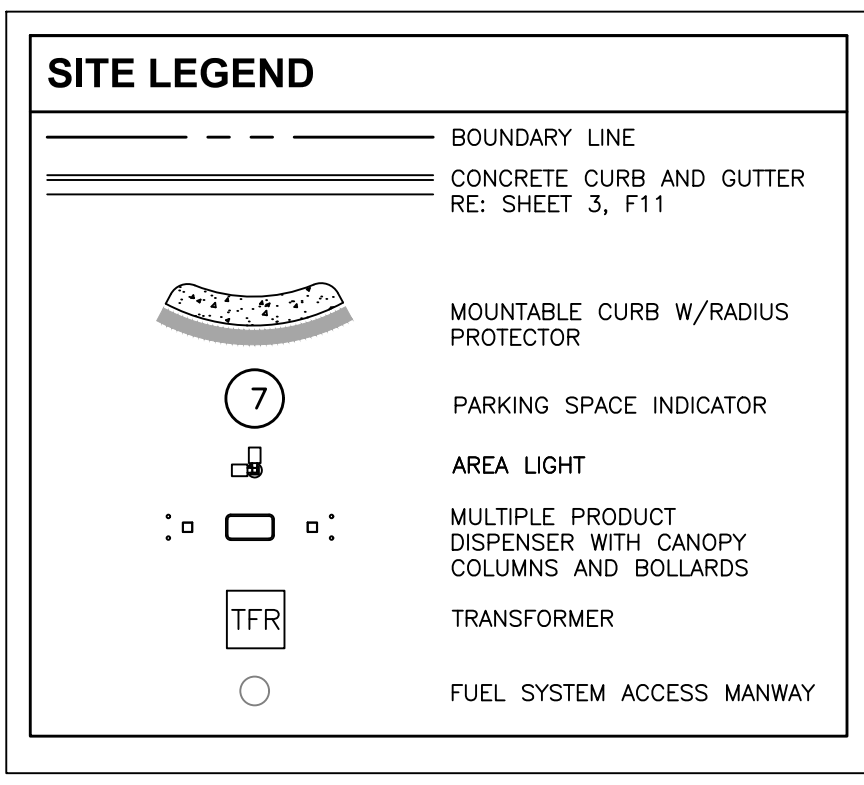


<p>CITY COUNCIL CERTIFICATE</p> <p>APPROVED BY THE DEPARTMENT OF CITY COUNCIL OF COMMERCE CITY,</p> <p>THIS _____ DAY OF _____, 20____.</p> <p>CITY SIGNATURE _____</p>	<p>CITY STAFF CERTIFICATE</p> <p>APPROVED BY THE DEPARTMENT OF COMMUNITY DEVELOPMENT OF THE CITY OF</p> <p>COMMERCE CITY, THIS _____ DAY OF _____, A.D. _____.</p> <p>DEPARTMENT OF COMMUNITY DEVELOPMENT SIGNATURE _____</p>
--	--

PROJECT NO.: QKT004201



QuikTrip No. 4201
 8040 ROSEMARY STREET
 COMMERCE CITY, CO



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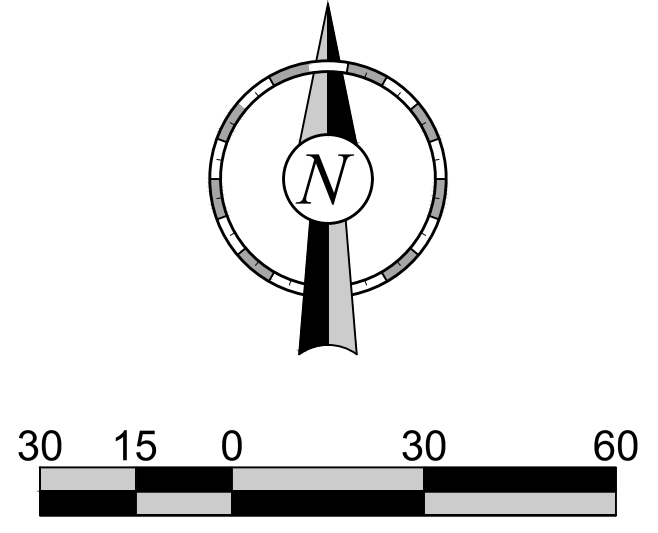
PROTOTYPE: P-112 (11/01/22)
 DIVISION: 83
 VERSION: 001
 DESIGNED BY: SGO
 DRAWN BY: SGO
 REVIEWED BY: ACJ

REV	DATE	DESCRIPTION
1	6/14/23	2ND DP SUBMITTAL
2	9/8/23	3RD DP SUBMITTAL
3	1/9/24	4TH DP SUBMITTAL

SHEET TITLE:
 SITE PLAN

SHEET NUMBER:
 3

SITE AREA
 GROSS (TOTAL) ±2.40 ACRES
 NET (USABLE) ±2.22 ACRES



APPENDIX B – LOS Descriptions

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in Exhibit 16-2. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.

Exhibit 16-2. Level-of-Service Criteria for Signalized Intersections

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	≤ 10.0
B	> 10.0 and ≤ 20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	> 80.0

LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: [Highway Capacity Manual, 2000](#). Transportation Research Board, National Research Council

Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Table 17-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. . . .

Table 17-2. Level of Service Criteria for TWSC Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. To remain consistent with the AWSC intersection analysis procedure described later in this chapter, a total delay of 50 sec/veh is assumed as the break point between LOS E and F.

The proposed level of service criteria for TWSC intersections are somewhat different from the criteria used in Chapter 16 for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. . . .

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

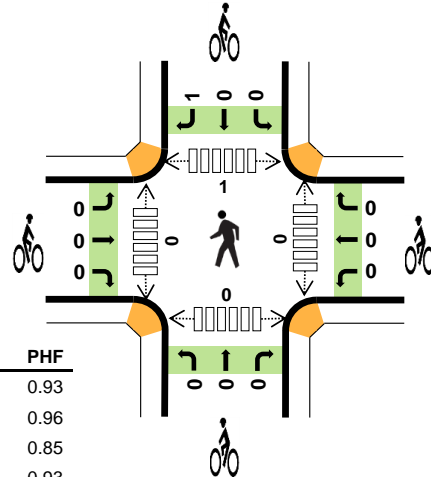
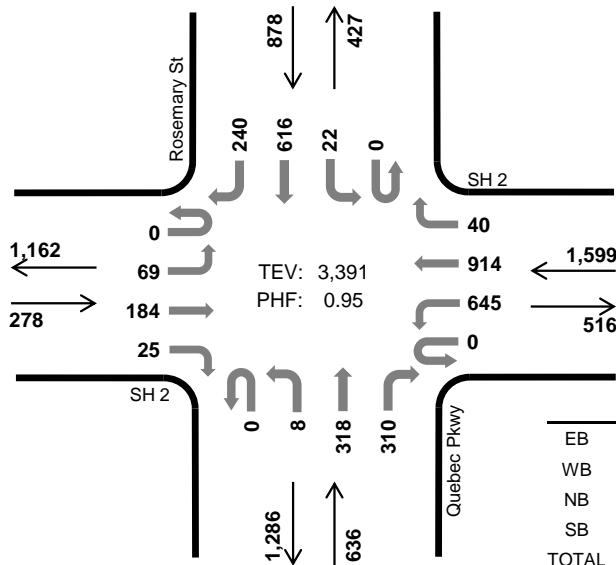
APPENDIX C – Crash Data & Traffic Counts

Rosemary St SH 2



Peak Hour

Date: 11/02/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:00 AM to 8:00 AM



	HV %:	PHF
EB	6.1%	0.93
WB	6.4%	0.96
NB	9.4%	0.85
SB	6.7%	0.93
TOTAL	7.0%	0.95

Two-Hour Count Summaries

Interval Start	SH 2 Eastbound				SH 2 Westbound				Quebec Pkwy Northbound				Rosemary St Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	10	60	5	0	174	198	6	0	0	74	50	0	2	170	41	790	0	
7:15 AM	0	18	33	15	0	175	229	12	0	2	85	86	0	5	167	63	890	0	
7:30 AM	0	24	50	1	0	127	250	10	0	4	93	90	0	6	144	61	860	0	
7:45 AM	0	17	41	4	0	169	237	12	0	2	66	84	0	9	135	75	851	3,391	
8:00 AM	0	35	29	1	0	128	177	11	0	1	91	94	0	8	130	63	768	3,369	
8:15 AM	0	36	35	2	0	136	154	7	0	2	66	82	0	9	126	46	701	3,180	
8:30 AM	0	39	36	3	0	120	128	6	0	2	62	64	0	4	117	35	616	2,936	
8:45 AM	0	21	32	1	0	98	77	6	0	2	57	59	0	5	101	37	496	2,581	
Count Total	0	200	316	32	0	1,127	1,450	70	0	15	594	609	0	48	1,090	421	5,972	0	
Peak Hour	All	0	69	184	25	0	645	914	40	0	8	318	310	0	22	616	240	3,391	0
	HV	0	0	16	1	0	71	27	5	0	2	21	37	0	2	43	14	239	0
	HV%	-	0%	9%	4%	-	11%	3%	13%	-	25%	7%	12%	-	9%	7%	6%	7%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	7	23	10	18	58	0	0	0	0	0	0	0	0	0	0
7:15 AM	2	20	20	19	61	0	0	0	0	0	0	0	1	0	1
7:30 AM	5	29	19	13	66	0	0	0	0	0	0	0	0	0	0
7:45 AM	3	31	11	9	54	0	0	0	1	1	0	0	0	0	0
8:00 AM	4	28	25	10	67	0	0	0	0	0	0	0	0	0	0
8:15 AM	5	36	19	9	69	0	0	0	0	0	0	0	0	0	0
8:30 AM	8	31	24	14	77	0	0	0	0	0	0	2	0	0	2
8:45 AM	4	22	14	9	49	0	0	0	0	0	0	0	0	0	0
Count Total	38	220	142	101	501	0	0	0	1	1	0	2	1	0	3
Peak Hour	17	103	60	59	239	0	0	0	1	1	0	0	1	0	1

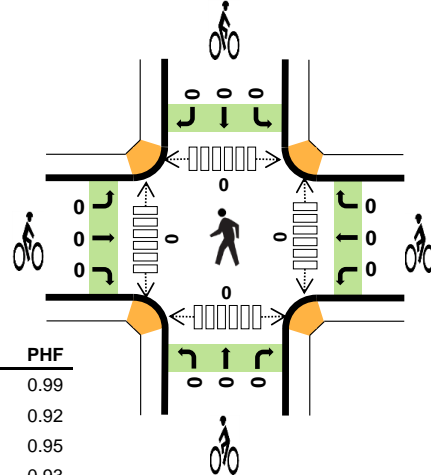
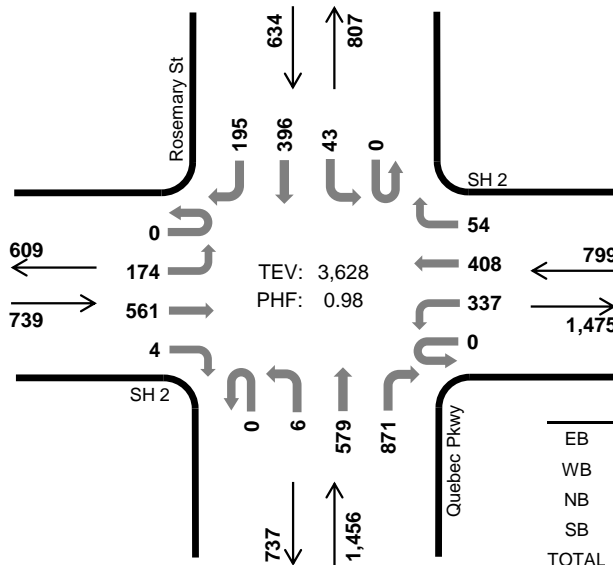
Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	SH 2				SH 2				Quebec Pkwy				Rosemary St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	6	1	0	19	3	1	0	0	6	4	0	0	13	5	58	0
7:15 AM	0	0	2	0	0	14	4	2	0	1	10	9	0	0	14	5	61	0
7:30 AM	0	0	5	0	0	20	9	0	0	0	3	16	0	1	9	3	66	0
7:45 AM	0	0	3	0	0	18	11	2	0	1	2	8	0	1	7	1	54	239
8:00 AM	0	0	4	0	0	17	11	0	0	0	5	20	0	0	8	2	67	248
8:15 AM	0	4	1	0	0	24	12	0	0	0	4	15	0	0	6	3	69	256
8:30 AM	0	3	4	1	0	24	7	0	0	0	7	17	0	0	11	3	77	267
8:45 AM	0	0	4	0	0	13	8	1	0	0	5	9	0	0	6	3	49	262
Count Total	0	7	29	2	0	149	65	6	0	2	42	98	0	2	74	25	501	0
Peak Hour	0	0	16	1	0	71	27	5	0	2	21	37	0	2	43	14	239	0
Two-Hour Count Summaries - Bikes																		
Interval Start	SH 2			SH 2			Quebec Pkwy			Rosemary St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
<i>Note: U-Turn volumes for bikes are included in Left-Turn, if any.</i>																		

Rosemary St SH 2



Peak Hour

Date: 11/02/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	3.9%	0.99
WB	10.5%	0.92
NB	6.3%	0.95
SB	4.3%	0.93
TOTAL	6.4%	0.98

Two-Hour Count Summaries

Interval Start	SH 2 Eastbound				SH 2 Westbound				Quebec Pkwy Northbound				Rosemary St Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	43	119	4	0	72	110	18	0	2	147	243	0	23	77	52	910	0	
4:15 PM	0	38	144	1	0	81	94	9	0	1	148	235	0	15	92	51	909	0	
4:30 PM	0	47	138	2	0	95	107	14	0	3	138	203	0	8	92	44	891	0	
4:45 PM	0	43	143	0	0	77	107	16	0	1	139	205	0	10	113	48	902	3,612	
5:00 PM	0	46	136	1	0	84	100	15	0	1	154	228	0	10	99	52	926	3,628	
5:15 PM	0	49	142	3	0	82	83	12	1	0	142	215	0	15	114	51	909	3,628	
5:30 PM	0	25	120	3	0	93	86	12	0	1	143	211	0	9	114	53	870	3,607	
5:45 PM	0	47	102	2	0	73	73	3	0	2	155	186	0	10	93	47	793	3,498	
Count Total	0	338	1,044	16	0	657	760	99	1	11	1,166	1,726	0	100	794	398	7,110	0	
Peak Hour	All	0	174	561	4	0	337	408	54	0	6	579	871	0	43	396	195	3,628	0
	HV	0	4	25	0	0	43	35	6	0	0	21	70	0	2	19	6	231	0
	HV%	-	2%	4%	0%	-	13%	9%	11%	-	0%	4%	8%	-	5%	5%	3%	6%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	8	16	27	6	57	0	0	0	0	0	0	0	0	0	0
4:15 PM	11	29	24	4	68	0	0	0	0	0	0	0	0	0	0
4:30 PM	7	26	28	5	66	0	0	0	0	0	0	0	0	0	0
4:45 PM	5	14	19	11	49	0	0	0	0	0	0	0	0	0	0
5:00 PM	6	15	20	7	48	0	0	0	0	0	0	0	0	0	0
5:15 PM	8	12	25	4	49	0	0	0	0	0	0	0	0	0	0
5:30 PM	5	11	22	0	38	0	0	0	0	0	0	0	0	0	0
5:45 PM	2	6	20	2	30	0	0	0	0	0	0	0	0	0	0
Count Total	52	129	185	39	405	0	0	0	0	0	0	0	0	0	0
Peak Hour	29	84	91	27	231	0	0	0	0	0	0	0	0	0	0

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	SH 2				SH 2				Quebec Pkwy				Rosemary St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	1	7	0	0	9	5	2	0	0	9	18	0	0	5	1	57	0
4:15 PM	0	2	9	0	0	16	13	0	0	0	5	19	0	0	2	2	68	0
4:30 PM	0	0	7	0	0	12	11	3	0	0	3	25	0	1	3	1	66	0
4:45 PM	0	2	3	0	0	4	7	3	0	0	9	10	0	1	8	2	49	240
5:00 PM	0	0	6	0	0	11	4	0	0	0	4	16	0	0	6	1	48	231
5:15 PM	0	2	6	0	0	7	4	1	0	0	4	21	0	0	3	1	49	212
5:30 PM	0	2	3	0	0	6	4	1	0	0	6	16	0	0	0	0	38	184
5:45 PM	0	1	1	0	0	2	3	1	0	0	5	15	0	0	2	0	30	165
Count Total	0	10	42	0	0	67	51	11	0	0	45	140	0	2	29	8	405	0
Peak Hour	0	4	25	0	0	43	35	6	0	0	21	70	0	2	19	6	231	0
Two-Hour Count Summaries - Bikes																		
Interval Start	SH 2			SH 2			Quebec Pkwy			Rosemary St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Note: U-Turn volumes for bikes are included in Left-Turn, if any.</i>																		

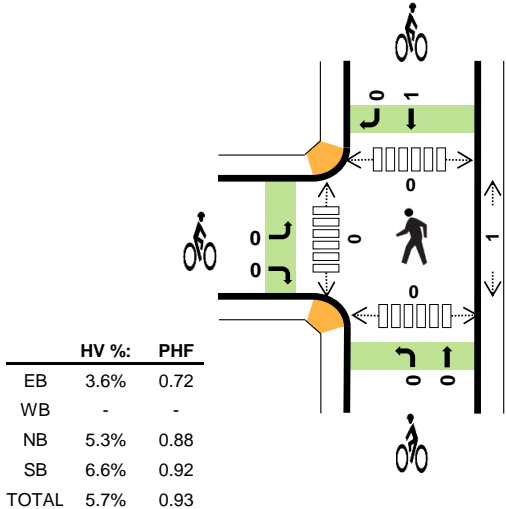
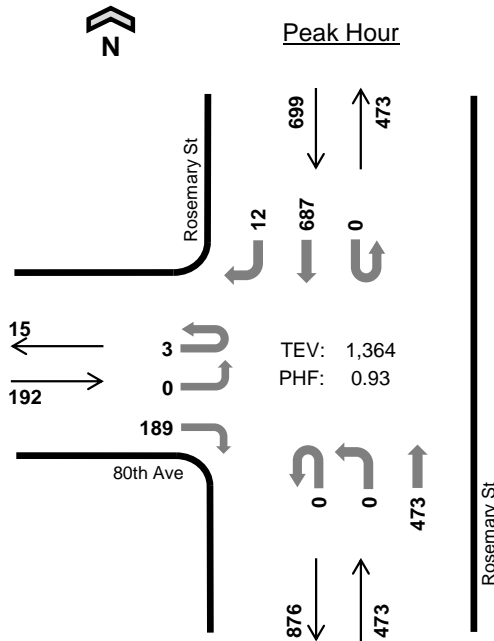


Rosemary St 80th Ave

Date: 11/02/2022

Count Period: 7:00 AM to 9:00 AM

Peak Hour: 7:15 AM to 8:15 AM



Two-Hour Count Summaries

Interval Start	80th Ave				N/A				Rosemary St				Rosemary St				15-min Total	Rolling One Hour	
	Eastbound		Westbound		Northbound		Southbound		UT		LT		TH		RT				
7:00 AM	1	0	0	35	0	0	0	0	0	0	87	0	0	0	175	2	300	0	
7:15 AM	0	0	0	67	0	0	0	0	0	0	115	0	0	0	169	2	353	0	
7:30 AM	1	0	0	45	0	0	0	0	0	0	130	0	0	0	189	0	365	0	
7:45 AM	1	0	0	41	0	0	0	0	0	0	94	0	0	0	162	2	300	1,318	
8:00 AM	1	0	0	36	0	0	0	0	0	0	134	0	0	0	167	8	346	1,364	
8:15 AM	0	0	0	50	0	0	0	0	0	0	110	0	0	0	128	7	295	1,306	
8:30 AM	0	0	0	37	0	0	0	0	0	0	112	0	0	0	118	4	271	1,212	
8:45 AM	0	0	0	32	0	0	0	0	0	0	84	0	0	0	106	8	230	1,142	
Count Total	4	0	0	343	0	0	0	0	0	0	866	0	0	0	1,214	33	2,460	0	
Peak Hour	All	3	0	0	189	0	0	0	0	0	0	473	0	0	0	687	12	1,364	0
	HV	0	0	0	7	0	0	0	0	0	0	25	0	0	0	42	4	78	0
	HV%	0%	-	-	4%	-	-	-	-	-	-	5%	-	-	-	6%	33%	6%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	2	0	6	16	24	0	0	0	0	0	0	0	0	0	0
7:15 AM	4	0	14	14	32	0	0	0	0	0	1	0	0	0	1
7:30 AM	2	0	3	10	15	0	0	0	0	0	0	0	0	0	0
7:45 AM	1	0	3	11	15	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	5	11	16	0	0	0	1	1	0	0	0	0	0
8:15 AM	1	0	8	9	18	0	0	0	0	0	0	0	0	0	0
8:30 AM	2	0	10	15	27	0	0	0	0	0	1	0	0	0	1
8:45 AM	1	0	6	10	17	0	0	0	0	0	0	0	0	0	0
Count Total	13	0	55	96	164	0	0	0	1	1	2	0	0	0	2
Peak Hr	7	0	25	46	78	0	0	0	1	1	1	0	0	0	1

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	80th Ave				N/A				Rosemary St				Rosemary St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	2	0	0	0	0	0	0	6	0	0	0	16	0	24	0
7:15 AM	0	0	0	4	0	0	0	0	0	0	14	0	0	0	14	0	32	0
7:30 AM	0	0	0	2	0	0	0	0	0	0	3	0	0	0	10	0	15	0
7:45 AM	0	0	0	1	0	0	0	0	0	0	3	0	0	0	10	1	15	86
8:00 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	8	3	16	78
8:15 AM	0	0	0	1	0	0	0	0	0	0	8	0	0	0	9	0	18	64
8:30 AM	0	0	0	2	0	0	0	0	0	0	10	0	0	0	13	2	27	76
8:45 AM	0	0	0	1	0	0	0	0	0	0	6	0	0	0	8	2	17	78
Count Total	0	0	0	13	0	0	0	0	0	0	55	0	0	0	88	8	164	0
Peak Hour	0	0	0	7	0	0	0	0	0	0	25	0	0	0	42	4	78	0

Two-Hour Count Summaries - Bikes																	
Interval Start	80th Ave			N/A			Rosemary St			Rosemary St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

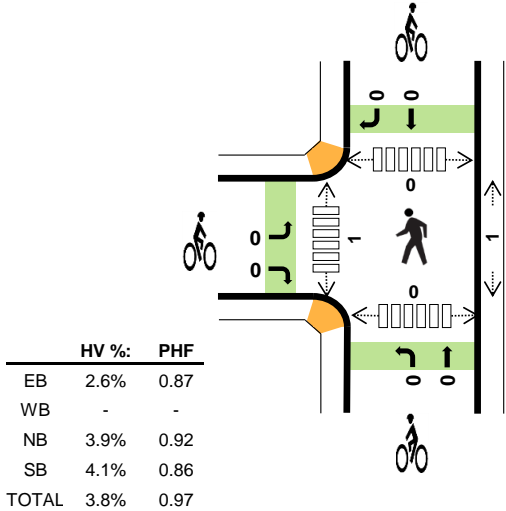
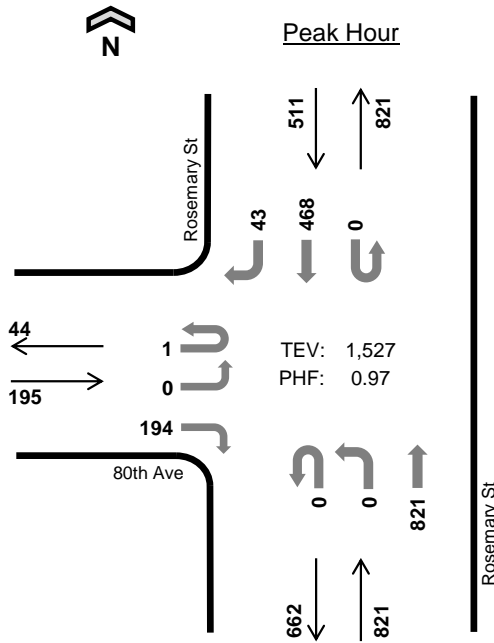


Rosemary St 80th Ave

Date: 11/02/2022

Count Period: 4:00 PM to 6:00 PM

Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	2.6%	0.87
WB	-	-
NB	3.9%	0.92
SB	4.1%	0.86
TOTAL	3.8%	0.97

Two-Hour Count Summaries

Interval Start	80th Ave				N/A				Rosemary St				Rosemary St				15-min Total	Rolling One Hour	
	Eastbound		Westbound		Westbound		Northbound		Northbound		Southbound		Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	0	0	72	0	0	0	0	0	0	213	0	0	0	84	18	387	0	
4:15 PM	0	0	0	50	0	0	0	0	0	0	191	0	0	0	103	11	355	0	
4:30 PM	0	0	0	54	0	0	0	0	0	0	205	0	0	0	95	16	370	0	
4:45 PM	0	0	0	56	0	0	0	0	0	0	191	0	0	0	120	8	375	1,487	
5:00 PM	1	0	0	43	0	0	0	0	0	0	222	0	0	0	113	11	390	1,490	
5:15 PM	0	0	0	41	0	0	0	0	0	0	203	0	0	0	140	8	392	1,527	
5:30 PM	0	0	0	54	0	0	0	0	0	0	181	0	0	0	121	8	364	1,521	
5:45 PM	0	0	0	49	0	0	0	0	0	0	199	0	0	0	99	6	353	1,499	
Count Total	1	0	0	419	0	0	0	0	0	0	1,605	0	0	0	875	86	2,986	0	
Peak Hour	All	1	0	0	194	0	0	0	0	0	0	821	0	0	0	468	43	1,527	0
	HV	0	0	0	5	0	0	0	0	0	0	32	0	0	0	18	3	58	0
	HV%	0%	-	-	3%	-	-	-	-	-	-	4%	-	-	-	4%	7%	4%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	1	0	11	5	17	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	7	6	13	0	0	0	0	0	0	0	0	0	0
4:30 PM	1	0	6	5	12	0	0	0	0	0	0	0	0	0	0
4:45 PM	3	0	13	5	21	0	0	0	0	0	1	1	0	0	2
5:00 PM	1	0	5	7	13	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	8	4	12	0	0	0	0	0	0	0	0	0	0
5:30 PM	1	0	8	0	9	0	0	0	0	0	0	0	0	0	0
5:45 PM	3	0	8	2	13	0	0	0	0	0	0	0	0	0	0
Count Total	10	0	66	34	110	0	0	0	0	0	1	1	0	0	2
Peak Hr	5	0	32	21	58	0	0	0	0	0	1	1	0	0	2

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	80th Ave				N/A				Rosemary St				Rosemary St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	1	0	0	0	0	0	0	11	0	0	0	4	1	17	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	7	0	0	0	5	1	13	0
4:30 PM	0	0	0	1	0	0	0	0	0	0	6	0	0	0	3	2	12	0
4:45 PM	0	0	0	3	0	0	0	0	0	0	13	0	0	0	5	0	21	63
5:00 PM	0	0	0	1	0	0	0	0	0	0	5	0	0	0	6	1	13	59
5:15 PM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	4	0	12	58
5:30 PM	0	0	0	1	0	0	0	0	0	0	8	0	0	0	0	0	9	55
5:45 PM	0	0	0	3	0	0	0	0	0	0	8	0	0	0	1	1	13	47
Count Total	0	0	0	10	0	0	0	0	0	0	66	0	0	0	28	6	110	0
Peak Hour	0	0	0	5	0	0	0	0	0	0	32	0	0	0	18	3	58	0

Two-Hour Count Summaries - Bikes																	
Interval Start	80th Ave			N/A			Rosemary St			Rosemary St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

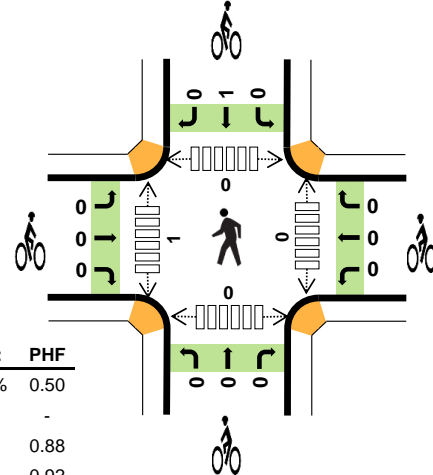
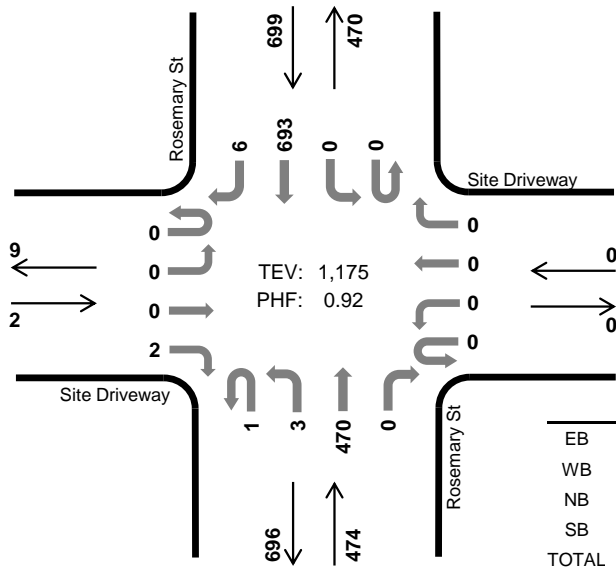
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Rosemary St Site Driveway



Peak Hour

Date: 11/02/2022
 Count Period: 7:00 AM to 9:00 AM
 Peak Hour: 7:15 AM to 8:15 AM



	HV %:	PHF
EB	100.0%	0.50
WB	-	-
NB	5.5%	0.88
SB	6.4%	0.92
TOTAL	6.2%	0.92

Two-Hour Count Summaries

Interval Start	Site Driveway Eastbound				Site Driveway Westbound				Rosemary St Northbound				Rosemary St Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	0	0	0	0	0	0	0	0	0	89	0	0	0	176	2	267	0	
7:15 AM	0	0	0	0	0	0	0	0	1	1	113	0	0	0	166	1	282	0	
7:30 AM	0	0	0	1	0	0	0	0	0	1	129	0	0	0	188	1	320	0	
7:45 AM	0	0	0	0	0	0	0	0	0	1	94	0	0	0	166	3	264	1,133	
8:00 AM	0	0	0	1	0	0	0	0	0	0	134	0	0	0	173	1	309	1,175	
8:15 AM	0	0	0	1	0	0	0	0	0	1	107	0	0	0	135	4	248	1,141	
8:30 AM	0	0	0	2	0	0	0	0	1	1	110	0	0	0	122	0	236	1,057	
8:45 AM	0	0	0	2	0	0	0	0	0	0	85	0	0	0	114	1	202	995	
Count Total	0	0	0	7	0	0	0	0	2	5	861	0	0	0	1,240	13	2,128	0	
Peak Hour	All	0	0	0	2	0	0	0	0	1	3	470	0	0	0	693	6	1,175	0
	HV	0	0	0	2	0	0	0	0	0	0	26	0	0	0	45	0	73	0
	HV%	-	-	-	100%	-	-	-	-	0%	0%	6%	-	-	-	6%	0%	6%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

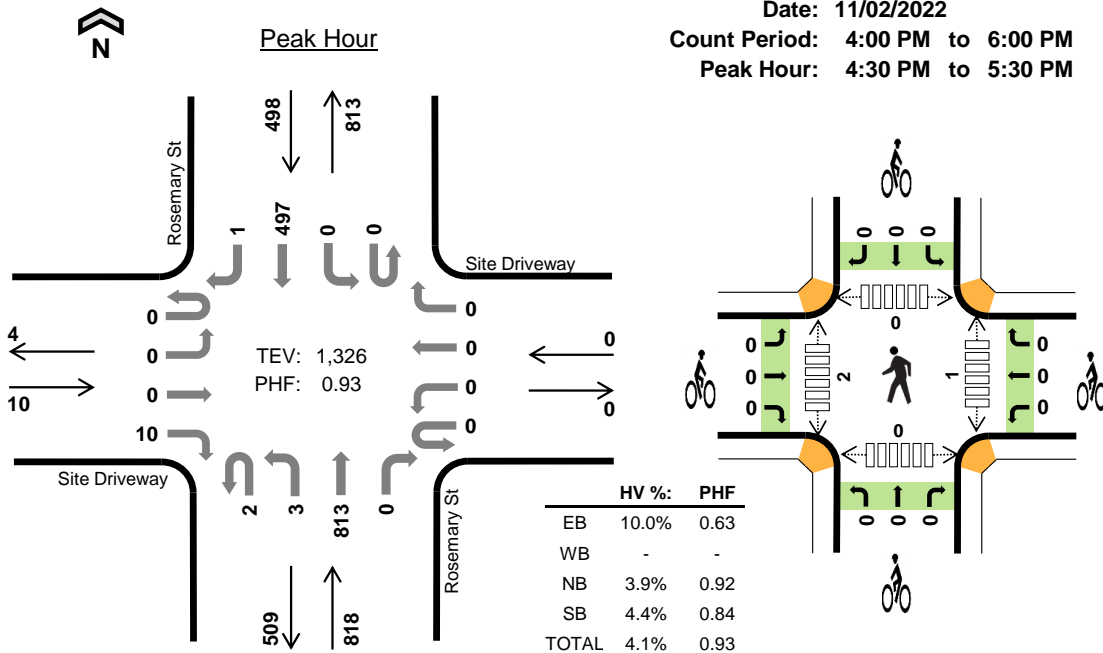
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	6	16	22	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	12	14	26	0	0	0	0	0	0	1	0	0	1
7:30 AM	1	0	4	10	15	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	4	11	15	0	0	0	1	1	0	0	0	0	0
8:00 AM	1	0	6	10	17	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	8	10	18	0	0	0	0	0	0	0	0	0	0
8:30 AM	1	0	9	14	24	0	0	0	0	0	0	0	0	0	0
8:45 AM	1	0	5	10	16	0	0	0	0	0	1	0	0	0	1
Count Total	4	0	54	95	153	0	0	0	1	1	1	1	0	0	2
Peak Hour	2	0	26	45	73	0	0	0	1	1	0	1	0	0	1

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Site Driveway				Site Driveway				Rosemary St				Rosemary St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	16	0	22	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	12	0	0	0	14	0	26	0
7:30 AM	0	0	0	1	0	0	0	0	0	0	4	0	0	0	10	0	15	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	11	0	15	78
8:00 AM	0	0	0	1	0	0	0	0	0	0	6	0	0	0	10	0	17	73
8:15 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8	2	18	65
8:30 AM	0	0	0	1	0	0	0	0	0	0	9	0	0	0	14	0	24	74
8:45 AM	0	0	0	1	0	0	0	0	0	0	5	0	0	0	10	0	16	75
Count Total	0	0	0	4	0	0	0	0	0	0	54	0	0	0	93	2	153	0
Peak Hour	0	0	0	2	0	0	0	0	0	0	26	0	0	0	45	0	73	0
Two-Hour Count Summaries - Bikes																		
Interval Start	Site Driveway			Site Driveway			Rosemary St			Rosemary St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
<i>Note: U-Turn volumes for bikes are included in Left-Turn, if any.</i>																		

Rosemary St Site Driveway



Date: 11/02/2022
 Count Period: 4:00 PM to 6:00 PM
 Peak Hour: 4:30 PM to 5:30 PM



Two-Hour Count Summaries

Interval Start	Site Driveway Eastbound				Site Driveway Westbound				Rosemary St Northbound				Rosemary St Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	0	0	2	0	0	0	0	0	0	211	0	0	0	103	3	319	0	
4:15 PM	0	1	0	2	0	0	0	0	0	0	192	0	0	0	111	0	306	0	
4:30 PM	0	0	0	4	0	0	0	0	1	1	203	0	0	0	107	0	316	0	
4:45 PM	0	0	0	1	0	0	0	0	0	1	185	0	0	0	122	0	309	1,250	
5:00 PM	0	0	0	4	0	0	0	0	1	1	220	0	0	0	120	0	346	1,277	
5:15 PM	0	0	0	1	0	0	0	0	0	0	205	0	0	0	148	1	355	1,326	
5:30 PM	0	1	0	1	0	0	0	0	0	1	178	0	0	0	133	0	314	1,324	
5:45 PM	0	0	0	0	0	0	0	0	0	1	206	0	0	0	98	0	305	1,320	
Count Total	0	2	0	15	0	0	0	0	2	5	1,600	0	0	0	942	4	2,570	0	
Peak Hour	All	0	0	0	10	0	0	0	0	2	3	813	0	0	0	497	1	1,326	0
	HV	0	0	0	1	0	0	0	0	0	0	32	0	0	0	21	1	55	0
	HV%	-	-	-	10%	-	-	-	-	0%	0%	4%	-	-	-	4%	100%	4%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	11	6	17	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	7	6	13	0	0	0	0	0	0	0	0	0	0
4:30 PM	1	0	8	4	13	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	11	6	17	0	0	0	0	0	0	2	0	0	2
5:00 PM	0	0	6	7	13	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	7	5	12	0	0	0	0	0	1	0	0	0	1
5:30 PM	1	0	8	0	9	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	8	1	9	0	0	0	0	0	0	0	0	0	0
Count Total	2	0	66	35	103	0	0	0	0	0	1	2	0	0	3
Peak Hour	1	0	32	22	55	0	0	0	0	0	1	2	0	0	3

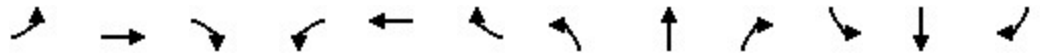
Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Site Driveway				Site Driveway				Rosemary St				Rosemary St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	11	0	0	0	5	1	17	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	7	0	0	0	6	0	13	0
4:30 PM	0	0	0	1	0	0	0	0	0	0	8	0	0	0	4	0	13	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	11	0	0	0	6	0	17	60
5:00 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	7	0	13	56
5:15 PM	0	0	0	0	0	0	0	0	0	0	7	0	0	0	4	1	12	55
5:30 PM	0	1	0	0	0	0	0	0	0	1	7	0	0	0	0	0	9	51
5:45 PM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	1	0	9	43
Count Total	0	1	0	1	0	0	0	0	0	1	65	0	0	0	33	2	103	0
Peak Hour	0	0	0	1	0	0	0	0	0	0	32	0	0	0	21	1	55	0
Two-Hour Count Summaries - Bikes																		
Interval Start	Site Driveway			Site Driveway			Rosemary St			Rosemary St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Note: U-Turn volumes for bikes are included in Left-Turn, if any.</i>																		

APPENDIX D – Existing Synchro Outputs

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023

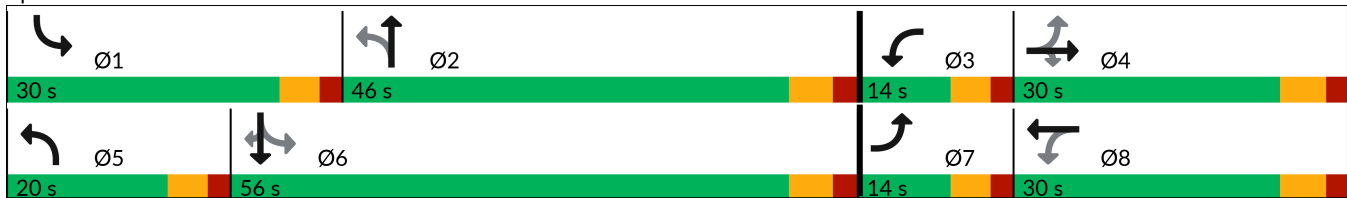


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	585	266	9	335	354	94	153	21	599	893	45
Future Volume (vph)	28	585	266	9	335	354	94	153	21	599	893	45
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	30.0	30.0	14.0	30.0		20.0	46.0		30.0	56.0	56.0
Total Split (%)	11.7%	25.0%	25.0%	11.7%	25.0%		16.7%	38.3%		25.0%	46.7%	46.7%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	26.8	25.0	25.0	23.7	19.7	89.9	30.1	20.6	89.9	51.2	39.0	39.0
Actuated g/C Ratio	0.30	0.28	0.28	0.26	0.22	1.00	0.33	0.23	1.00	0.57	0.43	0.43
v/c Ratio	0.11	0.67	0.46	0.05	0.53	0.27	0.35	0.21	0.02	0.88	0.66	0.07
Control Delay (s/veh)	24.8	34.8	6.7	24.8	36.5	0.4	15.9	29.3	0.0	31.1	25.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.8	34.8	6.7	24.8	36.5	0.4	15.9	29.3	0.0	31.1	25.1	0.2
LOS	C	C	A	C	D	A	B	C	A	C	C	A
Approach Delay (s/veh)		26.0			18.1			22.3			26.8	
Approach LOS		C			B			C			C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 89.9
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay (s/veh): 24.3
 Intersection LOS: C
 Intersection Capacity Utilization 83.5%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY



Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	30	636	289	11	394	416	102	166	23	651	971	49
v/c Ratio	0.11	0.67	0.46	0.05	0.53	0.27	0.35	0.21	0.02	0.88	0.66	0.07
Control Delay (s/veh)	24.8	34.8	6.7	24.8	36.5	0.4	15.9	29.3	0.0	31.1	25.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.8	34.8	6.7	24.8	36.5	0.4	15.9	29.3	0.0	31.1	25.1	0.2
Queue Length 50th (ft)	11	148	0	4	104	0	25	40	0	244	237	0
Queue Length 95th (ft)	38	#342	74	18	181	0	58	73	0	#568	385	0
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	303	1020	659	255	933	1524	406	1556	1524	745	1945	925
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.62	0.44	0.04	0.42	0.27	0.25	0.11	0.02	0.87	0.50	0.05

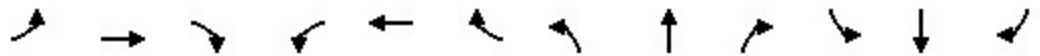
Intersection Summary

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

HCM 6th Signalized Intersection Summary

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	585	266	9	335	354	94	153	21	599	893	45
Future Volume (veh/h)	28	585	266	9	335	354	94	153	21	599	893	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	30	636	0	11	394	0	102	166	0	651	971	0
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	301	773		219	773		284	593		722	1314	
Arrive On Green	0.06	0.22	0.00	0.06	0.22	0.00	0.07	0.17	0.00	0.28	0.38	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	30	636	0	11	394	0	102	166	0	651	971	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	1.1	15.3	0.0	0.4	8.7	0.0	4.1	3.7	0.0	24.5	21.2	0.0
Cycle Q Clear(g_c), s	1.1	15.3	0.0	0.4	8.7	0.0	4.1	3.7	0.0	24.5	21.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	301	773		219	773		284	593		722	1314	
V/C Ratio(X)	0.10	0.82		0.05	0.51		0.36	0.28		0.90	0.74	
Avail Cap(c_a), veh/h	370	948		289	948		448	1581		722	1976	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	23.3	32.1	0.0	23.9	29.5	0.0	26.5	31.3	0.0	20.4	23.2	0.0
Incr Delay (d2), s/veh	0.1	4.9	0.0	0.1	0.5	0.0	0.8	0.3	0.0	14.6	0.8	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	6.6	0.0	0.2	3.4	0.0	1.7	1.5	0.0	12.4	7.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.4	37.0	0.0	24.0	30.1	0.0	27.3	31.6	0.0	35.0	24.0	0.0
LnGrp LOS	C	D		C	C		C	C		C	C	
Approach Vol, veh/h		666			405			268			1622	
Approach Delay, s/veh		36.4			29.9			29.9			28.4	
Approach LOS		D			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	21.0	10.5	25.6	11.8	39.2	10.5	25.6				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	24.5	40.0	8.5	24.0	14.5	50.0	8.5	24.0				
Max Q Clear Time (g_c+I1), s	26.5	5.7	2.4	17.3	6.1	23.2	3.1	10.7				
Green Ext Time (p_c), s	0.0	1.0	0.0	2.3	0.1	7.0	0.0	1.9				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	30.5
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 2.1

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	192	0	474	687	12
Future Vol, veh/h	0	192	0	474	687	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	88	88	92	92
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	0	226	0	539	747	13

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	374	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	612	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	612	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	14.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	612	-
HCM Lane V/C Ratio	-	0.369	-
HCM Control Delay (s/veh)	-	14.3	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q (veh)	-	1.7	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

11/15/2023

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↔	↔			↕	↕
Traffic Vol, veh/h	0	0	2	0	0	0	4	470	0	0	697	6
Future Vol, veh/h	0	0	2	0	0	0	4	470	0	0	697	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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	85	85	85	85	85	85	88	88	88	92	92	92
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	2	0	0	0	5	534	0	0	758	7

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	-	-	383	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	7.02	4.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	3.36	2.26
Pot Cap-1 Maneuver	0	0	604	0
Stage 1	0	0	-	-
Stage 2	0	0	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	604	719
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

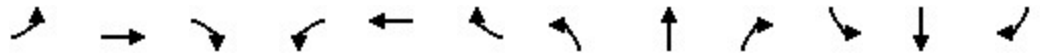
Approach	EB	WB	NB	SB
HCM Control Delay, s/v	11	0	0.1	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	818	-	-	604	-	-	-
HCM Lane V/C Ratio	0.006	-	-	0.004	-	-	-
HCM Control Delay (s/veh)	9.4	0	-	11	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0	-	-	-

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	423	197	6	577	851	187	559	6	338	397	57
Future Volume (vph)	43	423	197	6	577	851	187	559	6	338	397	57
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	40.0	40.0	14.0	40.0		20.0	46.0		20.0	46.0	46.0
Total Split (%)	11.7%	33.3%	33.3%	11.7%	33.3%		16.7%	38.3%		16.7%	38.3%	38.3%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	29.6	27.7	27.7	26.1	22.4	85.7	35.0	22.5	85.7	41.2	25.8	25.8
Actuated g/C Ratio	0.35	0.32	0.32	0.30	0.26	1.00	0.41	0.26	1.00	0.48	0.30	0.30
v/c Ratio	0.18	0.42	0.34	0.02	0.70	0.61	0.42	0.68	0.00	0.86	0.42	0.11
Control Delay (s/veh)	19.7	24.3	5.2	18.0	34.6	1.8	17.5	34.0	0.0	41.0	28.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.7	24.3	5.2	18.0	34.6	1.8	17.5	34.0	0.0	41.0	28.1	0.4
LOS	B	C	A	B	C	A	B	C	A	D	C	A
Approach Delay (s/veh)		18.3			15.1			29.6			31.6	
Approach LOS		B			B			C			C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 85.7
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay (s/veh): 22.3 Intersection LOS: C
 Intersection Capacity Utilization 73.5% ICU Level of Service D
 Analysis Period (min) 15

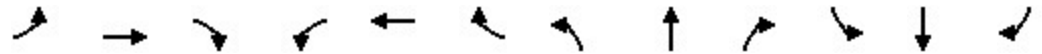
Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

Ø1 20 s	Ø2 46 s	Ø3 14 s	Ø4 40 s
Ø5 20 s	Ø6 46 s	Ø7 14 s	Ø8 40 s

Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	47	460	214	7	627	925	203	608	7	367	432	62
v/c Ratio	0.18	0.42	0.34	0.02	0.70	0.61	0.42	0.68	0.00	0.86	0.42	0.11
Control Delay (s/veh)	19.7	24.3	5.2	18.0	34.6	1.8	17.5	34.0	0.0	41.0	28.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.7	24.3	5.2	18.0	34.6	1.8	17.5	34.0	0.0	41.0	28.1	0.4
Queue Length 50th (ft)	16	94	0	2	173	0	66	167	0	136	107	0
Queue Length 95th (ft)	42	184	53	12	264	0	133	256	0	#384	178	0
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	279	1474	781	362	1418	1524	544	1668	1524	426	1668	811
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.31	0.27	0.02	0.44	0.61	0.37	0.36	0.00	0.86	0.26	0.08

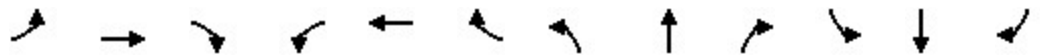
Intersection Summary

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

HCM 6th Signalized Intersection Summary

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	423	197	6	577	851	187	559	6	338	397	57
Future Volume (veh/h)	43	423	197	6	577	851	187	559	6	338	397	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	47	460	0	7	627	0	203	608	0	367	432	0
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
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	250	824		306	824		471	813		453	1032	
Arrive On Green	0.06	0.24	0.00	0.06	0.24	0.00	0.11	0.24	0.00	0.18	0.30	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	47	460	0	7	627	0	203	608	0	367	432	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	1.6	9.5	0.0	0.2	13.7	0.0	7.0	13.3	0.0	12.4	8.1	0.0
Cycle Q Clear(g_c), s	1.6	9.5	0.0	0.2	13.7	0.0	7.0	13.3	0.0	12.4	8.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	250	824		306	824		471	813		453	1032	
V/C Ratio(X)	0.19	0.56		0.02	0.76		0.43	0.75		0.81	0.42	
Avail Cap(c_a), veh/h	324	1447		381	1447		583	1702		455	1702	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.5	27.0	0.0	20.4	28.6	0.0	19.4	28.6	0.0	18.6	22.7	0.0
Incr Delay (d2), s/veh	0.4	0.6	0.0	0.0	1.5	0.0	0.6	1.4	0.0	10.5	0.3	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	3.8	0.0	0.1	5.3	0.0	2.6	5.2	0.0	5.6	3.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	21.9	27.6	0.0	20.4	30.1	0.0	20.0	30.0	0.0	29.2	22.9	0.0
LnGrp LOS	C	C		C	C		C	C		C	C	
Approach Vol, veh/h		507			634			811			799	
Approach Delay, s/veh		27.1			30.0			27.5			25.8	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.9	25.1	10.5	25.4	14.7	30.2	10.5	25.4				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	14.5	40.0	8.5	34.0	14.5	40.0	8.5	34.0				
Max Q Clear Time (g_c+I1), s	14.4	15.3	2.2	11.5	9.0	10.1	3.6	15.7				
Green Ext Time (p_c), s	0.0	3.9	0.0	3.0	0.2	2.7	0.0	3.7				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	27.5
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 1.7

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	195	0	821	468	43
Future Vol, veh/h	0	195	0	821	468	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	92	92	86	86
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	0	224	0	892	544	50

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	272	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	714	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	714	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	12.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	714	-
HCM Lane V/C Ratio	-	0.314	-
HCM Control Delay (s/veh)	-	12.3	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q (veh)	-	1.3	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

11/15/2023

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↔			↕	
Traffic Vol, veh/h	0	0	10	0	0	0	5	816	0	0	501	1
Future Vol, veh/h	0	0	10	0	0	0	5	816	0	0	501	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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	85	85	85	85	85	85	92	92	92	85	85	85
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	12	0	0	0	5	887	0	0	589	1

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	-	-	295	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	7.02	4.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	3.36	2.26
Pot Cap-1 Maneuver	0	0	690	551
Stage 1	0	0	-	-
Stage 2	0	0	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	690	551
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	10.3	0	0.1	0
HCM LOS	B	A		

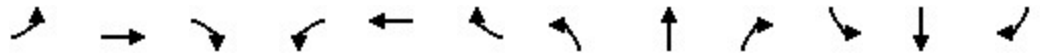
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	955	-	-	690	-	-	-
HCM Lane V/C Ratio	0.006	-	-	0.017	-	-	-
HCM Control Delay (s/veh)	8.8	0	-	10.3	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0.1	-	-	-

APPENDIX E – Background (without site development) Synchro Outputs

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023

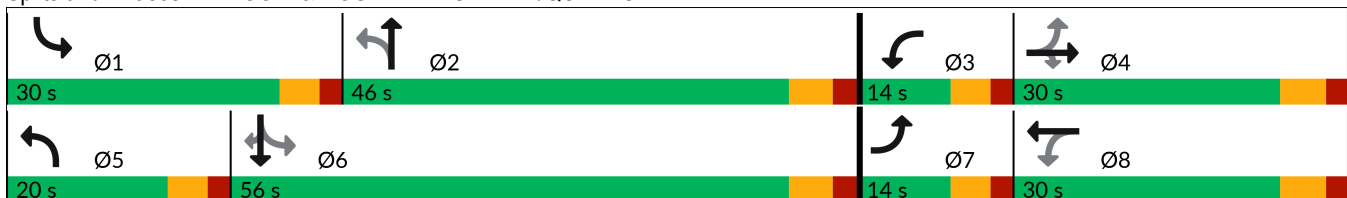


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	585	266	9	335	365	94	158	22	617	920	45
Future Volume (vph)	28	585	266	9	335	365	94	158	22	617	920	45
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	30.0	30.0	14.0	30.0		20.0	46.0		30.0	56.0	56.0
Total Split (%)	11.7%	25.0%	25.0%	11.7%	25.0%		16.7%	38.3%		25.0%	46.7%	46.7%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	26.5	24.7	24.7	23.4	19.4	90.7	30.6	21.1	90.7	52.3	39.9	39.9
Actuated g/C Ratio	0.29	0.27	0.27	0.26	0.21	1.00	0.34	0.23	1.00	0.58	0.44	0.44
v/c Ratio	0.10	0.69	0.46	0.05	0.50	0.26	0.35	0.22	0.02	0.90	0.67	0.07
Control Delay (s/veh)	25.4	35.8	6.9	25.6	36.8	0.4	15.6	28.9	0.0	32.7	25.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	25.4	35.8	6.9	25.6	36.8	0.4	15.6	28.9	0.0	32.7	25.0	0.2
LOS	C	D	A	C	D	A	B	C	A	C	C	A
Approach Delay (s/veh)		26.7			17.9			22.0			27.3	
Approach LOS		C			B			C			C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 90.7
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay (s/veh): 24.8
 Intersection LOS: C
 Intersection Capacity Utilization 84.5%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY



Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	30	636	289	10	364	397	102	172	24	671	1000	49
v/c Ratio	0.10	0.69	0.46	0.05	0.50	0.26	0.35	0.22	0.02	0.90	0.67	0.07
Control Delay (s/veh)	25.4	35.8	6.9	25.6	36.8	0.4	15.6	28.9	0.0	32.7	25.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	25.4	35.8	6.9	25.6	36.8	0.4	15.6	28.9	0.0	32.7	25.0	0.2
Queue Length 50th (ft)	11	150	0	4	96	0	25	41	0	251	243	0
Queue Length 95th (ft)	39	#356	75	18	182	0	57	75	0	#604	398	0
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	306	995	649	249	924	1524	401	1541	1524	748	1926	917
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.64	0.45	0.04	0.39	0.26	0.25	0.11	0.02	0.90	0.52	0.05

Intersection Summary

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

HCM 6th Signalized Intersection Summary
 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	585	266	9	335	365	94	158	22	617	920	45
Future Volume (veh/h)	28	585	266	9	335	365	94	158	22	617	920	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	30	636	0	10	364	0	102	172	0	671	1000	0
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
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	313	773		219	773		277	593		719	1314	
Arrive On Green	0.06	0.22	0.00	0.06	0.22	0.00	0.07	0.17	0.00	0.28	0.38	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	30	636	0	10	364	0	102	172	0	671	1000	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	1.1	15.3	0.0	0.4	8.0	0.0	4.1	3.8	0.0	24.5	22.1	0.0
Cycle Q Clear(g_c), s	1.1	15.3	0.0	0.4	8.0	0.0	4.1	3.8	0.0	24.5	22.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	313	773		219	773		277	593		719	1314	
V/C Ratio(X)	0.10	0.82		0.05	0.47		0.37	0.29		0.93	0.76	
Avail Cap(c_a), veh/h	382	948		289	948		440	1581		719	1976	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	23.2	32.1	0.0	23.9	29.3	0.0	26.5	31.4	0.0	21.1	23.5	0.0
Incr Delay (d2), s/veh	0.1	4.9	0.0	0.1	0.4	0.0	0.8	0.3	0.0	19.1	1.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	6.6	0.0	0.1	3.1	0.0	1.7	1.5	0.0	13.8	8.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.3	37.0	0.0	24.0	29.7	0.0	27.4	31.7	0.0	40.2	24.4	0.0
LnGrp LOS	C	D		C	C		C	C		D	C	
Approach Vol, veh/h		666			374			274			1671	
Approach Delay, s/veh		36.4			29.6			30.1			30.8	
Approach LOS		D			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	21.0	10.5	25.6	11.8	39.2	10.5	25.6				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	24.5	40.0	8.5	24.0	14.5	50.0	8.5	24.0				
Max Q Clear Time (g_c+I1), s	26.5	5.8	2.4	17.3	6.1	24.1	3.1	10.0				
Green Ext Time (p_c), s	0.0	1.0	0.0	2.3	0.1	7.2	0.0	1.8				

Intersection Summary												
HCM 6th Ctrl Delay, s/veh											31.8	
HCM 6th LOS											C	

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 2

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	192	0	474	687	12
Future Vol, veh/h	0	192	0	474	687	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
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, %	6	6	6	6	6	6
Mvmt Flow	0	209	0	515	747	13

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	374	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	612	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	612	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	13.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	612	-
HCM Lane V/C Ratio	-	0.341	-
HCM Control Delay (s/veh)	-	13.9	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q (veh)	-	1.5	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

11/15/2023

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↔			↕		
Traffic Vol, veh/h	0	0	2	0	0	0	4	470	0	0	697	6
Future Vol, veh/h	0	0	2	0	0	0	4	470	0	0	697	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	2	0	0	0	4	511	0	0	758	7

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	383	-	-	256	765	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.02	-	-	7.02	4.22	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.36	-	-	3.36	2.26	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	604	0	0	731	818	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	604	-	-	731	818	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	11	0	0.1	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	818	-	-	604	-	-	-
HCM Lane V/C Ratio	0.005	-	-	0.004	-	-	-
HCM Control Delay (s/veh)	9.4	0	-	11	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0	-	-	-

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	423	197	6	577	877	187	576	6	348	409	57
Future Volume (vph)	43	423	197	6	577	877	187	576	6	348	409	57
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	40.0	40.0	14.0	40.0		20.0	46.0		20.0	46.0	46.0
Total Split (%)	11.7%	33.3%	33.3%	11.7%	33.3%		16.7%	38.3%		16.7%	38.3%	38.3%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	29.8	27.9	27.9	26.3	22.6	86.6	35.7	23.2	86.6	41.8	26.5	26.5
Actuated g/C Ratio	0.34	0.32	0.32	0.30	0.26	1.00	0.41	0.27	1.00	0.48	0.31	0.31
v/c Ratio	0.18	0.42	0.34	0.02	0.71	0.63	0.43	0.68	0.00	0.90	0.43	0.11
Control Delay (s/veh)	20.0	24.7	5.2	18.3	35.0	1.9	17.5	34.1	0.0	46.1	28.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	20.0	24.7	5.2	18.3	35.0	1.9	17.5	34.1	0.0	46.1	28.1	0.4
LOS	C	C	A	B	C	A	B	C	A	D	C	A
Approach Delay (s/veh)		18.6			15.1			29.8			33.8	
Approach LOS		B			B			C			C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 86.6
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay (s/veh): 22.9 Intersection LOS: C
 Intersection Capacity Utilization 74.5% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

Ø1 20 s	Ø2 46 s	Ø3 14 s	Ø4 40 s
Ø5 20 s	Ø6 46 s	Ø7 14 s	Ø8 40 s

Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	47	460	214	7	627	953	203	626	7	378	445	62
v/c Ratio	0.18	0.42	0.34	0.02	0.71	0.63	0.43	0.68	0.00	0.90	0.43	0.11
Control Delay (s/veh)	20.0	24.7	5.2	18.3	35.0	1.9	17.5	34.1	0.0	46.1	28.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	20.0	24.7	5.2	18.3	35.0	1.9	17.5	34.1	0.0	46.1	28.1	0.4
Queue Length 50th (ft)	16	95	0	2	174	0	66	173	0	146	112	0
Queue Length 95th (ft)	43	186	54	12	267	0	133	266	0	#410	184	0
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	276	1463	777	360	1403	1524	538	1650	1524	422	1650	804
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.31	0.28	0.02	0.45	0.63	0.38	0.38	0.00	0.90	0.27	0.08

Intersection Summary

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

HCM 6th Signalized Intersection Summary

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	423	197	6	577	877	187	576	6	348	409	57
Future Volume (veh/h)	43	423	197	6	577	877	187	576	6	348	409	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	47	460	0	7	627	0	203	626	0	378	445	0
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
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	247	821		303	821		469	832		450	1051	
Arrive On Green	0.06	0.24	0.00	0.06	0.24	0.00	0.11	0.24	0.00	0.18	0.31	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	47	460	0	7	627	0	203	626	0	378	445	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	1.6	9.6	0.0	0.2	13.9	0.0	7.0	13.8	0.0	12.9	8.4	0.0
Cycle Q Clear(g_c), s	1.6	9.6	0.0	0.2	13.9	0.0	7.0	13.8	0.0	12.9	8.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	247	821		303	821		469	832		450	1051	
V/C Ratio(X)	0.19	0.56		0.02	0.76		0.43	0.75		0.84	0.42	
Avail Cap(c_a), veh/h	321	1430		377	1430		579	1683		450	1683	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.9	27.4	0.0	20.7	29.0	0.0	19.4	28.7	0.0	18.8	22.7	0.0
Incr Delay (d2), s/veh	0.4	0.6	0.0	0.0	1.5	0.0	0.6	1.4	0.0	13.2	0.3	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	3.8	0.0	0.1	5.4	0.0	2.6	5.4	0.0	6.1	3.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	22.2	28.0	0.0	20.7	30.5	0.0	20.0	30.1	0.0	32.0	22.9	0.0
LnGrp LOS	C	C		C	C		B	C		C	C	
Approach Vol, veh/h		507			634			829			823	
Approach Delay, s/veh		27.4			30.4			27.7			27.1	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	25.8	10.5	25.5	14.8	31.0	10.5	25.5				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	14.5	40.0	8.5	34.0	14.5	40.0	8.5	34.0				
Max Q Clear Time (g_c+I1), s	14.9	15.8	2.2	11.6	9.0	10.4	3.6	15.9				
Green Ext Time (p_c), s	0.0	4.0	0.0	3.0	0.2	2.8	0.0	3.6				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	28.1
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 1.6

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	195	0	821	468	43
Future Vol, veh/h	0	195	0	821	468	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
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, %	6	6	6	6	6	6
Mvmt Flow	0	212	0	892	509	47

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	255	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	732	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	732	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	11.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	732	-
HCM Lane V/C Ratio	-	0.29	-
HCM Control Delay (s/veh)	-	11.9	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q (veh)	-	1.2	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

11/15/2023

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↔			↕	
Traffic Vol, veh/h	0	0	10	0	0	0	5	816	0	0	501	1
Future Vol, veh/h	0	0	10	0	0	0	5	816	0	0	501	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	11	0	0	0	5	887	0	0	545	1

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	-	-	273	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	7.02	4.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	3.36	2.26
Pot Cap-1 Maneuver	0	0	713	0
Stage 1	0	0	-	0
Stage 2	0	0	-	0
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	713	551
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

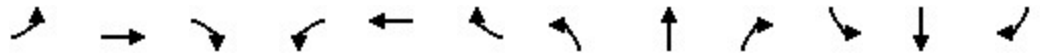
Approach	EB	WB	NB	SB
HCM Control Delay, s/v	10.1	0	0.1	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	992	-	-	713	-	-	-
HCM Lane V/C Ratio	0.005	-	-	0.015	-	-	-
HCM Control Delay (s/veh)	8.6	0	-	10.1	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0	-	-	-

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023

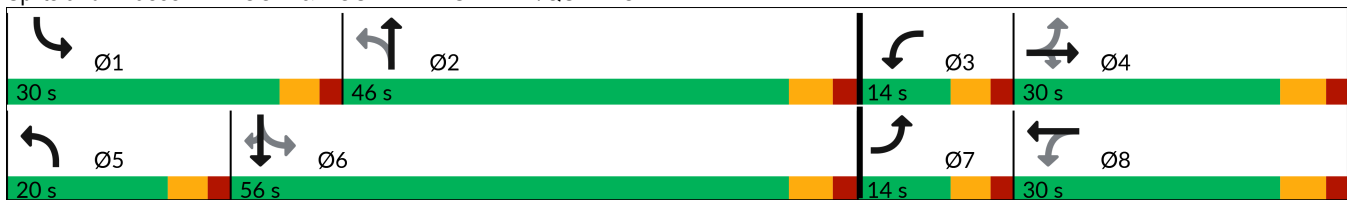


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	585	266	11	335	445	94	192	26	753	1123	45
Future Volume (vph)	28	585	266	11	335	445	94	192	26	753	1123	45
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	30.0	30.0	14.0	30.0		20.0	46.0		30.0	56.0	56.0
Total Split (%)	11.7%	25.0%	25.0%	11.7%	25.0%		16.7%	38.3%		25.0%	46.7%	46.7%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	27.5	25.6	25.6	24.7	20.6	98.1	37.6	27.2	98.1	58.6	45.5	45.5
Actuated g/C Ratio	0.28	0.26	0.26	0.25	0.21	1.00	0.38	0.28	1.00	0.60	0.46	0.46
v/c Ratio	0.11	0.72	0.47	0.06	0.51	0.32	0.41	0.22	0.02	1.08	0.77	0.06
Control Delay (s/veh)	28.7	40.1	7.3	28.8	40.3	0.5	17.2	27.7	0.0	77.4	28.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	28.7	40.1	7.3	28.8	40.3	0.5	17.2	27.7	0.0	77.4	28.5	0.2
LOS	C	D	A	C	D	A	B	C	A	E	C	A
Approach Delay (s/veh)		29.8			17.8			22.2			47.0	
Approach LOS		C			B			C			D	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 98.1
 Natural Cycle: 135
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.08
 Intersection Signal Delay (s/veh): 35.2 Intersection LOS: D
 Intersection Capacity Utilization 92.1% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY



Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	30	636	289	12	364	484	102	209	28	818	1221	49
v/c Ratio	0.11	0.72	0.47	0.06	0.51	0.32	0.41	0.22	0.02	1.08	0.77	0.06
Control Delay (s/veh)	28.7	40.1	7.3	28.8	40.3	0.5	17.2	27.7	0.0	77.4	28.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	28.7	40.1	7.3	28.8	40.3	0.5	17.2	27.7	0.0	77.4	28.5	0.2
Queue Length 50th (ft)	14	186	0	5	115	0	26	52	0	~455	350	0
Queue Length 95th (ft)	39	#363	76	21	185	0	57	89	0	#976	534	0
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	288	936	628	228	856	1524	337	1427	1524	754	1784	859
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.68	0.46	0.05	0.43	0.32	0.30	0.15	0.02	1.08	0.68	0.06

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

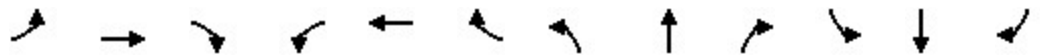
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	585	266	11	335	445	94	192	26	753	1123	45
Future Volume (veh/h)	28	585	266	11	335	445	94	192	26	753	1123	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	30	636	0	12	364	0	102	209	0	818	1221	0
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
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	290	749		197	749		236	794		725	1451	
Arrive On Green	0.05	0.22	0.00	0.05	0.22	0.00	0.07	0.23	0.00	0.26	0.42	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	30	636	0	12	364	0	102	209	0	818	1221	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	1.2	16.9	0.0	0.5	8.8	0.0	4.2	4.7	0.0	24.5	30.3	0.0
Cycle Q Clear(g_c), s	1.2	16.9	0.0	0.5	8.8	0.0	4.2	4.7	0.0	24.5	30.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	290	749		197	749		236	794		725	1451	
V/C Ratio(X)	0.10	0.85		0.06	0.49		0.43	0.26		1.13	0.84	
Avail Cap(c_a), veh/h	353	868		261	868		384	1446		725	1807	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.2	35.7	0.0	27.0	32.6	0.0	26.0	30.0	0.0	23.0	24.7	0.0
Incr Delay (d2), s/veh	0.2	7.1	0.0	0.1	0.5	0.0	1.2	0.2	0.0	74.6	3.1	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	7.6	0.0	0.2	3.5	0.0	1.7	1.9	0.0	18.9	11.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	26.4	42.8	0.0	27.2	33.1	0.0	27.2	30.2	0.0	97.6	27.8	0.0
LnGrp LOS	C	D		C	C		C	C		F	C	
Approach Vol, veh/h		666			376			311			2039	
Approach Delay, s/veh		42.1			32.9			29.2			55.8	
Approach LOS		D			C			C			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	28.0	10.5	26.7	11.8	46.1	10.5	26.7				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	24.5	40.0	8.5	24.0	14.5	50.0	8.5	24.0				
Max Q Clear Time (g_c+I1), s	26.5	6.7	2.5	18.9	6.2	32.3	3.2	10.8				
Green Ext Time (p_c), s	0.0	1.2	0.0	1.9	0.1	7.8	0.0	1.7				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	48.1
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 2

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	192	0	474	687	12
Future Vol, veh/h	0	192	0	474	687	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
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, %	6	6	6	6	6	6
Mvmt Flow	0	209	0	515	747	13

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	374	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	612	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	612	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	13.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	612	-
HCM Lane V/C Ratio	-	0.341	-
HCM Control Delay (s/veh)	-	13.9	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q (veh)	-	1.5	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

11/15/2023

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↔	↔			↕	↕
Traffic Vol, veh/h	0	0	2	0	0	0	4	470	0	0	697	6
Future Vol, veh/h	0	0	2	0	0	0	4	470	0	0	697	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	2	0	0	0	4	511	0	0	758	7

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	383	-	-	256	765	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.02	-	-	7.02	4.22	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.36	-	-	3.36	2.26	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	604	0	0	731	818	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	604	-	-	731	818	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

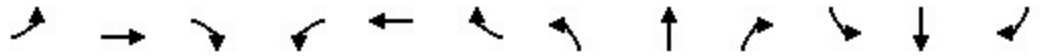
Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	11		0		0.1		0	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	818	-	-	604	-	-	-
HCM Lane V/C Ratio	0.005	-	-	0.004	-	-	-
HCM Control Delay (s/veh)	9.4	0	-	11	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0	-	-	-

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	423	197	8	577	1070	187	703	8	425	499	57
Future Volume (vph)	43	423	197	8	577	1070	187	703	8	425	499	57
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	40.0	40.0	14.0	40.0		20.0	46.0		20.0	46.0	46.0
Total Split (%)	11.7%	33.3%	33.3%	11.7%	33.3%		16.7%	38.3%		16.7%	38.3%	38.3%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	31.0	29.2	29.2	27.6	23.9	93.1	40.8	28.3	93.1	47.0	31.5	31.5
Actuated g/C Ratio	0.33	0.31	0.31	0.30	0.26	1.00	0.44	0.30	1.00	0.50	0.34	0.34
v/c Ratio	0.20	0.43	0.34	0.03	0.72	0.76	0.46	0.74	0.01	1.21	0.47	0.10
Control Delay (s/veh)	22.8	27.4	5.6	21.0	38.1	3.7	17.8	35.1	0.0	142.5	28.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	22.8	27.4	5.6	21.0	38.1	3.7	17.8	35.1	0.0	142.5	28.1	0.4
LOS	C	C	A	C	D	A	B	D	A	F	C	A
Approach Delay (s/veh)		20.6			15.8			31.2			76.0	
Approach LOS		C			B			C			E	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 93.1
 Natural Cycle: 115
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.21
 Intersection Signal Delay (s/veh): 33.9 Intersection LOS: C
 Intersection Capacity Utilization 82.3% ICU Level of Service E
 Analysis Period (min) 15

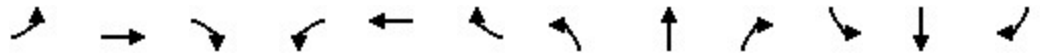
Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

Ø1 20 s	Ø2 46 s	Ø3 14 s	Ø4 40 s
Ø5 20 s	Ø6 46 s	Ø7 14 s	Ø8 40 s

Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	47	460	214	9	627	1163	203	764	9	462	542	62
v/c Ratio	0.20	0.43	0.34	0.03	0.72	0.76	0.46	0.74	0.01	1.21	0.47	0.10
Control Delay (s/veh)	22.8	27.4	5.6	21.0	38.1	3.7	17.8	35.1	0.0	142.5	28.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	22.8	27.4	5.6	21.0	38.1	3.7	17.8	35.1	0.0	142.5	28.1	0.4
Queue Length 50th (ft)	18	106	0	3	191	0	69	228	0	~317	145	0
Queue Length 95th (ft)	47	203	56	15	290	0	134	336	0	#627	228	0
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	260	1397	751	341	1312	1524	503	1543	1524	381	1543	760
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.33	0.28	0.03	0.48	0.76	0.40	0.50	0.01	1.21	0.35	0.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

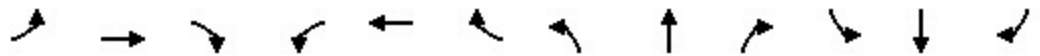
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Traffic Volume (veh/h)	43	423	197	8	577	1070	187	703	8	425	499	57
Future Volume (veh/h)	43	423	197	8	577	1070	187	703	8	425	499	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	47	460	0	9	627	0	203	764	0	462	542	0
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
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	229	805		285	805		448	970		419	1170	
Arrive On Green	0.06	0.23	0.00	0.06	0.23	0.00	0.11	0.28	0.00	0.17	0.34	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	47	460	0	9	627	0	203	764	0	462	542	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	1.7	10.4	0.0	0.3	15.0	0.0	7.2	18.0	0.0	14.5	10.8	0.0
Cycle Q Clear(g_c), s	1.7	10.4	0.0	0.3	15.0	0.0	7.2	18.0	0.0	14.5	10.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	229	805		285	805		448	970		419	1170	
V/C Ratio(X)	0.21	0.57		0.03	0.78		0.45	0.79		1.10	0.46	
Avail Cap(c_a), veh/h	298	1333		354	1333		548	1568		419	1568	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	24.0	29.7	0.0	22.8	31.5	0.0	18.8	29.1	0.0	20.6	22.7	0.0
Incr Delay (d2), s/veh	0.4	0.6	0.0	0.0	1.7	0.0	0.7	1.5	0.0	74.5	0.3	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	4.2	0.0	0.1	6.0	0.0	2.7	7.1	0.0	13.9	4.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	24.5	30.4	0.0	22.8	33.2	0.0	19.5	30.6	0.0	95.1	23.0	0.0
LnGrp LOS	C	C		C	C		B	C		F	C	
Approach Vol, veh/h		507			636			967			1004	
Approach Delay, s/veh		29.8			33.0			28.2			56.2	
Approach LOS		C			C			C			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	30.7	10.5	26.5	14.9	35.8	10.5	26.5				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	14.5	40.0	8.5	34.0	14.5	40.0	8.5	34.0				
Max Q Clear Time (g_c+I1), s	16.5	20.0	2.3	12.4	9.2	12.8	3.7	17.0				
Green Ext Time (p_c), s	0.0	4.8	0.0	2.9	0.2	3.4	0.0	3.6				

Intersection Summary												
HCM 6th Ctrl Delay, s/veh											38.5	
HCM 6th LOS											D	

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 1.6

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	195	0	821	468	43
Future Vol, veh/h	0	195	0	821	468	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
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, %	6	6	6	6	6	6
Mvmt Flow	0	212	0	892	509	47

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	255	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	732	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	732	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	11.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	732	-
HCM Lane V/C Ratio	-	0.29	-
HCM Control Delay (s/veh)	-	11.9	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q (veh)	-	1.2	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

11/15/2023

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↔			↕	
Traffic Vol, veh/h	0	0	10	0	0	0	5	816	0	0	501	1
Future Vol, veh/h	0	0	10	0	0	0	5	816	0	0	501	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	11	0	0	0	5	887	0	0	545	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	273	-	-	444	546	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.02	-	-	7.02	4.22	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.36	-	-	3.36	2.26	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	713	0	0	551	992	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	713	-	-	551	992	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB				
HCM Control Delay, s/v	10.1		0		0.1		0				
HCM LOS	B		A								

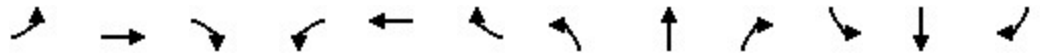
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	992	-	-	713	-	-	-
HCM Lane V/C Ratio	0.005	-	-	0.015	-	-	-
HCM Control Delay (s/veh)	8.6	0	-	10.1	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0	-	-	-

APPENDIX F – Future (with site development) Synchro Outputs

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023

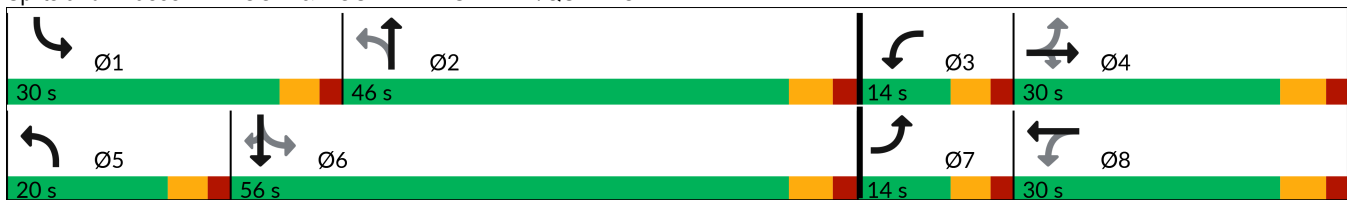


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	603	326	9	353	365	153	109	22	617	870	106
Future Volume (vph)	87	603	326	9	353	365	153	109	22	617	870	106
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	30.0	30.0	14.0	30.0		20.0	46.0		30.0	56.0	56.0
Total Split (%)	11.7%	25.0%	25.0%	11.7%	25.0%		16.7%	38.3%		25.0%	46.7%	46.7%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	28.1	26.2	26.2	22.7	17.5	91.3	32.2	21.0	91.3	51.3	34.5	34.5
Actuated g/C Ratio	0.31	0.29	0.29	0.25	0.19	1.00	0.35	0.23	1.00	0.56	0.38	0.38
v/c Ratio	0.32	0.64	0.50	0.05	0.57	0.25	0.53	0.14	0.02	0.88	0.71	0.17
Control Delay (s/veh)	27.3	33.9	6.5	25.0	39.3	0.4	19.5	29.0	0.0	30.3	28.4	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	27.3	33.9	6.5	25.0	39.3	0.4	19.5	29.0	0.0	30.3	28.4	3.9
LOS	C	C	A	C	D	A	B	C	A	C	C	A
Approach Delay (s/veh)		24.5			19.6			21.6			27.5	
Approach LOS		C			B			C			C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 91.3
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay (s/veh): 24.6 Intersection LOS: C
 Intersection Capacity Utilization 86.7% ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY



Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	95	655	354	10	384	397	166	118	24	671	946	115
v/c Ratio	0.32	0.64	0.50	0.05	0.57	0.25	0.53	0.14	0.02	0.88	0.71	0.17
Control Delay (s/veh)	27.3	33.9	6.5	25.0	39.3	0.4	19.5	29.0	0.0	30.3	28.4	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	27.3	33.9	6.5	25.0	39.3	0.4	19.5	29.0	0.0	30.3	28.4	3.9
Queue Length 50th (ft)	37	155	0	4	105	0	44	28	0	260	241	0
Queue Length 95th (ft)	91	#346	80	18	186	0	88	54	0	#539	367	30
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	307	1069	725	267	952	1583	396	1587	1583	773	1985	943
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.61	0.49	0.04	0.40	0.25	0.42	0.07	0.02	0.87	0.48	0.12

Intersection Summary

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

HCM 6th Signalized Intersection Summary

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	603	326	9	353	365	153	109	22	617	870	106
Future Volume (veh/h)	87	603	326	9	353	365	153	109	22	617	870	106
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	95	655	0	10	384	0	166	118	0	671	946	0
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	320	800		224	776		331	612		767	1256	
Arrive On Green	0.06	0.22	0.00	0.06	0.22	0.00	0.10	0.17	0.00	0.28	0.35	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	95	655	0	10	384	0	166	118	0	671	946	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	3.5	15.3	0.0	0.4	8.2	0.0	6.5	2.5	0.0	24.5	20.4	0.0
Cycle Q Clear(g_c), s	3.5	15.3	0.0	0.4	8.2	0.0	6.5	2.5	0.0	24.5	20.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	320	800		224	776		331	612		767	1256	
V/C Ratio(X)	0.30	0.82		0.04	0.49		0.50	0.19		0.87	0.75	
Avail Cap(c_a), veh/h	380	979		295	979		450	1632		767	2040	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	24.1	32.1	0.0	24.2	29.8	0.0	25.6	30.9	0.0	20.0	24.8	0.0
Incr Delay (d2), s/veh	0.5	4.6	0.0	0.1	0.5	0.0	1.2	0.2	0.0	11.0	0.9	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	6.8	0.0	0.1	3.4	0.0	2.7	1.0	0.0	12.1	8.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	24.6	36.7	0.0	24.3	30.3	0.0	26.8	31.0	0.0	31.0	25.7	0.0
LnGrp LOS	C	D		C	C		C	C		C	C	
Approach Vol, veh/h		750			394			284			1617	
Approach Delay, s/veh		35.2			30.2			28.5			27.9	
Approach LOS		D			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	21.0	10.5	25.6	14.2	36.8	11.1	25.0				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	24.5	40.0	8.5	24.0	14.5	50.0	8.5	24.0				
Max Q Clear Time (g_c+I1), s	26.5	4.5	2.4	17.3	8.5	22.4	5.5	10.2				
Green Ext Time (p_c), s	0.0	0.6	0.0	2.3	0.2	6.8	0.0	1.8				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	30.1
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 1.8

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	192	0	612	825	12
Future Vol, veh/h	0	192	0	612	825	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	209	0	665	897	13

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	449	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	557	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	557	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	15.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	557	-
HCM Lane V/C Ratio	-	0.375	-
HCM Control Delay (s/veh)	-	15.3	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q (veh)	-	1.7	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

01/05/2024

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	0	2	0	0	35	4	445	163	0	834	6
Future Vol, veh/h	0	0	2	0	0	35	4	445	163	0	834	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	2	0	0	38	4	484	177	0	907	7

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	457	-	-	242	914	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	551	0	0	759	742	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	-	-	551	-	-	759	742	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB				
HCM Control Delay, s/v	11.6		10		0.1		0				
HCM LOS	B		B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	742	-	-	551	759	-	-
HCM Lane V/C Ratio	0.006	-	-	0.004	0.05	-	-
HCM Control Delay (s/veh)	9.9	0	-	11.6	10	-	-
HCM Lane LOS	A	A	-	B	B	-	-
HCM 95th %tile Q (veh)	0	-	-	0	0.2	-	-

4: ROSEMARY STREET & N SITE ACCESS Performance by lane

Lane	WB	WB	NB	NB	SB	SB	All
Movements Served	L	R	T	TR	LT	T	
Denied Del/Veh (s)							0.2
Total Del/Veh (s)	30.1	7.8	0.3	0.4	2.3	0.9	4.5

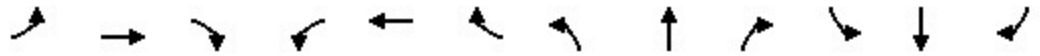
Intersection: 4: ROSEMARY STREET & N SITE ACCESS

Movement	WB	WB	NB	NB	SB
Directions Served	L	R	T	TR	LT
Maximum Queue (ft)	189	79	10	9	56
Average Queue (ft)	87	13	0	0	14
95th Queue (ft)	161	42	7	5	42
Link Distance (ft)	174	174	181	181	753
Upstream Blk Time (%)	2	0			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	439	250	6	593	877	237	535	6	348	367	109
Future Volume (vph)	93	439	250	6	593	877	237	535	6	348	367	109
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	40.0	40.0	14.0	40.0		20.0	46.0		20.0	46.0	46.0
Total Split (%)	11.7%	33.3%	33.3%	11.7%	33.3%		16.7%	38.3%		16.7%	38.3%	38.3%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	33.7	31.8	31.8	28.2	23.3	88.7	35.6	21.8	88.7	39.1	23.6	23.6
Actuated g/C Ratio	0.38	0.36	0.36	0.32	0.26	1.00	0.40	0.25	1.00	0.44	0.27	0.27
v/c Ratio	0.37	0.39	0.38	0.02	0.72	0.63	0.55	0.70	0.00	0.93	0.44	0.24
Control Delay (s/veh)	21.7	23.0	4.8	17.5	35.9	1.9	21.1	36.5	0.0	53.2	30.8	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	21.7	23.0	4.8	17.5	35.9	1.9	21.1	36.5	0.0	53.2	30.8	6.2
LOS	C	C	A	B	D	A	C	D	A	D	C	A
Approach Delay (s/veh)		17.0			15.7			31.5			37.0	
Approach LOS		B			B			C			D	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 88.7
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay (s/veh): 23.7
 Intersection LOS: C
 Intersection Capacity Utilization 74.8%
 ICU Level of Service D
 Analysis Period (min) 15

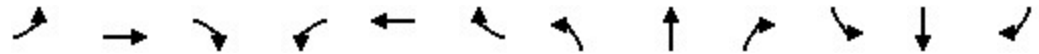
Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

Ø1 20 s	Ø2 46 s	Ø3 14 s	Ø4 40 s
Ø5 20 s	Ø6 46 s	Ø7 14 s	Ø8 40 s

Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	101	477	272	7	645	953	258	582	7	378	399	118
v/c Ratio	0.37	0.39	0.38	0.02	0.72	0.63	0.55	0.70	0.00	0.93	0.44	0.24
Control Delay (s/veh)	21.7	23.0	4.8	17.5	35.9	1.9	21.1	36.5	0.0	53.2	30.8	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	21.7	23.0	4.8	17.5	35.9	1.9	21.1	36.5	0.0	53.2	30.8	6.2
Queue Length 50th (ft)	35	97	0	2	180	0	90	162	0	~151	104	0
Queue Length 95th (ft)	75	186	57	11	265	0	170	245	0	#392	166	38
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	278	1423	795	375	1351	1524	507	1589	1524	406	1589	779
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.34	0.34	0.02	0.48	0.63	0.51	0.37	0.00	0.93	0.25	0.15

Intersection Summary

~ 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.

HCM 6th Signalized Intersection Summary
 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Traffic Volume (veh/h)	93	439	250	6	593	877	237	535	6	348	367	109
Future Volume (veh/h)	93	439	250	6	593	877	237	535	6	348	367	109
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	101	477	0	7	645	0	258	582	0	378	399	0
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
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	259	865		310	842		490	782		452	916	
Arrive On Green	0.07	0.25	0.00	0.06	0.24	0.00	0.14	0.23	0.00	0.18	0.27	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	101	477	0	7	645	0	258	582	0	378	399	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	3.5	9.8	0.0	0.2	14.2	0.0	9.1	12.8	0.0	13.6	7.8	0.0
Cycle Q Clear(g_c), s	3.5	9.8	0.0	0.2	14.2	0.0	9.1	12.8	0.0	13.6	7.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	259	865		310	842		490	782		452	916	
V/C Ratio(X)	0.39	0.55		0.02	0.77		0.53	0.74		0.84	0.44	
Avail Cap(c_a), veh/h	322	1436		384	1436		557	1689		452	1689	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.9	26.5	0.0	20.2	28.6	0.0	19.4	29.3	0.0	20.1	24.8	0.0
Incr Delay (d2), s/veh	1.0	0.6	0.0	0.0	1.5	0.0	0.9	1.4	0.0	13.0	0.3	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	3.9	0.0	0.1	5.5	0.0	3.4	5.0	0.0	6.4	3.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	22.8	27.1	0.0	20.3	30.1	0.0	20.3	30.7	0.0	33.1	25.2	0.0
LnGrp LOS	C	C		C	C		C	C		C	C	
Approach Vol, veh/h		578			652			840			777	
Approach Delay, s/veh		26.3			30.0			27.5			29.0	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	24.5	10.5	26.5	16.8	27.7	11.0	25.9				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	14.5	40.0	8.5	34.0	14.5	40.0	8.5	34.0				
Max Q Clear Time (g_c+I1), s	15.6	14.8	2.2	11.8	11.1	9.8	5.5	16.2				
Green Ext Time (p_c), s	0.0	3.7	0.0	3.1	0.2	2.5	0.1	3.7				

Intersection Summary												
HCM 6th Ctrl Delay, s/veh				28.3								
HCM 6th LOS				C								

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 1.5

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	195	0	939	586	43
Future Vol, veh/h	0	195	0	939	586	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
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, %	6	6	6	6	6	6
Mvmt Flow	0	212	0	1021	637	47

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	319	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	665	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	665	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	12.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	665	-
HCM Lane V/C Ratio	-	0.319	-
HCM Control Delay (s/veh)	-	12.9	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q (veh)	-	1.4	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

01/05/2024

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	0	10	0	0	29	5	796	138	0	619	1
Future Vol, veh/h	0	0	10	0	0	29	5	796	138	0	619	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	11	0	0	32	5	865	150	0	673	1

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	-	-	337	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	7.02	4.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	3.36	2.26
Pot Cap-1 Maneuver	0	0	647	0
Stage 1	0	0	-	-
Stage 2	0	0	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	647	560
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	10.7	11.8	0.1	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	887	-	-	647	560	-	-
HCM Lane V/C Ratio	0.006	-	-	0.017	0.056	-	-
HCM Control Delay (s/veh)	9.1	0.1	-	10.7	11.8	-	-
HCM Lane LOS	A	A	-	B	B	-	-
HCM 95th %tile Q (veh)	0	-	-	0.1	0.2	-	-

4: ROSEMARY STREET & N SITE ACCESS Performance by lane

Lane	WB	WB	NB	NB	SB	SB	All
Movements Served	L	R	T	TR	LT	T	
Denied Del/Veh (s)							0.1
Total Del/Veh (s)	30.6	8.2	0.3	0.6	3.9	0.6	3.7

Intersection: 4: ROSEMARY STREET & N SITE ACCESS

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	LT	T
Maximum Queue (ft)	177	56	10	63	11
Average Queue (ft)	78	11	0	17	0
95th Queue (ft)	148	39	5	48	8
Link Distance (ft)	174	174	181	753	753
Upstream Blk Time (%)	1				
Queuing Penalty (veh)	0				
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023

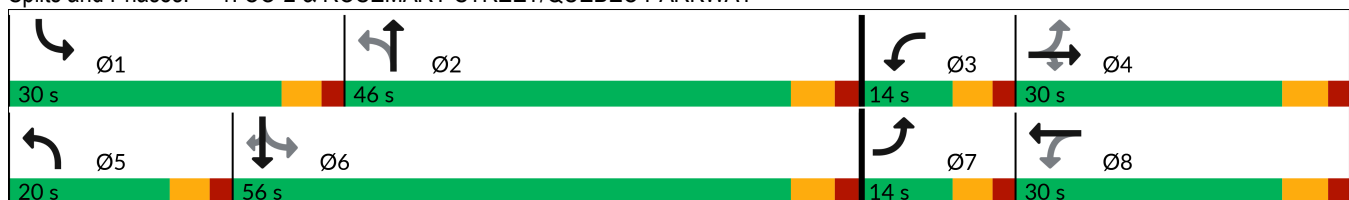


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	603	326	11	353	445	153	143	26	753	1073	106
Future Volume (vph)	87	603	326	11	353	445	153	143	26	753	1073	106
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	30.0	30.0	14.0	30.0		20.0	46.0		30.0	56.0	56.0
Total Split (%)	11.7%	25.0%	25.0%	11.7%	25.0%		16.7%	38.3%		25.0%	46.7%	46.7%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	30.1	28.2	28.2	25.0	19.7	102.7	41.9	29.3	102.7	60.6	42.3	42.3
Actuated g/C Ratio	0.29	0.27	0.27	0.24	0.19	1.00	0.41	0.29	1.00	0.59	0.41	0.41
v/c Ratio	0.36	0.70	0.53	0.06	0.59	0.32	0.61	0.16	0.02	1.08	0.83	0.16
Control Delay (s/veh)	32.7	40.2	7.1	29.0	44.6	0.5	28.6	27.5	0.0	77.3	33.8	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.7	40.2	7.1	29.0	44.6	0.5	28.6	27.5	0.0	77.3	33.8	3.6
LOS	C	D	A	C	D	A	C	C	A	E	C	A
Approach Delay (s/veh)		28.9			20.1			25.8			49.1	
Approach LOS		C			C			C			D	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 102.7
 Natural Cycle: 135
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.08
 Intersection Signal Delay (s/veh): 36.5 Intersection LOS: D
 Intersection Capacity Utilization 94.2% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY



Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	95	655	354	12	384	484	166	155	28	818	1166	115
v/c Ratio	0.36	0.70	0.53	0.06	0.59	0.32	0.61	0.16	0.02	1.08	0.83	0.16
Control Delay (s/veh)	32.7	40.2	7.1	29.0	44.6	0.5	28.6	27.5	0.0	77.3	33.8	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.7	40.2	7.1	29.0	44.6	0.5	28.6	27.5	0.0	77.3	33.8	3.6
Queue Length 50th (ft)	48	204	0	6	131	0	47	40	0	~480	368	0
Queue Length 95th (ft)	96	#375	84	21	195	0	124	69	0	#966	503	29
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	271	957	682	230	815	1524	317	1358	1524	756	1698	823
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.68	0.52	0.05	0.47	0.32	0.52	0.11	0.02	1.08	0.69	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

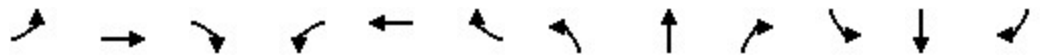
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	603	326	11	353	445	153	143	26	753	1073	106
Future Volume (veh/h)	87	603	326	11	353	445	153	143	26	753	1073	106
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	95	655	0	12	384	0	166	155	0	818	1166	0
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
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	287	756		188	713		278	846		754	1386	
Arrive On Green	0.06	0.22	0.00	0.05	0.21	0.00	0.09	0.25	0.00	0.25	0.40	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	95	655	0	12	384	0	166	155	0	818	1166	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	4.2	18.0	0.0	0.5	9.8	0.0	6.9	3.5	0.0	24.5	30.1	0.0
Cycle Q Clear(g_c), s	4.2	18.0	0.0	0.5	9.8	0.0	6.9	3.5	0.0	24.5	30.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	287	756		188	713		278	846		754	1386	
V/C Ratio(X)	0.33	0.87		0.06	0.54		0.60	0.18		1.08	0.84	
Avail Cap(c_a), veh/h	327	841		250	841		373	1401		754	1751	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.2	36.9	0.0	28.7	34.7	0.0	25.5	29.2	0.0	23.8	26.5	0.0
Incr Delay (d2), s/veh	0.7	8.8	0.0	0.1	0.6	0.0	2.0	0.1	0.0	58.0	3.1	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	8.3	0.0	0.2	4.0	0.0	2.8	1.4	0.0	17.1	11.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	28.9	45.8	0.0	28.8	35.4	0.0	27.5	29.3	0.0	81.8	29.7	0.0
LnGrp LOS	C	D		C	D		C	C		F	C	
Approach Vol, veh/h		750			396			321			1984	
Approach Delay, s/veh		43.6			35.2			28.4			51.2	
Approach LOS		D			D			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	30.2	10.5	27.6	14.6	45.6	11.7	26.4				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	24.5	40.0	8.5	24.0	14.5	50.0	8.5	24.0				
Max Q Clear Time (g_c+I1), s	26.5	5.5	2.5	20.0	8.9	32.1	6.2	11.8				
Green Ext Time (p_c), s	0.0	0.9	0.0	1.6	0.2	7.5	0.0	1.7				

Intersection Summary												
HCM 6th Ctrl Delay, s/veh											45.6	
HCM 6th LOS											D	

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 1.8

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	192	0	612	825	12
Future Vol, veh/h	0	192	0	612	825	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
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, %	6	6	6	6	6	6
Mvmt Flow	0	209	0	665	897	13

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	449	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	546	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	546	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	15.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	546	-
HCM Lane V/C Ratio	-	0.382	-
HCM Control Delay (s/veh)	-	15.6	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q (veh)	-	1.8	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

01/05/2024

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	0	2	0	0	35	4	445	163	0	834	6
Future Vol, veh/h	0	0	2	0	0	35	4	445	163	0	834	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	2	0	0	38	4	484	177	0	907	7

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	457	-	-	242	914	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.02	-	-	7.02	4.22	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.36	-	-	3.36	2.26	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	540	0	0	747	717	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	-	-	540	-	-	747	717	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB				
HCM Control Delay, s/v	11.7		10.1		0.1		0				
HCM LOS	B		B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	717	-	-	540	747	-	-
HCM Lane V/C Ratio	0.006	-	-	0.004	0.051	-	-
HCM Control Delay (s/veh)	10.1	0	-	11.7	10.1	-	-
HCM Lane LOS	B	A	-	B	B	-	-
HCM 95th %tile Q (veh)	0	-	-	0	0.2	-	-

4: ROSEMARY STREET & N SITE ACCESS Performance by lane

Lane	WB	WB	NB	NB	SB	SB	All
Movements Served	L	R	T	TR	LT	T	
Denied Del/Veh (s)							0.2
Total Del/Veh (s)	33.1	8.0	0.2	0.4	3.7	0.9	5.0

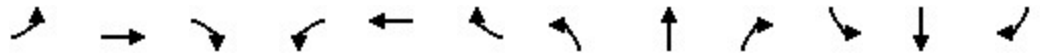
Intersection: 4: ROSEMARY STREET & N SITE ACCESS

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	LT	T
Maximum Queue (ft)	194	57	5	74	8
Average Queue (ft)	88	13	0	16	0
95th Queue (ft)	163	42	4	51	5
Link Distance (ft)	174	174	181	753	753
Upstream Blk Time (%)	3				
Queuing Penalty (veh)	0				
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Timings

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	439	250	8	593	1070	237	662	8	425	457	109
Future Volume (vph)	93	439	250	8	593	1070	237	662	8	425	457	109
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free	2		Free	6		6
Detector Phase	7	4	4	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	23.5	24.0	24.0	23.5	24.0		23.5	24.0		23.5	24.0	24.0
Total Split (s)	14.0	40.0	40.0	14.0	40.0		20.0	46.0		20.0	46.0	46.0
Total Split (%)	11.7%	33.3%	33.3%	11.7%	33.3%		16.7%	38.3%		16.7%	38.3%	38.3%
Yellow Time (s)	3.5	4.0	4.0	3.5	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0		5.5	6.0		5.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)	35.0	33.1	33.1	29.6	24.5	95.3	40.8	27.0	95.3	44.3	28.8	28.8
Actuated g/C Ratio	0.37	0.35	0.35	0.31	0.26	1.00	0.43	0.28	1.00	0.46	0.30	0.30
v/c Ratio	0.40	0.40	0.39	0.03	0.74	0.76	0.58	0.75	0.01	1.26	0.48	0.22
Control Delay (s/veh)	24.9	25.7	5.1	20.0	39.1	3.7	21.9	37.4	0.0	160.3	30.7	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.9	25.7	5.1	20.0	39.1	3.7	21.9	37.4	0.0	160.3	30.7	5.5
LOS	C	C	A	B	D	A	C	D	A	F	C	A
Approach Delay (s/veh)		19.0			16.3			33.0			83.5	
Approach LOS		B			B			C			F	

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 95.3	
Natural Cycle: 105	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.26	
Intersection Signal Delay (s/veh): 35.6	Intersection LOS: D
Intersection Capacity Utilization 82.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

Ø1 20 s	Ø2 46 s	Ø3 14 s	Ø4 40 s
Ø5 20 s	Ø6 46 s	Ø7 14 s	Ø8 40 s

Queues

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	101	477	272	9	645	1163	258	720	9	462	497	118
v/c Ratio	0.40	0.40	0.39	0.03	0.74	0.76	0.58	0.75	0.01	1.26	0.48	0.22
Control Delay (s/veh)	24.9	25.7	5.1	20.0	39.1	3.7	21.9	37.4	0.0	160.3	30.7	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.9	25.7	5.1	20.0	39.1	3.7	21.9	37.4	0.0	160.3	30.7	5.5
Queue Length 50th (ft)	39	106	0	3	193	0	93	215	0	~318	137	0
Queue Length 95th (ft)	85	204	61	14	290	0	172	315	0	#608	209	37
Internal Link Dist (ft)		163			1049			779			969	
Turn Bay Length (ft)				550		400	400		550	650		450
Base Capacity (vph)	261	1367	774	361	1263	1524	475	1485	1524	368	1485	736
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.35	0.35	0.02	0.51	0.76	0.54	0.48	0.01	1.26	0.33	0.16

Intersection Summary

~ 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.

HCM 6th Signalized Intersection Summary

1: CO-2 & ROSEMARY STREET/QUEBEC PARKWAY

11/15/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	93	439	250	8	593	1070	237	662	8	425	457	109
Future Volume (veh/h)	93	439	250	8	593	1070	237	662	8	425	457	109
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	101	477	0	9	645	0	258	720	0	462	497	0
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
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	245	857		294	824		468	921		419	1037	
Arrive On Green	0.07	0.25	0.00	0.06	0.24	0.00	0.13	0.27	0.00	0.16	0.30	0.00
Sat Flow, veh/h	1725	3441	1535	1725	3441	1535	1725	3441	1535	1725	3441	1535
Grp Volume(v), veh/h	101	477	0	9	645	0	258	720	0	462	497	0
Grp Sat Flow(s),veh/h/ln	1725	1721	1535	1725	1721	1535	1725	1721	1535	1725	1721	1535
Q Serve(g_s), s	3.8	10.6	0.0	0.3	15.4	0.0	9.3	17.0	0.0	14.5	10.4	0.0
Cycle Q Clear(g_c), s	3.8	10.6	0.0	0.3	15.4	0.0	9.3	17.0	0.0	14.5	10.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	245	857		294	824		468	921		419	1037	
V/C Ratio(X)	0.41	0.56		0.03	0.78		0.55	0.78		1.10	0.48	
Avail Cap(c_a), veh/h	297	1330		363	1330		526	1565		419	1565	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	24.1	28.8	0.0	22.4	31.3	0.0	19.1	29.8	0.0	22.7	25.1	0.0
Incr Delay (d2), s/veh	1.1	0.6	0.0	0.0	1.7	0.0	1.0	1.5	0.0	75.1	0.3	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	4.3	0.0	0.1	6.1	0.0	3.5	6.7	0.0	14.4	4.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	25.2	29.4	0.0	22.5	33.0	0.0	20.2	31.3	0.0	97.8	25.4	0.0
LnGrp LOS	C	C		C	C		C	C		F	C	
Approach Vol, veh/h		578			654			978			959	
Approach Delay, s/veh		28.6			32.8			28.4			60.3	
Approach LOS		C			C			C			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	29.5	10.5	27.9	17.0	32.5	11.3	27.1				
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0				
Max Green Setting (Gmax), s	14.5	40.0	8.5	34.0	14.5	40.0	8.5	34.0				
Max Q Clear Time (g_c+I1), s	16.5	19.0	2.3	12.6	11.3	12.4	5.8	17.4				
Green Ext Time (p_c), s	0.0	4.5	0.0	3.0	0.2	3.1	0.0	3.6				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	39.0
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
2: ROSEMARY STREET & 80TH AVENUE

11/15/2023

Intersection

Int Delay, s/veh 1.5

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	195	0	939	586	43
Future Vol, veh/h	0	195	0	939	586	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
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, %	6	6	6	6	6	6
Mvmt Flow	0	212	0	1021	637	47

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	319	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.02	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.36	-	-	-	-
Pot Cap-1 Maneuver	0	665	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	665	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s/v	12.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt NBT EBLn1 SBT

Capacity (veh/h)	-	665	-
HCM Lane V/C Ratio	-	0.319	-
HCM Control Delay (s/veh)	-	12.9	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q (veh)	-	1.4	-

HCM 6th TWSC
 3: ROSEMARY STREET & DRIVEWAY/SITE ACCESS

01/05/2024

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	0	10	0	0	29	5	796	138	0	619	1
Future Vol, veh/h	0	0	10	0	0	29	5	796	138	0	619	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	0	0	11	0	0	32	5	865	150	0	673	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	337	-	-	433	674	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.02	-	-	7.02	4.22	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.36	-	-	3.36	2.26	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	647	0	0	560	887	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	647	-	-	560	887	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB				
HCM Control Delay, s/v	10.7		11.8		0.1		0				
HCM LOS	B		B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	887	-	-	647	560	-	-
HCM Lane V/C Ratio	0.006	-	-	0.017	0.056	-	-
HCM Control Delay (s/veh)	9.1	0.1	-	10.7	11.8	-	-
HCM Lane LOS	A	A	-	B	B	-	-
HCM 95th %tile Q (veh)	0	-	-	0.1	0.2	-	-

4: ROSEMARY STREET & N SITE ACCESS Performance by lane

Lane	WB	WB	NB	NB	SB	SB	All
Movements Served	L	R	T	TR	LT	T	
Denied Del/Veh (s)							0.1
Total Del/Veh (s)	31.4	8.0	0.3	0.6	4.4	0.6	3.9

Intersection: 4: ROSEMARY STREET & N SITE ACCESS

Movement	WB	WB	NB	NB	SB
Directions Served	L	R	T	TR	LT
Maximum Queue (ft)	179	61	8	23	76
Average Queue (ft)	79	10	0	1	19
95th Queue (ft)	144	37	4	12	56
Link Distance (ft)	174	174	181	181	753
Upstream Blk Time (%)	2				
Queuing Penalty (veh)	0				
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					