705-713 Rymal Road East, Hamilton, ON
Transportation Impact Study

Paradigm Transportation Solutions Limited

April 2021
200558

ptsl.com

Project Summary

Project Number
200558

April 2021

Client
Royal Living Development Group
1059 Upper James Street, Unit 207
Hamilton ON L9C 3A6

Client Contact
Alex Arbab

Consultant Project Team
Stew Elkins, B.E.S
Adam Makarewicz, CET, MITE
Greg Lue, M.A.Sc., P.Eng.
Erica Bayley, P.Eng.

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
    905.381.2229
    416.479.9684
www.ptsl.com

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705-713 Rymal Road East, Hamilton , ON
Transportation Impact Study

Signing Licencee/Engineer, P.Eng.

Disclaimer

Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study (TIS) study for a residential development located at 705-713 Rymal Road East in the City of Hamilton.

This study determines the impacts of the additional traffic generated by the subject site on the surrounding road network, and the remedial measures necessary, if any, to accommodate future traffic in a satisfactory manner.

Development Concept

The subject site is located on the north side of Rymal Road East just east of Upper Sherman Avenue at municipal address 705-713 Rymal Road East in the City of Hamilton. The property owner is proposing to develop the site to include 41 two-storey townhouse units. The site is assumed to be built-out by 2023.

Vehicle access is proposed via one all-moves driveway connection to Rymal Road East located approximately 175 metres east of the intersection of Rymal Road East and Upper Sherman Avenue.

Conclusions

The main findings and conclusions of this study are as follows:

- **Existing Traffic**: The study area intersections are operating with satisfactory levels of service overall during the weekday AM and PM peak hours.
  - Localized congestion is occurring at the intersection of Rymal Road East and Eva Street/Miles Road for the northbound approach during the weekday peak hours.
- **Trip Generation**: The site's net trip generation is estimated to be approximately 20 AM peak hour vehicle trips and 27 PM peak hour vehicle trips.
- **Background Traffic**: Increased delay is projected at the study area intersections as a result of general growth in traffic and the addition of adjacent development proposals.
  - Rymal Road and Upper Sherman is projected to operate at LOS E for the southbound through movement and eastbound left turn movement.

- Rymal Road East and Eva Street/Miles Road is forecast to operate at LOS F and a v/c ratio of 1.00 for the northbound approach and the westbound left turn movement is projected to operate at LOS E.

- **Total Traffic**: The study area intersections are forecast to operate with similar levels of service as the background traffic conditions.
  - Rymal Road and Upper Sherman is projected to operate at LOS E for the southbound through movement and eastbound left turn movement.
  - Rymal Road East and Eva Street/Miles Road is forecast to operate at LOS F and a v/c ratio of 1.00 for the northbound approach and the westbound left turn movement is projected to operate at LOS E.
  - The addition of the site generated traffic increases the overall intersection delays by one second or less during the weekday peak hours.
  - The site driveway is forecast to operate with delays in the LOS A to C range with v/c ratios of less than 0.65.
- **Remedial Measures**: The following mitigation measures have been identified for consideration for implementation by the City:
  - A possible mitigation measure to improve operations and reduce delay at the intersection of Rymal Road and Upper Sherman Avenue would be implementation of an actuated-coordinated timing plan and optimized signal timings. This mitigation measure is not required by the proposed development.
  - A possible mitigation measure to improve operation and reduce delay at the intersection of Rymal Road and Eva Street/Miles Road would be implementation of an eastbound right turn lane, addition of a permitted/protective phase for the northbound approach and optimized signal timings. This mitigation measure is not required by the proposed development.
  - It is noted these improvements are not triggered by the proposed development.
- **Transportation Demand Management Plan**: The development plan proposes several TDM measures as identified by the City of Hamilton's TDM Guide for Development. In addition, there are several measures that the developer can implement to help encourage TDM. These measures include:

- Sidewalk connections linking the dwelling units to potential future municipal sidewalks along Rymal Road East
- The development is not expected to generate a significant number of auto trips.
- The development's landscaping plan could consider additional amenities such as landscaping and lighting to enhance the pedestrian realm and to prioritize pedestrians.
- All on-site sidewalks should be well-lit and should confirm to the City of Hamilton's design standards and the Accessibility for Ontarians with Disabilities Act (AODA) design standards.
- The developer should encourage residents to utilize sustainable transportation options for travel to/from the development (transit/cycling/walking). Residents should be provided with a welcome package that outlines the available transit routes and active transportation options for the area.

Recommendations

Based on the findings of this study, the following is recommended:

- The City consider implementing an actuated-coordinate timing plan at the intersection of Rymal Road and Upper Sherman Avenue to address projected deficiencies;
- The City consider implementing an eastbound right turn lane at the intersection of Rymal Road and Eva Street/Miles Road along with a permitted/protective phase for the northbound approach to address existing deficiencies;
- There are no operational concerns or safety concerns at the intersection of the proposed site access and Rymal Road.
- Recognizing the above, roadway improvements are not the Applicant's responsibility nor should the requirement for improvements form any condition of draft plan of subdivision approval.

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Tables

1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study (TIS) study for a residential development located at 705-713 Rymal Road East in the City of Hamilton. **Figure 1.1** illustrates the location of the subject site.

This study determines the impacts of the additional traffic generated by the subject site on the surrounding road network, and the remedial measures necessary, if any, to accommodate future traffic in a satisfactory manner. The scope of this study includes:

- Determine and assess the current study area traffic conditions;
- Forecast the additional traffic generated by the proposed development;
- Analyze the impacts of the additional traffic on the study area intersections for the five-years following full build-out of the subject site (Year 2028); and
- Recommend any necessary remedial measures to mitigate the traffic impacts.

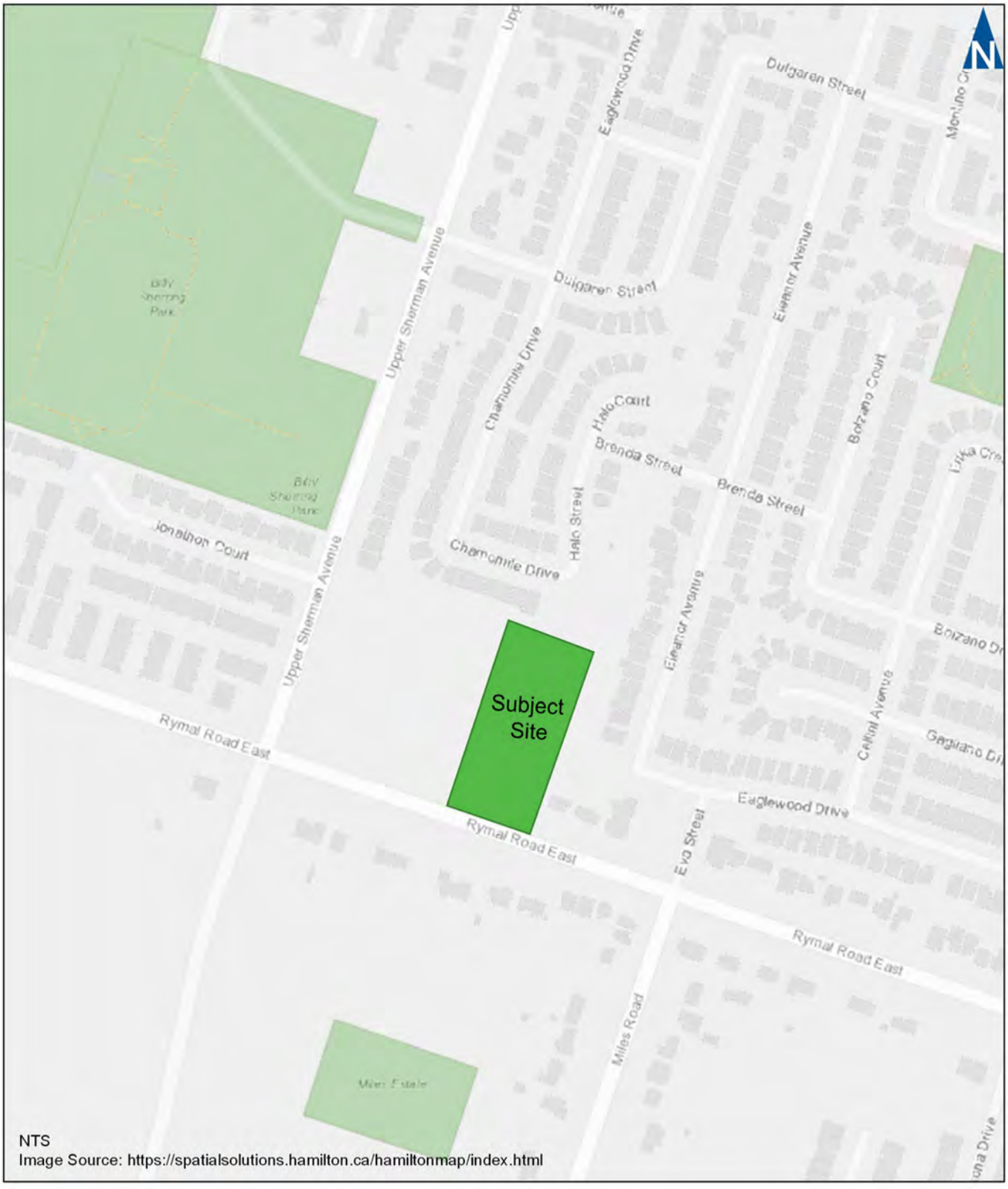
Appendix A contains the pre-study consultation material. The study scope was developed in consultation with the City of Hamilton in December 2020. The study follows the City's Transportation Impact Study Guidelines[1].

1.2 Study Area

The study area intersections assessed in this study include:

- Rymal Road East at Upper Sherman Avenue (signalized);
- Rymal Road East at Miles Road/Eva Street (signalized); and
- The proposed driveway connection to Rymal Road East (unsignalized).

[1] Traffic Impact Study Guidelines, City of Hamilton, July 2009



NTS
Image Source: https://spatialsolutions.hamilton.ca/hamiltonmap/index.html

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Location of Subject Site

705-713 Rymal Road East, Hamilton
200558

Figure 1.1

2 Existing Conditions

2.1 Roadway Characteristics

The City of Hamilton[2] roadways of interest within the study area include:

- **Rymal Road East** is an east-west major arterial road. In the study area it has a three-lane cross-section (one lane per direction and a two-way left-turn lane) with a posted speed limit of 60 km/h. There are no on-street cycle lanes or sidewalks on either side of the roadway between Upper Sherman Avenue and Miles Road/Eva Street. The City's Cycling Master Plan[3] identifies Rymal Road East between Upper Sherman Avenue and Glancaster Road as a future location for a multi-use trail. The timing of the development of this facility is unknown; however, the final reconstruction of Rymal Road East is likely to include this facility.**Upper Sherman Avenue** is a north-south minor arterial. In the study area it has a three-lane cross-section (one lane per direction and a two-way left-turn lane) with an assumed speed limit of 50 km/h. On-street cycle lanes and sidewalks are provided on both sides of the roadway. The City's Cycling Master Plan identifies Upper Sherman Avenue between Rymal Road East to Miles Road as a future location of bike lanes. The timing of the development of these facilities is unknown; however, the final reconstruction of Upper Sherman Avenue is likely to include these facilities.
- **Miles Road** is a north-south minor arterial. In the study area it has a two-lane cross-section with a posted speed limit of 50 km/h. There are no on-street cycle lanes or sidewalks on either side of the roadway.
- **Eva Street** is a north-south collector. In the study area is has a two-lane cross-section with an assumed speed limit of 50 km/h. There are sidewalks on both sides of the roadway.

Figure 2.1 illustrates the existing lane configurations and traffic control at the study area intersections.

[2] Urban Hamilton Official Plan, Schedule C Funtional Road Classification, August 16, 2013

[3] City of Hamilton: Shifting Gears Cycling Master Plan, June 2009.Cycling Map, March 2015.

NTS
Image Source: https://spatialsolutions.hamilton.ca/hamiltonmap/index.html

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Existing Lane Configuration & Traffic Control

705-713 Rymal Road East, Hamilton
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Figure 2.1

2.2 Transit Service

Hamilton Street Railway (HSR)[4] is the public transit operator in the City of Hamilton. The following routes provide direct connections to the subject site:

- **Route 24 (Upper Sherman)** provides service from the MacNab Transit Terminal to Upper Gage and Rymal Road. Service is provided seven days a week from approximately 5:00 AM to 1:30 AM. Weekday headways are as low as 15 to 30 minutes, and weekend headways vary between 20 to 60 minutes.
- **Route 44 (Rymal Road)** provides service between Eastgate Square and the Ancaster Business Park. Service is provided seven days a week from approximately 5:30 AM to 1:30 AM. Weekday headways are as low as 20 to 30 minutes and weekday headways vary between 30 to 60 minutes.

Figure 2.2 illustrates the existing public transit network within the study area. These routes provide direct connections to the larger HSR network at the MacNab Street Terminal and the GO Transit system at the Hunter Street GO station. The closest bus stops are provided on the north and south side of Rymal Road East just west of Eva Street approximately 120 metres (2-minute walk) east of the site.

The City of Hamilton's 10-Year Local Transit Strategy[5] aims to address increases in ridership through the introduction of additional bus service on the BLAST (five separate rapid transit corridors) corridors. **Figure 2.3** illustrates the proposed Rapid Transit corridor relative to the location of the subject site.

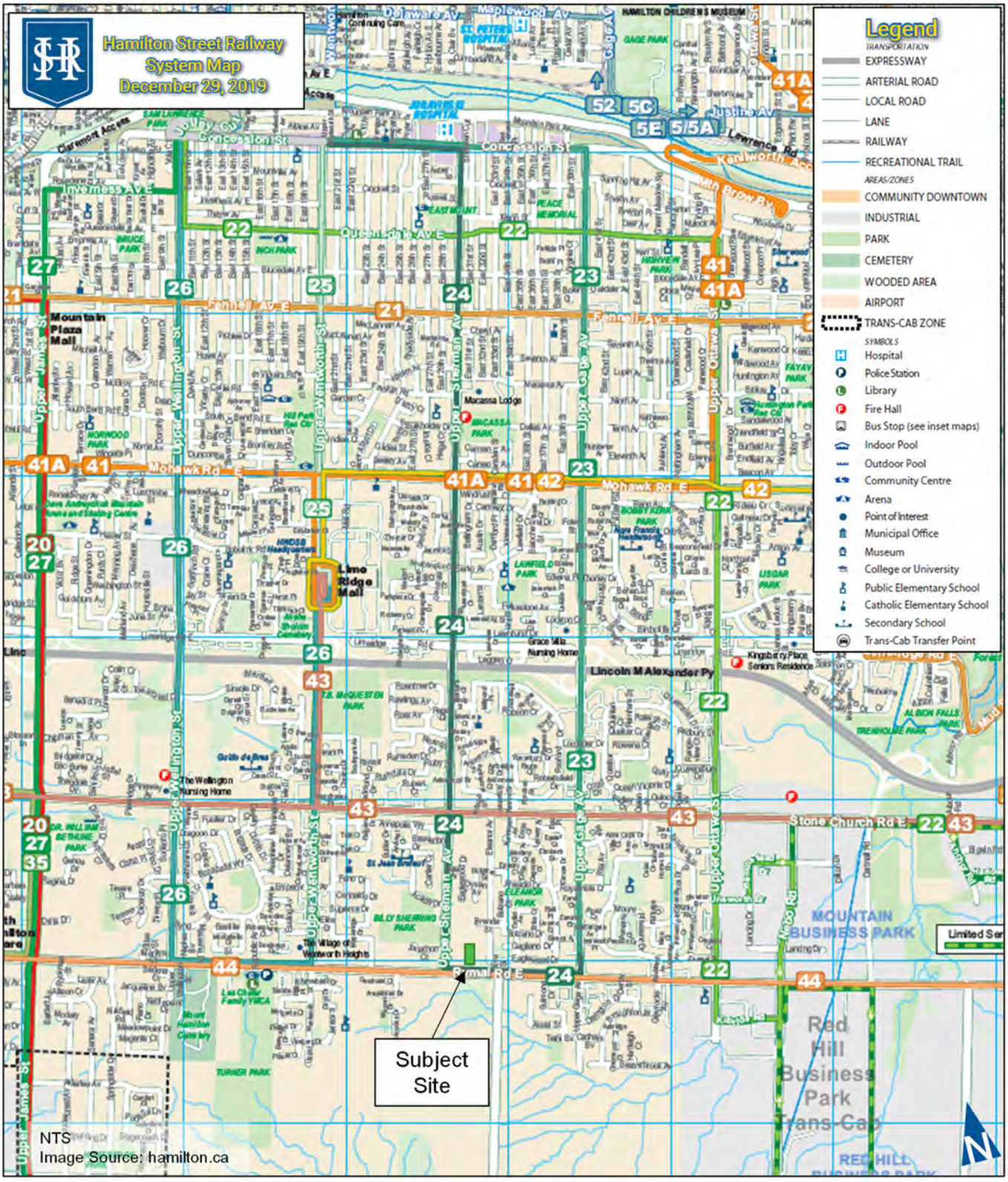
The BLAST network is estimated to be completed by Year 2041. One of these corridors (the "S" in the BLAST plan) is planned for Rymal Road. The preliminary route shows connections from Ancaster Business Park in the west to Upper Centennial Parkway in the east and south to the proposed Confederation GO Station. When completed, this route will provide high-order transit service to additional points throughout the City.

Provision of long-term rapid transit along Rymal Road East would improve service through the study area and would promote multi-modal travel within the area.

Walk Score is an online tool that assigns a numerical scores between 0 and 100 for an area's walkability, transit access, and bikeability.

[4] HSR Bus Schedules & Fares | City of Hamilton, Ontario, Canada
[5] City of Hamilton – Ten Year (2015 to 2024) Local Transit Strategy 2015

Transit Score is a measure of how well a location is served by transit considering factors such as distance and types of nearby transit service. The Transit Score for the subject site (705 and 713 Rymal Road East) is 46 which is associated with “Some Transit” which means that there are a few nearby transit options in proximity to the site. The addition of the proposed “S” route in the BLAST plan will likely result in an increase in the Transit Score in the future.



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Existing Transit Network

705-713 Rymal Road East, Hamilton
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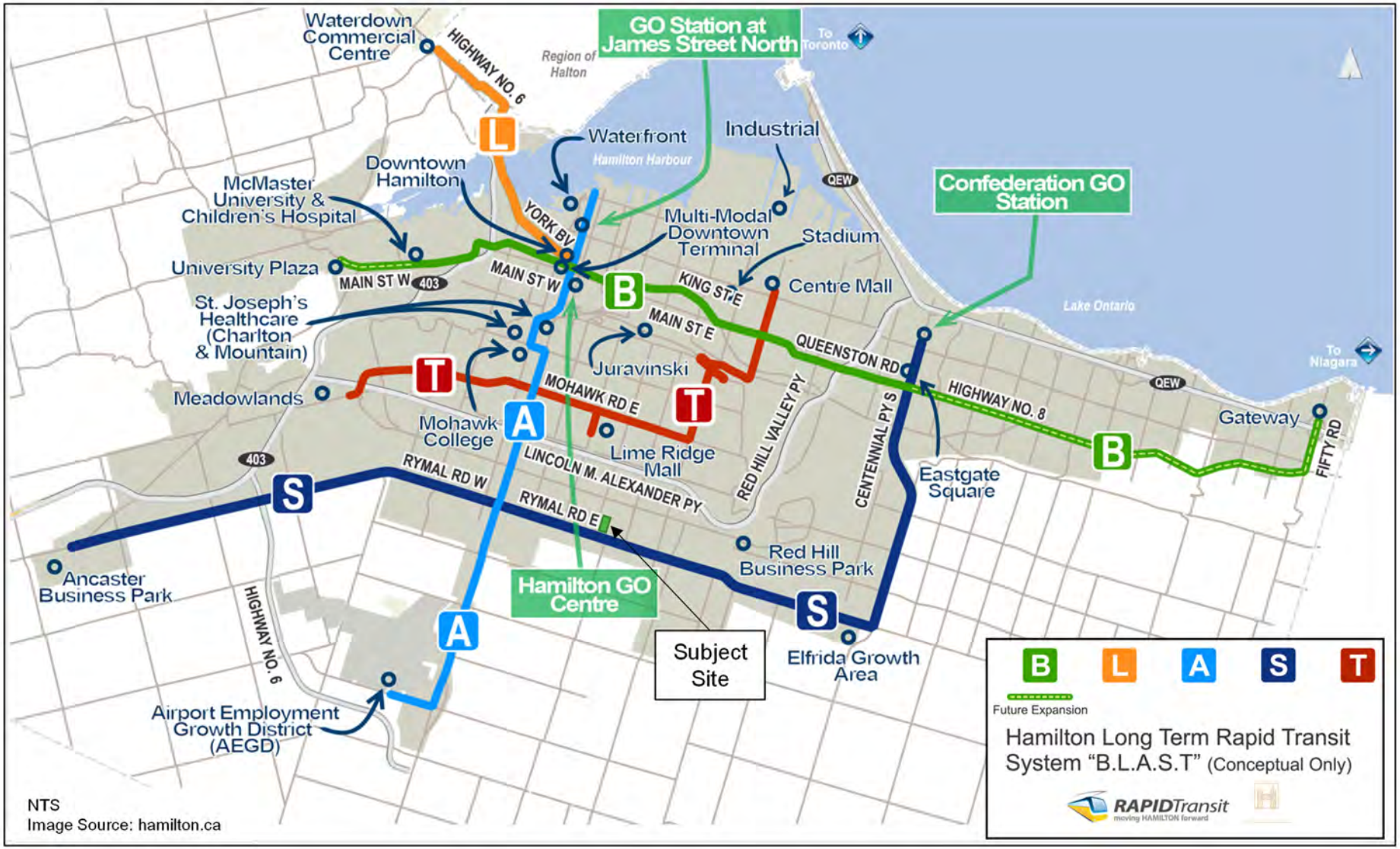
Figure 2.2



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Proposed Rapid Transit Corridors

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Figure 2.3

2.3 Pedestrian and Cycling Environment

2.3.1 Pedestrian Environment

Rymal Road East currently has gravel shoulders with no dedicated pedestrian facilities present within the study area. The nearest existing retail establishments are a grocery store plaza located at the corner of Upper Sherman Avenue and Rymal Road East (approximately 110 metres west of the site) and various commercial developments at the corner of Upper Gage Avenue and Rymal Road East (approximately 650 metres east of the site).

The Walk Score online tool was used to assess the walkability of the subject site (705 and 713 Rymal Road East). Walk Score ranks are based on nearby attractive amenities within walking distance of a given address. Currently, the subject site is noted to have a Walk Score of 40 and is considered a “Car-Dependent” location which means most daily errands require a personal vehicle[6]. However, this Walk Score does not appear to account for the recently developed grocery store plaza located 110 metres east of the development which improves the walkability of the area.

2.3.2 Cycling Environment

The City’s cycling infrastructure consists of on-street and off-street facilities. On-street routes are comprised of bicycle lanes, signed bicycle routes, and paved shoulders. Off-street facilities are in the form of multi-use pathways.

Rymal Road East currently has gravel shoulders within the study area. The City’s Cycling Master Plan identifies Rymal Road East between Upper Sherman Avenue and Glancaster Road as a future location for a multi-use trail. The Cycling Master Plan also identifies Upper Sherman Avenue between Rymal Road East to Miles Road as a future location of bike lanes. The timing of the development of these facilities is unknown.

The Walk Score online tool also provides a bike score between 0 and 100 based on whether the area is good for biking considering such factors as bike lanes, trails, hills, road connectivity, and destinations. Currently, the subject site (705 and 713 Rymal Road East) is noted to have a Bike Score of 44 and is considered to have minimal bike infrastructure. The proposed addition of a multi-use trail on Rymal Road East and bike lanes on Upper Sherman Avenue are likely to increase the bike score for subject site in the future.

[6] https://www.walkscore.com/score/705-rymal-rd-e-hamilton-on-canada#

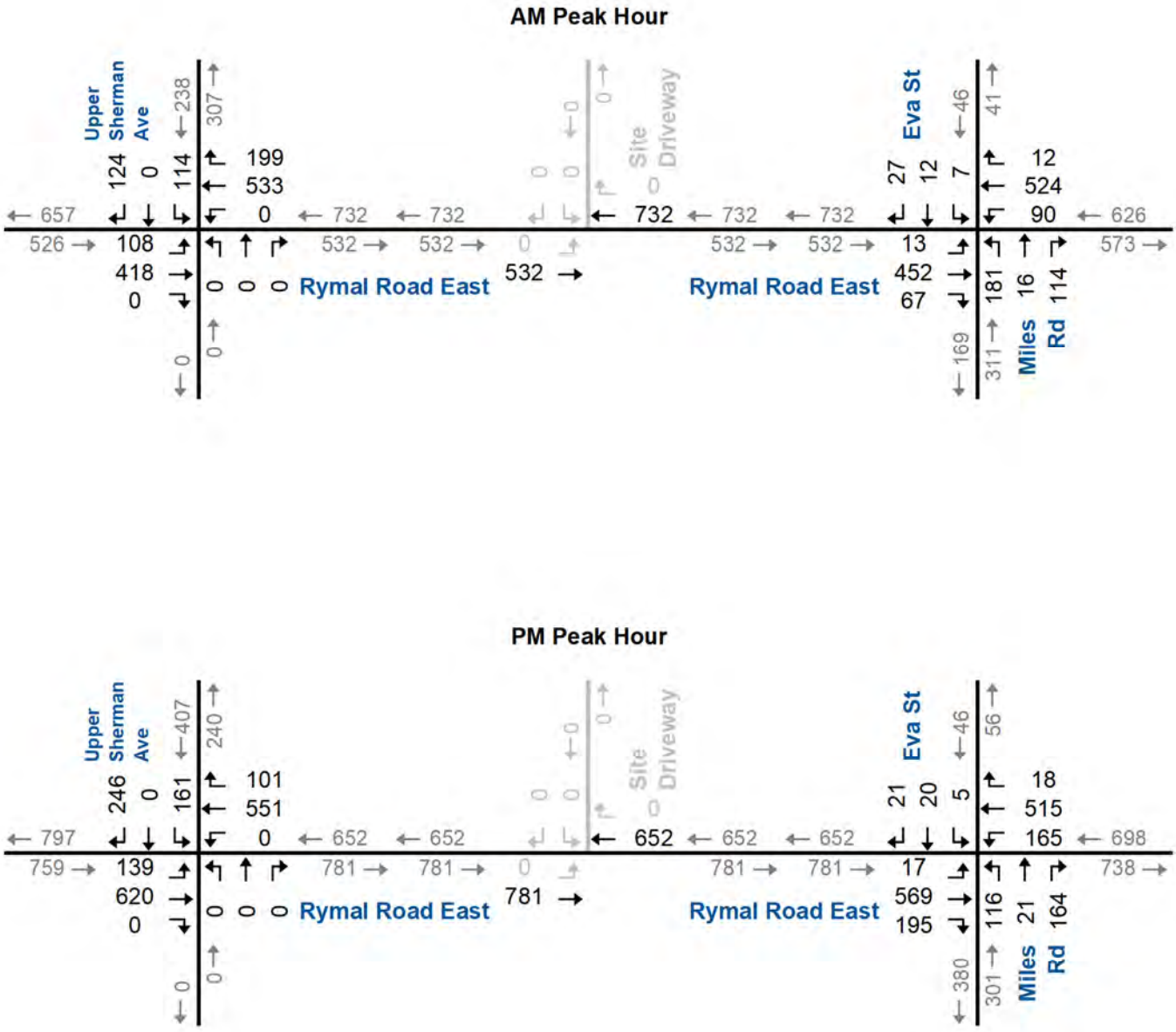
2.4 Traffic Volumes

To assess intersection operations, Turning Movement Counts (TMC) are used to quantify the movement of vehicles. Existing traffic counts at an intersection or on a road section forms the foundation for analysis. The traffic counts are usually collected during peak periods at an intersection to complete level of service analysis.

Turning movement counts from April and November 2019 at the study area intersections were obtained from the City of Hamilton. The counts were factored to a Year 2020 base year using a 2.0% growth rate. The growth rate was provided by the City. The counts were then balanced to ensure consistent flows between intersections.

Figure 2.4 illustrates the 2020 Base Year AM and PM peak hour traffic volumes for the study area intersections.

Appendix B contains the turning movement count and existing signal timing data.



2020 Base Year Traffic Volumes

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Figure 2.4

2.5 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay related to the number of vehicles desiring to make a movement, compared to the estimated capacity for that movement.

The capacity is based on several criteria including but not limited to, vehicle headways, intersection geometry, vehicle composition, opposing traffic flows, and for signalized intersections, signal timing. Capacity is evaluated in terms of the ratio of demand flow to capacity with a at capacity condition represented by a volume-to-capacity ratio of 1.0 (i.e. volume demand equals capacity).

Table 2.1 summarizes the level of service criteria for signalized and stop controlled intersections. The highest possible rating is LOS A, under which the average delay is equal or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds at signalized intersections, 50 seconds at unsignalized intersections or when the v/c ratio is greater than 1.0, the movement is classed as LOS F and remedial measures are usually implemented if feasible. LOS E is generally used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on capacity and safety considerations. It is also recognized that the guidelines for determining when improvements are necessary can vary in different municipalities.

TABLE 2.1: VEHICLE LEVEL OF SERVICE DEFINITIONS

Level of Service	Average Total Delay (sec/veh)	
	Signalized Intersections	Unsignalized Intersections
A	< = 10	<=10
B	> 10 & < = 20	> 10 & < = 15
C	> 20 & < = 35	> 15 & < = 25
D	> 35 & < = 55	> 25 & < = 35
E	> 55 & < = 80	> 35 & < = 50
F	> 80	> 50

The operations of the study area intersections were evaluated under existing traffic volumes and the existing signal timings provided by the City using Synchro 10. The intersection analysis considered the following measures of performance:

Table 2.2 summarizes the results of the analysis for the existing weekday AM and PM peak hour intersection operations, and the critical movements are summarized below:

Weekday AM Peak Hour

- Rymal Road East and Upper Sherman Avenue (signalized):
  - Eastbound left-turn queue length extends beyond the current available storage.
  - Westbound through-right movement operates with delays in the LOS D range with a v/c ratio greater than 0.90.
  - Southbound left-turn queue length extends beyond the current available storage.
- Rymal Road East and Eva Street/Miles Road (signalized)
  - Northbound right-through-left turn lane operates with delays in the LOS E range with a v/c ratio greater than 0.95.

Weekday PM Peak Hour

- Rymal Road East and Upper Sherman Avenue (signalized):
  - Eastbound left-turn queue length extends beyond the current available storage.
  - Southbound left-turn queue length extends beyond the current available storage.
- Rymal Road East and Eva Street/Miles Road (signalized)
  - Westbound left-turn queue length extends beyond the current available storage.
  - Northbound right-through-left turn lane operates with delays in the LOS E range with a v/c ratio greater than 0.85.

Appendix C contains the detailed Synchro output.

Localized congestion occurs in the study area during the AM and PM peak hours.

TABLE 2.2: 2020 BASE YEAR INTERSECTION OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Rymal Road East & Upper Sherman Avenue	TCS	LOS	D	C	>	C	A	D	>	D	<	A	>	A	D	C	>	C	D
			Delay	47	21	>	26	0	44	>	44	<	0	>	0	36	34	>	35	37
			V/C	0.72	0.50	>		0.00	0.93	>		<	0.00	>		0.33	0.09	>		0.69
			Q	27	101	>		0	264	>		<	0	>		38	0	>		
			Ex	10	-	>		10	-	>		<	-	>		35	-	>		
			Avail.	-17	-	>		10	-	>		<	-	>		-3	-	>		
	2 - Rymal Road East & Eva Street/Miles Road	TCS	LOS	A	B	>	B	A	B	>	B	<	E	>	E	C	C	>	C	C
			Delay	9	16	>	16	9	10	>	10	<	78	>	78	33	34	>	34	27
			V/C	0.03	0.56	>		0.22	0.51	>		<	0.95	>		0.03	0.05	>		0.66
			Q	4	110	>		13	86	>		<	133	>		6	12	>		
			Ex	20	-	>		20	-	>		<	-	>		20	-	>		
			Avail.	16	-	>		7	-	>		<	-	>		14	-	>		
PM Peak Hour	1 - Rymal Road East & Upper Sherman Avenue	TCS	LOS	C	C	>	C	A	C	>	C	<	A	>	A	D	C	>	D	C
			Delay	35	26	>	28	0	29	>	29	<	0	>	0	38	35	>	36	30
			V/C	0.66	0.69	>		0.00	0.76	>		<	0.00	>		0.43	0.17	>		0.62
			Q	26	167	>		0	185	>		<	0	>		51	0	>		
			Ex	10	-	>		10	-	>		<	-	>		35	-	>		
			Avail.	-16	-	>		10	-	>		<	-	>		-16	-	>		
	2 - Rymal Road East & Eva Street/Miles Road	TCS	LOS	A	C	>	C	B	A	>	B	<	E	>	E	C	C	>	C	C
			Delay	10	24	>	24	18	9	>	11	<	65	>	65	35	35	>	35	26
			V/C	0.04	0.79	>		0.59	0.45	>		<	0.88	>		0.03	0.07	>		0.8
			Q	6	250	>		21	78	>		<	115	>		4	14	>		
			Ex	20	-	>		20	-	>		<	-	>		20	-	>		
			Avail.	14	-	>		-1	-	>		<	-	>		16	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

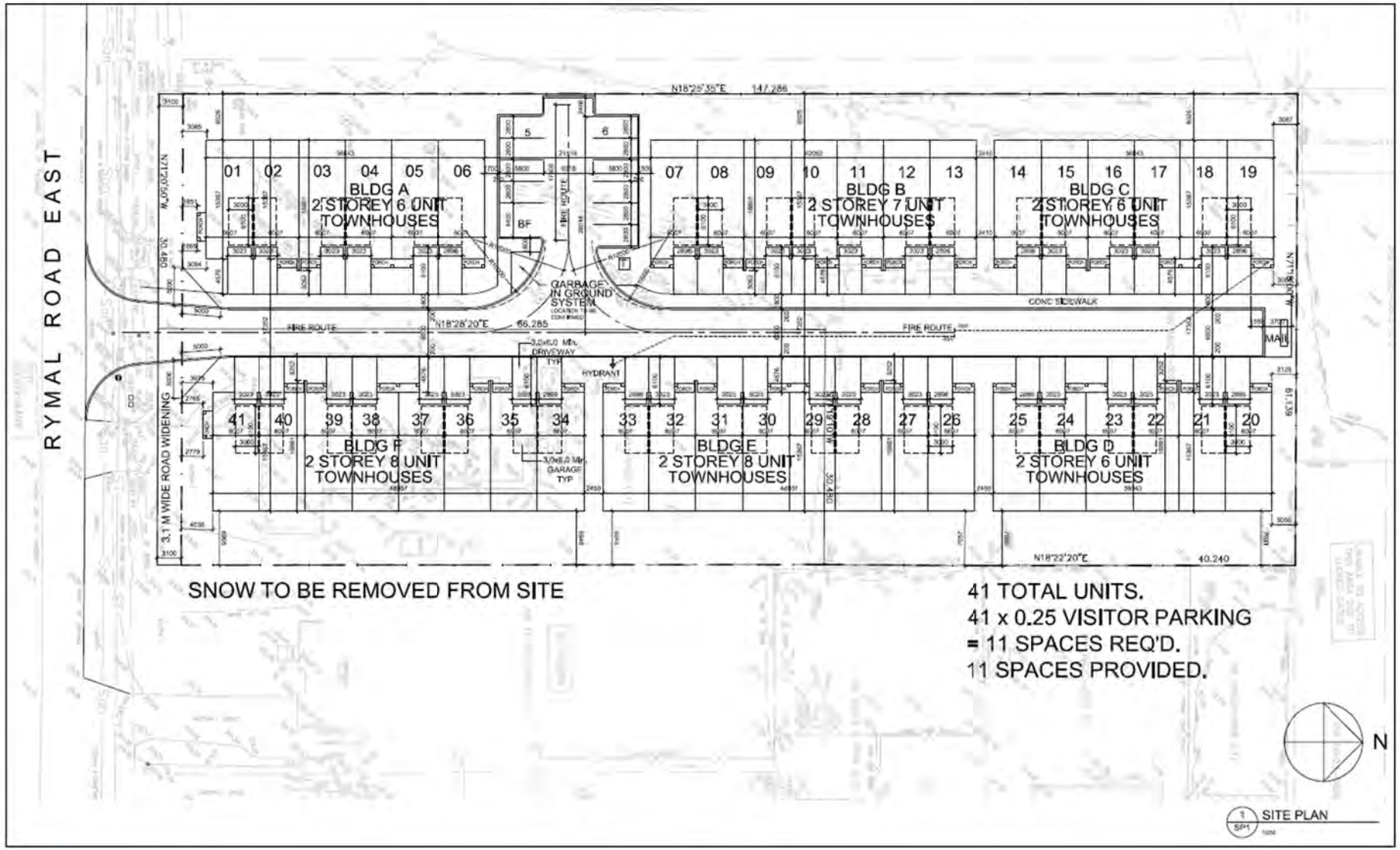
3 Development Concept

3.1 Development Description

The subject site is located on the north side of Rymal Road East just east of Upper Sherman Avenue at municipal address 705-713 Rymal Road East in the City of Hamilton. The property owner is proposing to develop the site to include 41 two-storey townhouse units. The site is assumed to be built-out by 2023.

Vehicle access is proposed via one all-moves driveway connection to Rymal Road East located approximately 175 metres east of the intersection of Rymal Road East and Upper Sherman Avenue.

Figure 3.1 illustrates the site concept plan.



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Site Concept Plan

705-713 Rymal Road East, Hamilton
200558

Figure 3.1

3.2 Site Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation[7] provides methods to estimate site trip generation. Land Use Code (LUC) Multifamily Housing, Low-Rise (220) was used to estimate the site trip generation.

The regression equation rates were used to calculate the trips generated by the site based on the number of multifamily housing units. **Table 3.1** summarizes the estimated trip generation. The site's trip generation is estimated to be approximately 20 AM peak hour trips and 27 PM peak hour trips. To remain conservative, no reductions of alternative modes of transportation have been applied.

TABLE 3.1: TRIP GENERATION

ITE Land Use	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
220 - Multifamily Housing (Low-Rise)	41	4	16	**20**	17	10	**27**

AM: Ln(X) = 0.95 Ln(X) - 0.51 / PM: Ln(X) = 0.89 Ln(X) -0.02

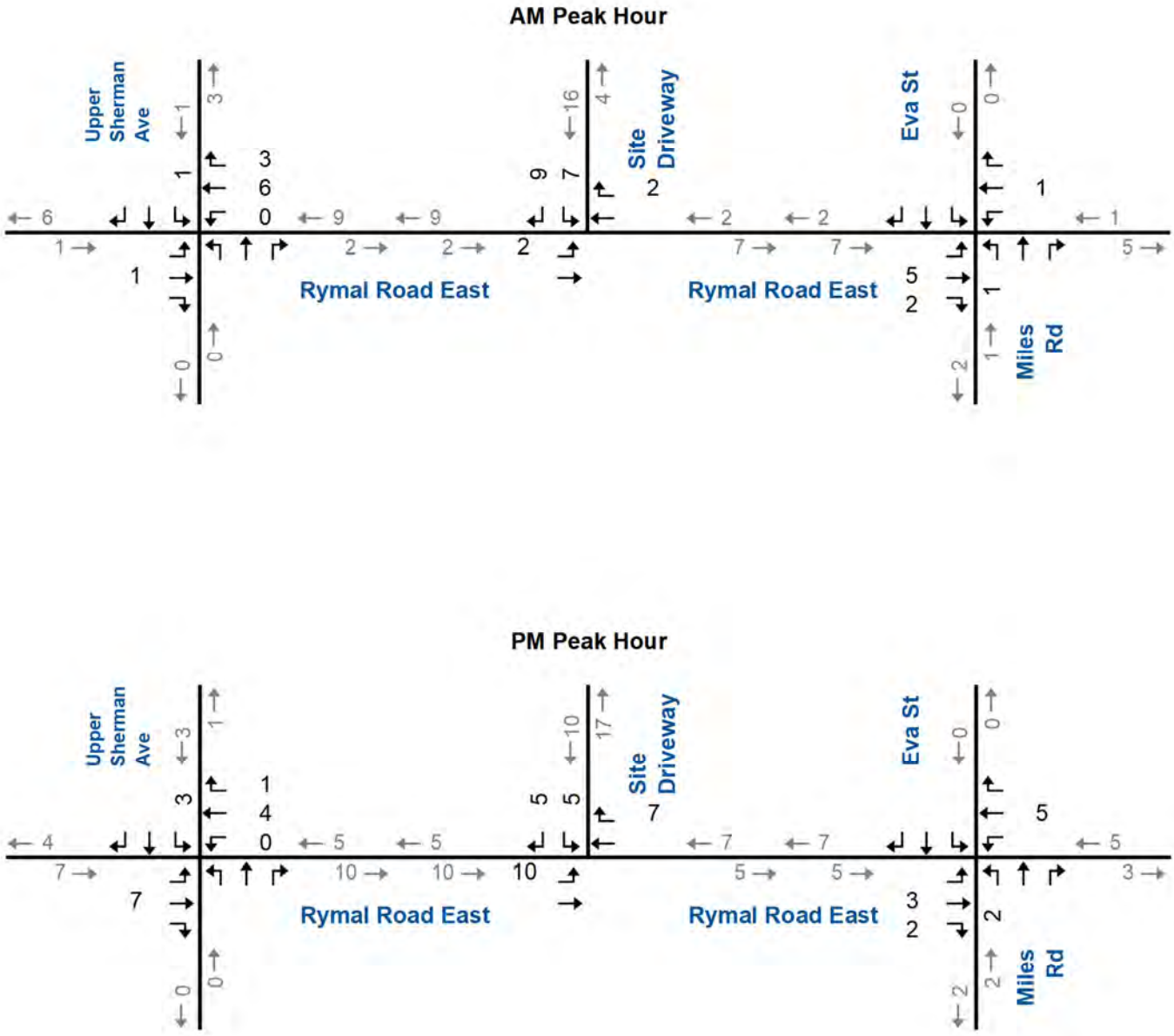
The trip distribution used for this study was based on the existing distribution at the study area intersections. As the surrounding land is predominately residential land use comprised of multifamily housing and single-family detached housing. The existing traffic distribution observed from traffic counts captures the peak traffic patterns which would be the primary route to/from the subject site. The trip distribution is shown in **Table 3.2**.

TABLE 3.2: TRIP DISTRIBUTION

Direction	Route	AM Peak Hour		PM Peak Hour	
		Inbound	Outbound	Inbound	Outbound
North	Upper Sherman Avenue	15%	19%	19%	12%
East	Rymal Road East	33%	31%	32%	33%
South	Miles Road	18%	10%	14%	17%
West	Rymal Road East	34%	41%	35%	38%
Total		**100%**	**100%**	**100%**	**100%**

Figure 3.2 contains the AM and PM peak hour trip assignment to the adjacent road network.

[7] *Trip Generation Tenth Edition*, Institute of Transportation Engineers, Washington D.C., 2017



Site Generated Traffic Volumes

705-713 Rymal Road East, Hamilton
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Figure 3.2

4 Evaluation of Future Traffic Conditions

The assessment of future conditions in this section includes the following components necessary to assess the traffic implications on the adjacent road network:

- Future background traffic volume estimates;
- Level of service analysis for background traffic (pre-development);
- Future total traffic volume estimates; and
- Level of service analysis for total traffic volumes (post-development).

4.1 Road Network Improvements

For the future horizon year, the south leg of Upper Sherman Avenue is open to the Nora Frances Henderson Secondary School. This will include the following additional lane configurations to the Rymal Road East and Upper Sherman Avenue intersection:

- Eastbound right-turn lane;
- Westbound right-turn lane;
- Northbound left-turn lane;
- Northbound shared through/right-turn lane; and
- Southbound shared through/right-turn lane.

No improvements to the Rymal Road East and Miles Road/Eva Street intersection are included in the future traffic analysis.

4.2 Forecast Traffic Volumes

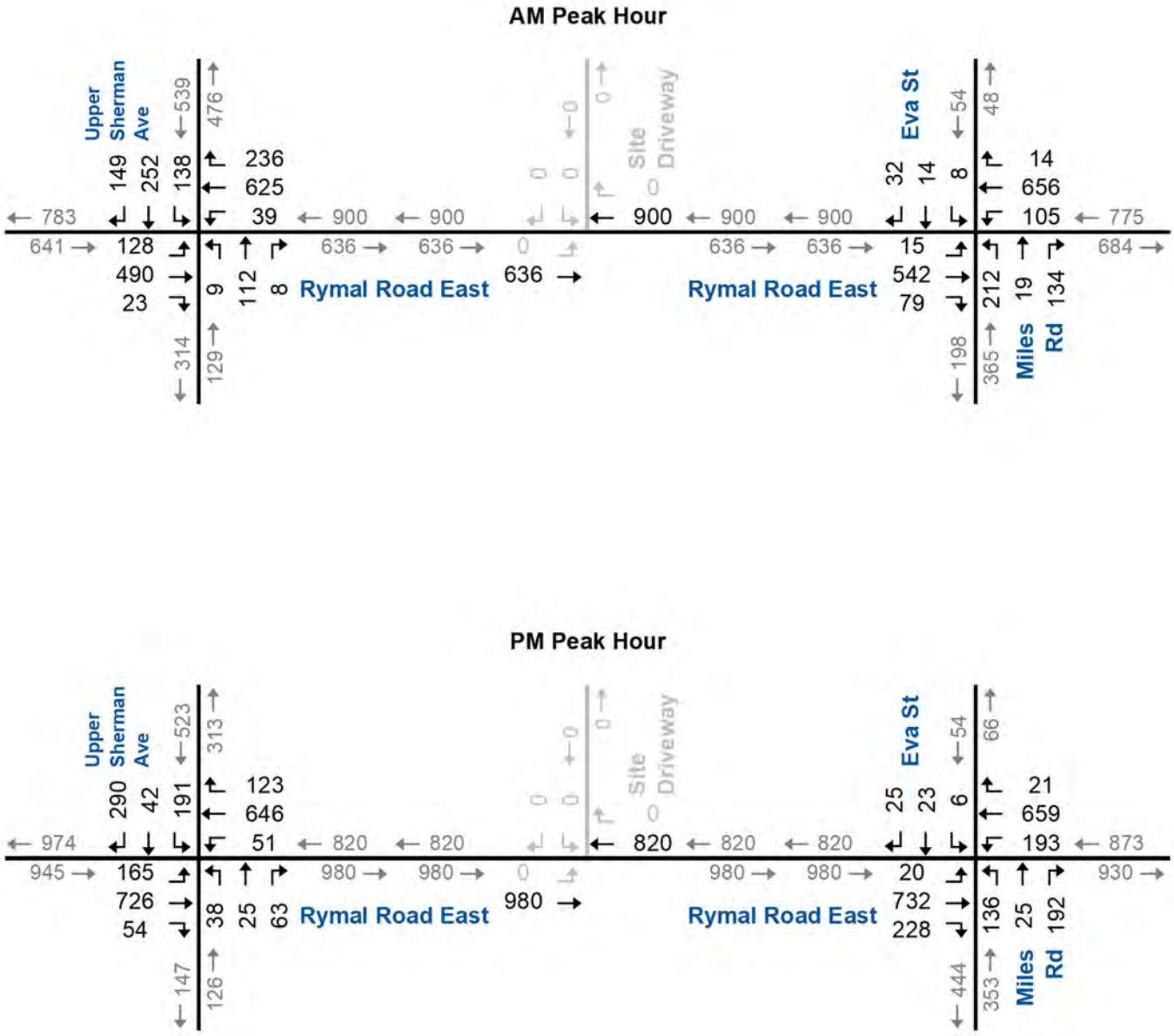
The future horizon traffic volumes five years from the assumed build out date (2028) are estimated to consist of:

- Increased non-site traffic (generalized background traffic growth) estimated to be 2.0 percent per annum as directed by the City;
- 1518 & 1540 Upper Sherman Avenue includes approximately 321 residential units and 353 m^2 (3,800 ft^2) of retail space. Trips generated by this site are based on the transportation impact study[8] for the development;
- Nora Frances Henderson Secondary School (NFHSS): This school is proposed to have a GFA of approximately 15,080 m^2 (162,320 ft^2). Trips generated by this site are based on the transportation impact study for the 1518 & 1540 Upper Sherman Avenue development; and
- Traffic generated by the subject site.

Appendix D contains the background development trip assignment.

Figure 4.1 illustrates the forecast 2028 background traffic volumes. **Figure 4.2** illustrates the forecast 2028 total traffic volumes.

[8] Paradigm Transportation Solutions Limited - 1518 & 1540 Upper Sherman Avenue Transportation Impact, Parking & TDM Options Study 2018



2028 Background Traffic Volumes

705-713 Rymal Road East, Hamilton
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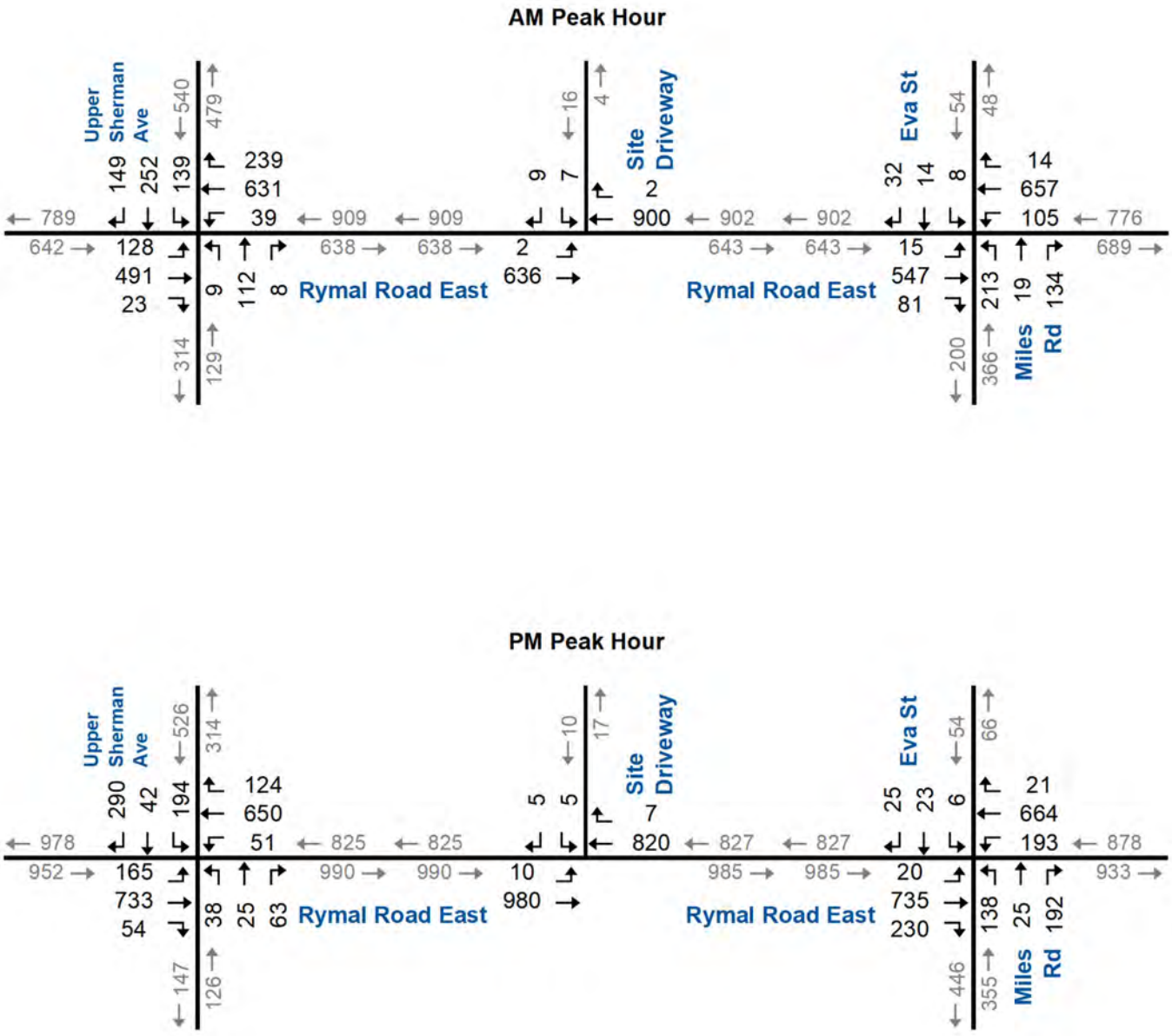
Figure 4.1



2028 Total Traffic Volumes

705-713 Rymal Road East, Hamilton
200558

Figure 4.2

4.3 Forecast Traffic Operations

4.3.1 2028 Background Traffic Operations

The study area intersection operations analysis for the background traffic scenario followed the same methodology used for the existing traffic conditions including the existing signal timings. **Table 4.1** details the level of service conditions, and the critical movements are summarized below:

Weekday AM Peak Hour

- Rymal Road East and Upper Sherman Avenue (signalized):
  - Eastbound left-turn queue length is forecast to extend beyond the available storage.
  - Westbound right-turn queue length is forecast to extend beyond the available storage.
  - Southbound left-turn queue length is forecast to extend beyond the available storage.
  - Southbound through-right turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.90.
- Rymal Road East and Eva Street/Miles Road (signalized)
  - Northbound right-through-left turn lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.

Weekday PM Peak Hour

- Rymal Road East and Upper Sherman Avenue (signalized):
  - Eastbound left-turn queue length is forecast to extend beyond the available storage.
  - Westbound left-turn queue length is forecast to extend beyond the available storage.
  - Southbound left-turn queue length is forecast to extend beyond the available storage.
- Rymal Road East and Eva Street/Miles Road (signalized)
  - Eastbound through lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.
  - Westbound left turn lane operates with delays in the LOS E range with a v/c ratio greater than 0.85. Queue lengths are forecast to extend beyond the available storage.

- Northbound right-through-left turn lane operates with delays in the LOS F range with a v/c ratio greater than 1.00.
- The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 1.00.

Appendix E contains the detailed Synchro 10 reports.

TABLE 4.1: 2028 BACKGROUND INTERSECTION OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Rymal Road East & Upper Sherman Avenue	TCS	LOS	C	C	B	**C**	B	C	B	**C**	C	D	>	**D**	D	E	>	**E**	**C**
			Delay	29	23	14	**24**	14	30	17	**26**	35	36	>	**36**	41	65	>	**59**	**34**
			V/C	0.58	0.59	0.02		0.02	0.78	0.28		0.07	0.26	>		0.48	0.90	>		**0.79**
			Q	24	125	0		9	185	39		6	0	>		44	0	>		
			Ex	10	-	25		10	-	25		35	-	>		35	-	>		
			Avail.	-14	-	25		1	-	-14		29	-	>		-9	-	>		
	2 - Rymal Road East & Eva Street/Miles Road	TCS	LOS	A	B	>	**B**	B	B	>	**B**	<	F	>	**F**	C	C	>	**C**	**D**
			Delay	10	19	>	**19**	11	13	>	**13**	<	128	>	**128**	33	34	>	**33**	**38**
			V/C	0.05	0.67	>		0.31	0.64	>		<	1.12	>		0.03	0.06	>		**0.80**
			Q	5	149	>		14	124	>		<	166	>		6	13	>		
			Ex	20	-	>		20	-	>		<	-	>		20	-	>		
			Avail.	15	-	>		6	-	>		<	-	>		14	-	>		
PM Peak Hour	1 - Rymal Road East & Upper Sherman Avenue	TCS	LOS	E	C	B	**C**	C	C	B	**C**	D	C	>	**C**	D	D	>	**D**	**C**
			Delay	56	32	15	**35**	26	27	16	**26**	37	34	>	**35**	42	38	>	**40**	**33**
			V/C	0.81	0.81	0.04		0.31	0.73	0.12		0.25	0.10	>		0.56	0.37	>		**0.70**
			Q	43	216	3		11	180	16		15	0	>		60	0	>		
			Ex	10	-	25		10	-	25		35	-	>		35	-	>		
			Avail.	-33	-	22		-1	-	9		20	-	>		-25	-	>		
	2 - Rymal Road East & Eva Street/Miles Road	TCS	LOS	B	E	>	**E**	E	B	>	**C**	<	F	>	**F**	C	C	>	**C**	**D**
			Delay	12	70	>	**69**	63	11	>	**23**	<	91	>	**91**	33	34	>	**34**	**54**
			V/C	0.06	1.06	>		0.87	0.58	>		<	1.00	>		0.04	0.08	>		**1.02**
			Q	7	362	>		66	114	>		<	147	>		5	15	>		
			Ex	20	-	>		20	-	>		<	-	>		20	-	>		
			Avail.	13	-	>		-46	-	>		<	-	>		15	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

4.3.2 2028 Total Traffic Operations

The study area intersection operations analysis for the future total traffic scenario followed the same methodology used for the background traffic conditions. **Table 4.2** details the level of service conditions for the weekday AM and PM peak hours.

All study area intersections are forecast to operate within similar levels of service as documented under the background scenario. The following summarizes the operations.

Weekday AM/PM Peak Hour

- The site driveway is forecast to operate with delays in the LOS A to C range with v/c ratios of less than 0.65.
- The addition of the site generated traffic increases the overall intersection delays by one second or less during the AM and PM peak hours.

Weekday AM Peak Hour

- Rymal Road East and Upper Sherman Avenue (signalized):
  - Eastbound left-turn queue length is forecast to extend beyond the available storage.
  - Southbound left-turn queue length is forecast to extend beyond the available storage.
  - Southbound through-right turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.90.
- Rymal Road East and Eva Street/Miles Road (signalized)
  - Northbound right-through-left turn lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.

Weekday PM Peak Hour

- Rymal Road East and Upper Sherman Avenue (signalized):
  - Eastbound left-turn queue length is forecast to extend beyond the available storage.
  - Westbound left-turn queue length is forecast to extend beyond the available storage.
  - Southbound left-turn queue length is forecast to extend beyond the available storage.

- Rymal Road East and Eva Street/Miles Road (signalized)
  - Eastbound through lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.
  - Westbound left turn lane operates with delays in the LOS E range with a v/c ratio greater than 0.85. Queue lengths are forecast to extend beyond the available storage.
  - Northbound right-through-left turn lane operates with delays in the LOS F range with a v/c ratio greater than 1.00.
  - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 1.00.

Appendix F contains the detailed Synchro 10 reports.

TABLE 4.2: 2028 TOTAL INTERSECTION OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Rymal Road East & Upper Sherman Avenue	TCS	LOS	C	C	B	**C**	B	C	B	**C**	C	D	>	**D**	D	E	>	**E**	**C**
			Delay	30	23	14	**24**	16	31	17	**26**	35	36	>	**36**	41	65	>	**59**	**34**
			V/C	0.59	0.59	0.02		0.12	0.78	0.28		0.07	0.26	>		0.49	0.90	>		**0.79**
			Q	24	125			9	188			6	0	>		45	0	>		
			Ex	10	-	25		10	-	25		35	-	>		35	-	>		
			Avail.	-14	-			1	-			29	-	>		-10	-	>		
	2 - Rymal Road East & Eva Street/Miles Road	TCS	LOS	A	B	>	**B**	B	B	>	**B**	<	F	>	**F**	C	C	>	**C**	**D**
			Delay	10	19	>	**19**	11	13	>	**13**	<	130	>	**130**	33	34	>	**33**	**39**
			V/C	0.05	0.68	>		0.31	0.64	>		<	1.12	>		0.03	0.06	>		**0.81**
			Q	5	153	>		14	125	>		<	168	>		6	13	>		
			Ex	20	-	>		20	-	>		<	-	>		20	-	>		
			Avail.	15	-	>		6	-	>		<	-	>		14	-	>		
	3 - Rymal Road East & Eva Street/Miles Road	TWSC	LOS	B	A	>	**A**		A	>	**A**					C		>	**C**	
			Delay	11	0	>	**0**		0	>	**0**					18		>	**18**	
			V/C	0.00	0.41	>			0.58	>						0.06		>		
			Q	0	0	>			0	>						2		>		
			Ex	20	-	>			-	>						-		>		
			Avail.	20	-	>			-	>						-		>		
PM Peak Hour	1 - Rymal Road East & Upper Sherman Avenue	TCS	LOS	E	C	B	**D**	C	C	B	**C**	D	C	>	**C**	D	D	>	**D**	**C**
			Delay	58	32	15	**36**	26	28	16	**26**	37	34	>	**35**	42	38	>	**40**	**33**
			V/C	0.82	0.82	0.04		0.32	0.73	0.12		0.25	0.10	>		0.57	0.37	>		**0.71**
			Q	44	220			11	182			15	0	>		61	0	>		
			Ex	10	-	25		10	-	25		35	-	>		35	-	>		
			Avail.	-34	-			-1	-			20	-	>		-26	-	>		
	2 - Rymal Road East & Eva Street/Miles Road	TCS	LOS	B	E	>	**E**	E	B	>	**C**	<	F	>	**F**	C	C	>	**C**	**D**
			Delay	12	72	>	**71**	63	11	>	**23**	<	92	>	**92**	33	34	>	**34**	**55**
			V/C	0.06	1.06	>		0.87	0.58	>		<	1.00	>		0.04	0.08	>		**1.02**
			Q	7	364	>		66	115	>		<	148	>		5	15	>		
			Ex	20	-	>		20	-	>		<	-	>		20	-	>		
			Avail.	13	-	>		-46	-	>		<	-	>		15	-	>		
	3 - Rymal Road East & Eva Street/Miles Road	TWSC	LOS	B	A	>	**A**		A	>	**A**					C		>	**C**	
			Delay	10	0	>	**0**		0	>	**0**					19		>	**19**	
			V/C	0.02	0.63	>			0.53	>						0.04		>		
			Q	0	0	>			0	>						1		>		
			Ex	20	-	>			-	>						-		>		
			Avail.	20	-	>			-	>						-		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

5 Remedial Measures

This chapter contains analysis to identify if improvement measures are required at the study area intersections.

5.1 Auxiliary Turn Lane Requirements

Left-turn access from Rymal Road East to the subject can be accommodated by the two-way left-turn lane along Rymal Road East. No auxiliary turn-lanes are required.

5.2 Assessment of Impacts

Based on the analysis, congestion is currently and/or forecast to occur at the two signalized intersections within the study area. A summary of the findings at each intersection is further discussed.

5.2.1 Rymal Road at Upper Sherman Avenue

The delays at this intersection are primarily associated with the eastbound left turn movement and southbound through movements during the weekday peak hours. A possible mitigation measure to improve operations and reduce delay at the intersection would be implementation of an actuated signal timing plan as opposed to fixed. The use of actuated signal operations is mainly used along suburban arterials and rural roads as vehicle and pedestrian volumes vary considerably throughout the day.

It is noted this improvement is not triggered by the proposed development.

5.2.2 Rymal Road at Eva Street/Miles Road

This intersection is projected to operate with high levels of delay for the northbound approach during the weekday peak hours. A possible mitigation measure to improve operations and reduce delay at the intersection would be implementation of a permitted/protective phase (advanced green) for the northbound approach as well as the implementation of an eastbound right turn lane.

It is noted this improvement is not triggered by the proposed development.

5.3 Sensitivity Analysis

A sensitivity analysis to assess the identified improvements noted above at the study area intersections has been undertaken for the forecast 2028 Total traffic conditions. The following improvements and assumptions have been made:

- Rymal Road at Upper Sherman Avenue will operate with an actuated-coordinate timing plan with optimizing timings;
- Rymal Road at Eva Street/Miles Road will operate with a separate right turn lane for the eastbound approach, a permitted/protective phased for the northbound approach and optimized timings.

Table 5.1 summarizes the results of the sensitivity analysis. **Appendix G** contains the detailed Synchro reports. Overall, the intersections are expected to operate with considerable improvements.

TABLE 5.1: 2028 SENSITIVITY INTERSECTION OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Rymal Road East & Upper Sherman Avenue	TCS	LOS	B	B	B	**B**	B	C	B	**C**	D	D	>	**D**	C	D	>	**D**	**C**
			Delay	18	19	12	**19**	15	27	16	**24**	44	43	>	**43**	34	52	>	**48**	**29**
			V/C	0.50	0.55	0.02		0.11	0.78	0.27		0.16	0.36	>		0.51	0.84	>		**0.79**
			Q	30	152			11	250			5	0	>		38	0	>		
			Ex	10	-	25		10	-	25		35	-	>		35	-	>		
			Avail.	-20	-			-1	-			30	-	>		-3	-	>		
	2 - Rymal Road East & Eva Street/Miles Road	TCS	LOS	B	C	>	**C**	B	C	>	**B**	<	D	>	**D**	C	C	>	**C**	**C**
			Delay	14	24	>	**23**	15	20	>	**20**	<	50	>	**50**	27	27	>	**27**	**27**
			V/C	0.06	0.67	>		0.35	0.72	>		<	0.84	>		0.03	0.05	>		**0.82**
			Q	6	157	>		21	183	>		<	118	>		5	11	>		
			Ex	20	-	>		20	-	>		<	-	>		20	-	>		
			Avail.	14	-	>		-1	-	>		<	-	>		15	-	>		
	3 - Rymal Road East & Eva Street/Miles Road	TWSC	LOS	B	A	>	**A**		A	>	**A**					C		>	**C**	
			Delay	11	0	>	**0**		0	>	**0**					18		>	**18**	
			V/C	0.00	0.41	>			0.58	>						0.06		>		
			Q	0	0	>			0	>						2		>		
			Ex	20	-	>			-	>						-		>		
			Avail.	20	-	>			-	>						-		>		
PM Peak Hour	1 - Rymal Road East & Upper Sherman Avenue	TCS	LOS	B	B	B	**B**	B	C	B	**C**	D	D	>	**D**	D	D	>	**D**	**C**
			Delay	18	19	10	**18**	16	24	16	**23**	48	49	>	**49**	47	43	>	**45**	**27**
			V/C	0.51	0.69	0.04		0.21	0.73	0.10		0.28	0.19	>		0.72	0.36	>		**0.71**
			Q	27	194			10	198			17	0	>		66	0	>		
			Ex	10	-	25		10	-	25		35	-	>		35	-	>		
			Avail.	-17	-			0	-			19	-	>		-31	-	>		
	2 - Rymal Road East & Eva Street/Miles Road	TCS	LOS	B	C	>	**C**	D	B	>	**C**	<	D	>	**D**	C	C	>	**C**	**C**
			Delay	15	34	>	**30**	43	15	>	**21**	<	52	>	**52**	29	30	>	**30**	**30**
			V/C	0.07	0.85	>		0.82	0.63	>		<	0.84	>		0.03	0.07	>		**0.87**
			Q	8	256	>		65	151	>		<	119	>		5	13	>		
			Ex	20	-	>		20	-	>		<	-	>		20	-	>		
			Avail.	12	-	>		-45	-	>		<	-	>		15	-	>		
	3 - Rymal Road East & Eva Street/Miles Road	TWSC	LOS	B	A	>	**A**		A	>	**A**					C		>	**C**	
			Delay	10	0	>	**0**		0	>	**0**					19		>	**19**	
			V/C	0.02	0.63	>			0.53	>						0.04		>		
			Q	0	0	>			0	>						1		>		
			Ex	20	-	>			-	>						-		>		
			Avail.	20	-	>			-	>						-		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

6 Transportation Demand Management

This section of the report has been prepared to meet Section 3.A Residential of the City of Hamilton's Transportation Demand Management for Development Guidelines[9].

The goal of Transportation Demand Management (TDM) is making the capacity of our roads more efficient by reducing vehicle demand. TDM approaches consider how people's choices of travel mode are affected by factors such as land use patterns, development design, parking availability, parking cost, and the relative cost, convenience, and availability of alternative modes of travel. TDM is one of the tools that municipalities are using to create more vibrant and sustainable communities. Using policies and programs to make active and sustainable transportation more convenient, a TDM approach to transportation can deliver long-term environmental sustainability, improve public health, create stronger communities, and build more prosperous and livable cities. Various TDM strategies are used to influence these factors so that the alternatives are more competitive with driving alone, thus reducing reliance on motor vehicles.

There are several reasons why incorporating a TDM plan into a residential site is important:

- It can help reduce auto ownership levels, therefore reducing private vehicle trips and congestion
- It can create safe and attractive environments that encourage travel by walking, cycling and transit and
- It can support the development of healthy communities

The following section outlines the TDM options on the site.

6.1 Cycling

The City's TDM guide for residential development prescribes the following rates:

- Long-Term Bicycle Parking: 0.50 to 1.25 spaces/unit; and
- Short-Term Bicycle Parking: 0.05 to 0.20 spaces/unit

[9] City of Hamilton, Transportation Demand Management for Development Guidelines, June 2015.

With the development providing attached garages for all 41 units, residential bicycle parking can be accommodated within the dwelling unit as the units are comprise of a garage and back yard area that could accommodate auxiliary structures such as a shed.

In terms of short-term bicycle parking, two to eight spaces are required based on the guidelines noted above. However, the proposed site plan does not provide for any outdoor bicycle parking areas (e.g. post and ring, racks, etc.). As this is a residential townhouse complex rather than an apartment complex, residents and visitors to the site have the option of storing bicycles on their property. A separate area for outdoor bicycle parking should only be considered, if feasible.

6.2 Walking

Accessibility to and from a development is essential in helping to ensure that those that can walk, do. Proper pedestrian connections from the surrounding community to the development should be constructed to ensure safety and to enhance the overall pedestrian experience.

The proposed site plan includes a sidewalk on the west side of the access road connecting to the right-of-way on Rymal Road East. Rymal Road East does not currently have sidewalk facilities, but should future facilities be added, the development sidewalks should be connected to the municipal sidewalk.

The development's landscaping plan could consider additional amenities such as landscaping and lighting to enhance the pedestrian realm and to prioritize pedestrians. All on-site sidewalks should be well-lit and should confirm to the City of Hamilton's design standards and the Accessibility for Ontarians with Disabilities Act (AODA) design standards.

6.3 Transit

The use of transit places less reliance on the use of personal automobiles for trips that can be completed by convenient and desirable transit options. The provision of convenient and desirable transit can be made by providing well-lit transit stops with seating, and weather protective shelters. Additional amenities including bicycle parking, schedule information, real time bus status, and maps can increase the convenience of the transit network.

No additional transit related infrastructure is proposed as part of this development application. The existing transit stops located on the north and south side of Rymal Road East just west of Eva Street

approximately 120 metres (2-minute walk) east of the site are expected to continue to service the area. It expected that through regular internal reviews, the HSR will monitor the amenities provided at the transit stops throughout the City and based on the demand, will address the need for additional amenities.

6.4 Parking

The City's TDM Guide for Development provides guidelines indicating that providing no more than the minimum number of required parking spaces as outlined in the Zoning by-law should be provided to encourage residents and visitors to utilize other modes of travel.

Based on the site plan statistics a total of 11 parking spaces for visitors and a total of 82 spaces for residents will be provided. With the development supplying 93 parking spaces, the minimum requirements as stipulated in the City of Hamilton Zoning By-Law 6593 is met.

As visitor and residential parking is typically well utilized within townhouse complexes and on-street parking is not permitted along Rymal Road East, the proposed parking supply is considered appropriate.

In the event that visitor parking is seldom used, some of these spaces could be converted to bicycle parking or even allocated to more outdoor amenity space such as a patio or community garden. However, this would need to be explored later through the condominium corporation and further supported by the residents of the development once the community has been established.

6.5 Travel Planning/Education/Promotion

Increasing awareness of sustainable transportation opportunities for residents and visitors of the development should be considered by the developer. Residents should be provided with a welcome package that outlines the available transit routes and active transportation options such as the availability of bicycle parking and the development's proximity to the existing bicycle network. A travel plan will engage and educate residents on the available sustainable modes of travel and how to overcome obstacles that may be perceived.

General education of all modes of transportation, including their benefits and how to make the best use of them, are key components to TDM success. The strategies require cooperation and coordination with several partners, including transit providers, building owners, area municipalities as well as residents.

By educating about sustainable modes of travel as well as providing travel demand management tools and incentives, TDM can be further integrated within the development to promote all modes of transportation.

The applicant will develop marketing/informational materials as part of their initial scope of work. Information on transportation options and/or links to the appropriate website should be conveyed to all prospective residents as a component of a resident welcome packet.

Available information should include schedules for local and regional transit services, bicycle and trail networks and the location of retail and recreational establishments.

6.6 Other TDM Measures

6.6.1 Carshare

Car sharing is recognized in the City's TDM policy as a means of reducing automobile dependence by providing access to a car on an as-need basis and reducing the need to own a vehicle. The provision of secured car-share space can result in a reduction in residential parking requirements. Car-share appeals to a break range of households from young urban professionals to families who want a lifestyle that is not tied to owning and maintaining a private vehicle, but also want to retain the option to drive for primarily non-work trip purposes. Several carshare companies are currently providing vehicles within Hamilton (Communauto and Zipcar); however, the vehicles are located predominantly in the lower city (beyond walking distance from the subject site) where vehicle ownership rates tend to be lower. It is unlikely that carsharing will be incorporated into the development at this present time.

6.6.2 Bike Share

The City of Hamilton, in partnership with Social Bicycles (SoBi), has implemented a bike share program. At present, stations are located north of the subject site in the lower city. Since SoBi does not provide service near the subject site, bikeshare is unlikely to be implemented at this present time.

6.7 Evaluation of TDM Measures

Table 6.1 summarizes the City's Staff Evaluation form for TDM measures outlined above. The form indicates the development has five measures provided to the "Modest Level of Provision". This suggests the development is below average for supporting TDM initiatives.

Overall, the development is not expected to generate a significant amount of auto trips. The site is located is a predominantly auto-orientated, low density, area with few opportunities for TDM measures. The proposed on-site pedestrian network and access to transit will improve the pedestrian realm and support non-auto users (pedestrians, cyclists, and transit users). Increasing awareness of sustainable modes of transportation for residents can assist in lowering the development's parking demand and ultimately the development's transportation impacts.

General education of all modes of transportation, including their benefits and how to make the best use of them, are key components to TDM success.

TABLE 6.1: TDM STAFF EVALUATION CHECK LIST

Project Name: 705-713 Rymal Road East
Property Address: 705-713 Rymal Road East
Applicant Name:

Land Use: Residential Townhomes
Application Type: Residential

Located on existing transit or AT network? Y X N

Use the following checklist to assess how well each TDM initiative is addressed in the development application (note instances where initiatives are not applicable). For each category, initiatives are listed from "high" to "low" TDM impact.

Category	TDM Initiative	Not Applicable	Modest* level of provision	High* level of provision
Cycling	Bicycle network implementation	X		
	Secure, indoor bicycle parking	X		
	End-of-trip amenities (e.g. showers, change rooms)	X		
	Visible, well-lit, short-term bicycle parking (above minimum)	X		
Walking	Safe and attractive walkways		X	
	Pedestrian amenities on-site (benches, landscaping, lighting)		X	
	Pathway connections between school and neighbourhood	X		
	Student pick-up/drop-off away from main entrances	X		
Transit	Implement transit priority measures	X		
	Weather-protected waiting areas	X		
	Enhanced walking routes to transit	X		
	Bicycle parking at or near transit stops	X		
	On-site transit information	X		
Parking	No more than the minimum required spaces		X	
	Paid parking/Unbundle parking	X		
	Shared parking (nearby development/on-street)	X		
	Reduced parking for car share vehicle parking	X		
	Cash-in-lieu of parking	X		
	Reduced parking based on proximity to transit	X		
Carpool	Preferential carpool parking spaces	X		
Carshare/ Bikeshare	On-site carshare vehicles(s)	X		
	On-site bikeshare facility	X		
Wayfinding and Travel Planning	Travel planning resources		X	
	Wayfinding signage	X		
	Support development of School Travel Plans	X		
Education/ Promotion, Incentives	Membership in a TMA/Smart Commute	X		
	Subsidized transit passes, carshare memberships, and/or bikeshare memberships	X		
	Contributing to building TDM brand		X	

***Definitions for "Modest" and "High" are relative to a typical development of the same type and will be further bench marked through annual review. **Staff comments to be provided on the following page.**

Project Name: 705-713 Rymal Road East

Checklist evaluation:

# measures N/A:	23	82% < 50% modest provision **= below average ***
# measures modest provision:	5	18% > 50% modest provision **= average***
# measures high provision:	0	0% > 10% high provision **= above average***

6.8 Summary

The development plan proposes several TDM measures as identified by the City of Hamilton's TDM Guide for Development. These measures include:

- Sidewalk connections linking the dwelling units to potential future municipal sidewalks along Rymal Road East

Additional measures that are currently not included on the site plan that will be implemented by the applicate at the site plan stage to help promote and encourage TDM:

- The development's landscaping plan could consider additional amenities such as landscaping and lighting to enhance the pedestrian realm and to prioritize pedestrians.
- All on-site sidewalks should be well-lit and should confirm to the City of Hamilton's design standards and the Accessibility for Ontarians with Disabilities Act (AODA) design standards.
- The developer encourage residents to utilize sustainable transportation options for travel to/from the development (transit/cycling/walking). Residents be provided with a welcome package that outlines the available transit routes and active transportation options for the area.

7 Conclusion and Recommendations

7.1 Conclusions

The main findings and conclusions of this study are as follows:

- **Existing Traffic**: The study area intersections are operating with satisfactory levels of service overall during the weekday AM and PM peak hours.
  - Localized congestion is occurring at the intersection of Rymal Road East and Eva Street/Miles Road for the northbound approach during the weekday peak hours.
- **Trip Generation**: The site's net trip generation is estimated to be approximately 20 AM peak hour vehicle trips and 27 PM peak hour vehicle trips.
- **Background Traffic**: Increased delay is projected at the study area intersections as a result of general growth in traffic and the addition of adjacent development proposals.
  - Rymal Road and Upper Sherman is projected to operate at LOS E for the southbound through movement and eastbound left turn movement.
  - Rymal Road East and Eva Street/Miles Road is forecast to operate at LOS F and a v/c ratio of 1.00 for the northbound approach and the westbound left turn movement is projected to operate at LOS E.
- **Total Traffic**: The study area intersections are forecast to operate with similar levels of service as the background traffic conditions.
  - Rymal Road and Upper Sherman is projected to operate at LOS E for the southbound through movement and eastbound left turn movement.
  - Rymal Road East and Eva Street/Miles Road is forecast to operate at LOS F and a v/c ratio of 1.00 for the northbound approach and the westbound left turn movement is projected to operate at LOS E.
  - The addition of the site generated traffic increases the overall intersection delays by one second or less during the weekday peak hours.
  - The site driveway is forecast to operate with delays in the LOS A to C range with v/c ratios of less than 0.65.

- **Remedial Measures**: The following mitigation measures have been identified for consideration for implementation by the City:
  - A possible mitigation measure to improve operations and reduce delay at the intersection of Rymal Road and Upper Sherman Avenue would be implementation of an actuated-coordinated timing plan and optimized signal timings. This mitigation measure is not required by the proposed development.
  - A possible mitigation measure to improve operation and reduce delay at the intersection of Rymal Road and Eva Street/Miles Road would be implementation of an eastbound right turn lane, addition of a permitted/protective phase for the northbound approach and optimized signal timings. This mitigation measure is not required by the proposed development.
  - It is noted these improvements are not triggered by the proposed development.
- **Transportation Demand Management Plan**: The development plan proposes several TDM measures as identified by the City of Hamilton's TDM Guide for Development. In addition, there are several measures that the developer can implement to help encourage TDM. These measures include:
  - Sidewalk connections linking the dwelling units to potential future municipal sidewalks along Rymal Road East
  - The development is not expected to generate a significant number of auto trips.
  - The development's landscaping plan could consider additional amenities such as landscaping and lighting to enhance the pedestrian realm and to prioritize pedestrians.
  - All on-site sidewalks should be well-lit and should confirm to the City of Hamilton's design standards and the Accessibility for Ontarians with Disabilities Act (AODA) design standards.
  - The developer should encourage residents to utilize sustainable transportation options for travel to/from the development (transit/cycling/walking). Residents should be provided with a welcome package that outlines the available transit routes and active transportation options for the area.

7.2 Recommendations

Based on the findings of this study, the following is recommended:

- The City consider implementing an actuated-coordinate timing plan at the intersection of Rymal Road and Upper Sherman Avenue to address projected deficiencies;
- The City consider implementing an eastbound right turn lane at the intersection of Rymal Road and Eva Street/Miles Road along with a permitted/protective phase for the northbound approach to address existing deficiencies;
- There are no operational concerns or safety concerns at the intersection of the proposed site access and Rymal Road.
- Recognizing the above, roadway improvements are not the Applicant's responsibility nor should the requirement for improvements form any condition of draft plan of subdivision approval.

Appendix A

Terms of Reference

Greg Lue

Subject: FW: (200558) 705 Rymal Road East TIA Scope of Work - WC-18-057

From: Transportation Planning <Transportation.Planning@hamilton.ca>
Sent: November 23, 2020 11:04 AM
To: Andrew Evans <aevans@ptsl.com>
Cc: Chris Day <cday@ptsl.com>; Rybensky, Yvette <Yvette.Rybensky@hamilton.ca>; Roth, Jennifer <Jennifer.Roth@hamilton.ca>
Subject: RE: (200558) 705 Rymal Road East TIA Scope of Work - WC-18-057

Hi Andrew,

Transportation Planning has reviewed the proposed development 705 Rymal Road East (FC-18-057) and formally clears the TIS condition without further submissions being required moving forward with any formal site plan application.

Thank you,
Matthew Radaelli
Project Manager, Transportation Planning – Development Approvals
On Behalf of Transportation Planning
COVID-19 UPDATE: Flexibility and patience is asked of ourselves, clients, contractors and customers working with the City of Hamilton. Most staff are working remotely with limited access to voicemail, so please send emails. All in-person meetings that are required will be become conference calls or another form of virtual meetings. The City is making adjustments to ensure staff are connected to office tools and project files while we protect ourselves and our communities during this time. Please note that while we are trying to maintain time frames for comments on applications and dealing with responding information, we may not always achieve these goals.

From: Andrew Evans <aevans@ptsl.com>
Sent: November 18, 2020 8:00 AM
To: Transportation Planning <Transportation.Planning@hamilton.ca>
Cc: Chris Day <cday@ptsl.com>
Subject: RE: (200558) 705 Rymal Road East TIA Scope of Work - WC-18-057

Greetings,

Further to our scope of work (below), we have reviewed available turning movement counts at the Rymal Road East and Upper Sherman Avenue intersection (attached) and have further questions.

It is our understanding that the south leg of the Rymal Road East and Upper Sherman Avenue intersection is now in operation and is for the Nora Francis Henderson Secondary School. The 2019 turning movement count does not include the south leg of Upper Sherman Avenue. Given the Covid-19 pandemic, would you like us to recount the intersection of Upper Sherman Avenue and Rymal Road East intersection or continue to use the 2019 turning movement count and add a 2% growth rate along with the following background developments to come up with the future background traffic:

- 1518 & 1540 Upper Sherman Avenue; approximately 321 residential units and 353 square metres of retail space; and

- Nora Francis Henderson Secondary School; proposed to have a GFA of approximately 15,080 square metres (162, 320 square feet)?

Note that the 1615 Upper Sherman Avenue and 675-695 Rymal Road East commercial retail development appear to be in operation when the 2019 turning movement counts were conducted. Also, we understand a place of worship is proposed near Upper Sherman Avenue and Rymal Road East; however, we do not have any information regarding the capacity and timing of this site. It is likely that the peak trip generation of this site will occur outside of the weekday AM and PM peak hour and therefore, we are not planning to include this development in our background traffic forecasts.

Thank you and regards.

Andrew Evans, M.Sc.
Transportation Planner

Paradigm Transportation Solutions Limited
p: 905.381.2229 x **305**
m: 519.497.3239

Since 1998, our unique "work at home" business model has enabled us to harness technology, offer high quality service and strong communication with our clients and now allows us to carry on our work for you during COVID-19.

Let's stay safe and look out for each other. We will get through this together.

From: Andrew Evans
Sent: November 11, 2020 1:03 PM
To: Transportation Planning <Transportation.Planning@hamilton.ca>
Cc: Chris Day <cday@ptsl.com>
Subject: (200558) 705 Rymal Road East TIA Scope of Work - WC-18-057

Greetings,

Paradigm has retained to undertake a Transportation Impact Assessment (TIA) for a proposed residential development situated at 705 Rymal Road East (File number WC-18-057). Previous comments from the City on our scope of work dated 30 November 2018 have been included for reference. It is our understanding that the previous study was not submitted.

The subject site is located on the northside of Rymal Road East, east of Upper Sherman Avenue in the City of Hamilton. The property owner is proposing to develop the site to include 41 two-storey townhouse units.

Below is our Scope of Work for the TIS for your review and comments:

Study Area Intersections:
- Rymal Road East at Upper Sherman Avenue (signalized);
- Rymal Road East at Eva Street/Miles Road (signalized); and
- Site driveway at Rymal Road East (assumed unsignalized).

Planning Horizons:

- Five years from the anticipated build-out of the site (assumed Year 2028).

Analysis Periods:

- Weekday AM and PM peak hours.

Existing Traffic:

- Derived from Turning Movement Counts at study area intersections
- Please confirm how we are to proceed with Existing Count Volumes due to Covid-19 pandemic?

Background Traffic:

- A background growth rate of 2.0% per annum
- Please provide any background developments from nearby approved and/or in-stream developments

Site Generated Traffic:

- ITE Trip Generation Manual (10th Edition) LUC 220 – Multifamily Housing (Low-Rise)
  - 20 AM peak hour trips and 27 PM peak hour trips
- Trip Distribution based on Existing Traffic Patterns and/or 2016 TTS Survey data

Thank you and regards.

Andrew Evans, M.Sc.
Transportation Planner

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road Cambridge ON N1R 8J8
p: 905.381.2229 x **305**
m: 519.497.3239
e: aevans@ptsl.com
w: www.ptsl.com

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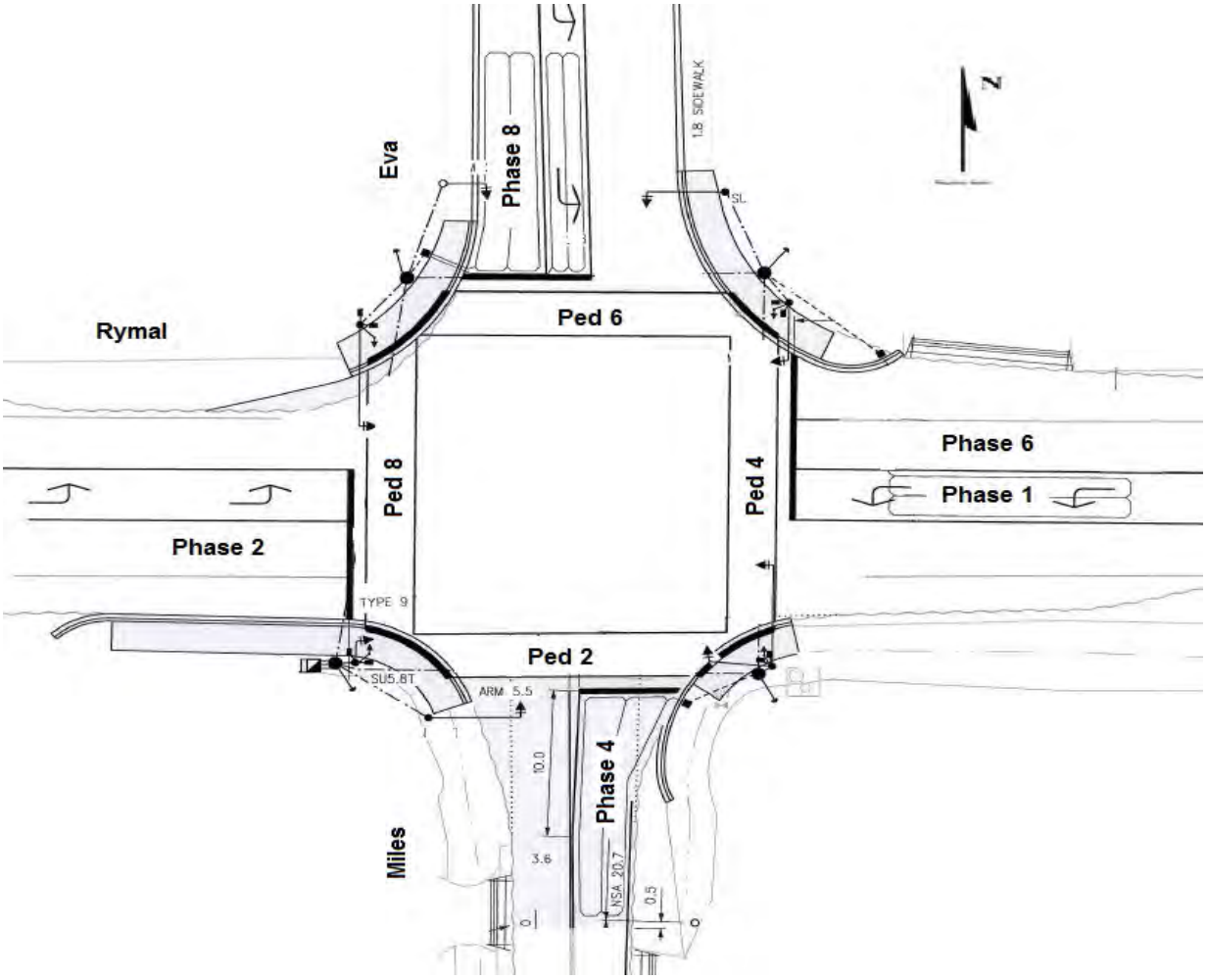
Let's stay safe and look out for each other. We will get through this together.

Appendix B

Existing Count Data

City of Hamilton - Traffic
Traffic Signal Controller Timing Data

Intersection:	**Rymal Rd @ Eva/Miles**				
Controller Type:	**3000E**	Page	**1**	of	**15**
Programmed By:	**DLB**	Installed By:	**RDG**		
Date:	**23-May-19**	Date:	**23-May-19**		



ϕ1: **Rymal - WBLT, Loop # 1**
ϕ2: **Rymal - EB - South Xwalk**
ϕ3:
ϕ4: **Miles - NB - East Xwalk**
ϕ5:
ϕ6: **Rymal - WB - North Xwalk**
ϕ7:
ϕ8: **Eva - SB - West Xwalk**

Flash Operation: **Red: Rymal**
Red: Miles/Eva

SEQUENCE/START-UP (MM-3-1-1)

START-UP PHASES/INTERVAL/SEQUENCE

(X = Enable for start-up phases. Must be compatible if more than one)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
START-UP	Phases				**X**				**X**								
	Interval	**0**	(0=Red, 1=Yel, 2= Grn, determines color of selected phases above on start-up)														
	Flash	**10**	(0-255 seconds start-up flash time)														
	Red	**5**	(0-25.5 secs = length of first red after start-up if start-up in yellow or red)														
	Sequence	**3**	(2=single ring, 3=dual ring, 4=123/567+48, 5=12/56+3478, 6=1234/56+78, 7=1234/5678, 8=dual quad, 9=12ph														

PHASE RING ASSIGNMENTS

X = Phase assigned to ring (if used). Phases in different rings but same co-phase group can time together.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RING	Ring 1	**X**	**X**		**X**												
	Ring 2						**X**		**X**								
	Ring 3																
	Ring 4																

CO-PHASE GRP 1-4 ASSIGNMENTS

X = phase assigned to co-phase group. All ph's assigned to rings must be assigned to co-phase group.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CO-PHASE	CO PH 1	**X**	**X**				**X**										
	CO PH 2				**X**				**X**								
	CO PH 3																
	CO PH 4																

CONTROLLER DATA

PHASE RECALLS/MODES; MIN, MAX, etc. (MM-3-1-2-1-PGDN, etc.) USE 1 TO ALL 4 TIMING PLANS

TP1 PHASE RECALLS

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK	X			X				X								
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

TP2 PHASE RECALLS

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK	X			X				X								
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

TP3 PHASE RECALLS

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK	X			X				X								
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

PHASE RECALLS/MODES; CNA, INH MAX, PED OPTIONS, etc. (MM-3-1-2-2) **ONLY 1 PLAN PER UNIT**

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	CNA 1		X				X										
	CNA 2																
	CNA 3																
	CNA 4																
	WRM		X				X										
	INH MAX																
	PED RECY																
	FL WALK																
	FDW->YEL																
	FDW->RED																
	COND PED																

CONTROLLER DATA

PHASE TIMES (MM-3-1-3-PGDN, etc.)

USE 1 TO ALL 4 TIMING PLANS

		TP1															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial	5	20		10		20		10								
	Passage	2.0			3.0				3.0								
	Yellow	3.0	3.7		3.3		3.7		3.3								
	Red	0.0	2.0		2.4		2.0		2.4								
	Walk		10		10		10		10								
	Ped Clr		12		16		12		16								
	Max 1	10	60		26		60		26								
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	Al/Act																
	Max In																

CONTROLLER DATA

TP2

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial	5	20		15		20		15								
	Passage	2.0			3.0				3.0								
	Yellow	3.0	3.7		3.3		3.7		3.3								
	Red	0.0	2.0		2.4		2.0		2.4								
	Walk		10		10		10		10								
	Ped Clr		12		16		12		16								
	Max 1	12	58		26		58		26								
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	Al/Act																
	Max In																

TP3

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial	5	20		10		20		10								
	Passage	2.0			3.0				3.0								
	Yellow	3.0	3.7		3.3		3.7		3.3								
	Red	0.0	2.0		2.4		2.0		2.4								
	Walk		10		10		10		10								
	Ped Clr		12		16		12		16								
	Max 1	12	58		26		58		26								
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	Al/Act																
	Max In																

VEHICLE DETECTOR ASSIGNMENTS (MM-3-1-4-1, PGDN etc.)

(X = ASSIGN VEH DETECTOR TO THAT PHASE)

	DET/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VEH	1	X															
DET	2																
ASSIGN-	3								X								
MENTS	4				X												
	5																
	6																
	7				X												
	8								X								

PED DETECTOR ASSIGNMENTS (MM-3-1-4-2)

(X = ASSIGN PED DETECTOR TO THAT PHASE)

	DET/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PED	1																
DET	2																
ASSIGN-	3																
MENTS	4				X				X								
	5																
	6																
	7																
	8				X				X								

DETECTOR MODES (MM-3-1-4-3)

	DET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VEH DET	Mode	**0**		**0**	**0**				**0**								
MODES																	

DUAL ENTRY (MM-3-1-6)

DUAL ENTRY ENABLE:	**Y**	Y/N: Y=Enable Dual Entry. Note this is only one setting even though it appears on each controller screen.

PG1	PH/CALLS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DUAL	1						**X**										
ENTRY	2						**X**										
ASSIGN-	3								**X**								
MENTS	4								**X**								
	5		**X**														
	6		**X**														
	7				**X**												
	8				**X**												

ENHANCED OPTIONS

DYNAMIC OMITS (MM-3-1-9-1-1)

DYNAM OMITS GP1 ENABLE:	**Y**	Y/N: Y=Enable. Note: This is one setting but appears on each screen. No input rquired for GP1.

(X = ENABLE)

GRP1-1	FUNC/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DYNAM.	OMIT PHS	**X**															
OMITS	IF PH ON		**X**				**X**										
ASSIGN-	OR O/L	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
MENTS	GRN																

SELECTION SOURCE (MM-3-2-2)

Entries determine how parameters get selected

Cycle Source:	**1**	0=TOD, 1=CL, 2=INT
Split Source:	**1**	0=TOD, 1=CL, 2=INT
Offset Source:	**1**	0=TOD, 1=CL, 2=INT

Free Source:	**1**	0=TOD, 1=CL, 2=INT
Flash Source:	**0**	0=TOD, 1=CL, 2=INT
Inter-TOD Revert:	**255**	0-255 SECS

TOD = Time of day control by internal clock, CL = Closed loop (comm), INT = Interconnect. Inter-TOD Revert is time allowed after failed interconnect before unit reverts to TOD (Time Base) control.

COORD BASIC OPTIONS (MM-3-2-3)

Reference to End (vs. begin) of Main St.:	**N**	Y/N: Y = Offset references to end of main st. green. N = Beginning of Main st. green.
Use % (vs. secs) for Phase Allocation:	**N**	Y/N: Y = Phase allocations loaded as percent of 100. N = Allocations in seconds.
Use % (vs. secs) for Offset Entry:	**N**	Y/N: Y = Offset loaded as percent of 100. N = Offset loaded in seconds.
Use Fixed (vs. floating) Force Offs:	**Y**	Y/N: Y = Force offs are fixed to cycle. N=Force offs like max times, begin with green.
Permissive Type:	**0**	0-2: 0=Yield, 1= Single, 2= Multiple. See Permissives note below

C/S TO TIMING PLAN (MM-3-2-9-6)

USE THIS CHART WHEN 4 SPLITS/CYCLE = Y

	CYCLE	1	2	3	4	5	6
SPLIT TO TIME PLAN	SPLIT 1	**1**	**2**	**3**			
	SPLIT 2						
	SPLIT 3						
	SPLIT 4						

(0-4 = TIME PLAN IMPLEMENTED WHEN SPLIT IN EFFECT)

CYCLES & OFFSETS (MM-3-2-4)

NOTE: FIRST SPECIFY OFSET SEEKING MODE AND 4 SPLITS CYCLE MODE (ENHANCED OPTIONS, OPERATING MODES)

	Cycle #	1/1	2/1	3/1	4/1		
CYCLE & OFFSETS	Length	**100**	**120**	**120**			
	Offset 1	**44**	**11**	**11**			
	Offset 2						
	Offset 3						
	Offset 4						
	Offset 5						
	Max Dwell	**32**	**32**	**32**			

COORD PHASES (MM-3-2-5)

	CYCLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COORD PHASES	**1-1**		**X**				**X**										
	2-1		**X**				**X**										
	3-1		**X**				**X**										
	4-1																

OFFSET SEEKING MODE (MM-3-2-7)

Offset Seeking Mode:	**0**

Mode

0 Add only, cycle times 20% slow only to get in sync

1 Dwell, cycle timer stops at cycle 0 up to max dwell time to get in step

2 Short Route, cycle times 20% fast or slow--whichever gets in step fastest

ENHANCED OPTIONS

OPERATING OPTIONS (MM-3-2-9-1)

Enhanced Perm:	**Y**	Y/N: See note	Invert Free In:	**N**	Y/N: See note
Central Override:	**N**	Y/N: See note	Split Matrix:	**N**	Y/N: See note
No PCL Offset Adjust:	**N**	Y/N: See note	4 Splits/Cycle:	**Y**	Y/N: See note
			No Early Coord Ped:	**N**	Y/N: See note

Yield Percent	**1**	0-10%: See note
EGB%	**0**	0-100%: See note
RGB%	**10**	0-100%: See note
# Cycles to out of step:	**0**	0-255: 0=Disable

CYCLE SYNC OPTIONS (MM-3-2-9-2)

Sync Source:	**0**	0-2, 0=TOD/CL/Interconnect, 1= City Zero, 2= Absolute

Charts below only For City Zero offfsets or Absolute (0's). These are not daily reference times for Sync Source Option 0 (see TOD).

Cycle 1:	**0**	Cycle 2:	**0**	Cycle 3:	**0**
Cycle 4:	**0**	Cycle 5:	**0**	Cycle 6:	**0**

MANUAL/AUTO FORCE OFFS & PERMS

SET MANUAL MODE (MM-3-2-9-3-1)

Auto Perm and FO:	**Y**	Y/N: Y = Perms & Force offs auto-calculated from phase allocations. N = Manually entered
Ped Perm:	**0**	0-255: 0 = Auto calculated. 1-255 = secs each ped perm, starting with vehicle permissives

PHASE ALLOCATION (MM-3-2-6)

	ENTRY IN:	Secs	% or Secs: Not a controller entry--for reference only. Controller entry is under basic options.															
PHASE ALLO-CATION	PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	C1 S1	**15**	**51**		**32**		**68**		**32**								
	C1 S2																
	C1 S3																
	C1 S4																
	C2 S1	**18**	**65**		**32**		**80**		**32**								
	C2 S2																
	C2 S3																
	C2 S4																
	C3 S1	**18**	**68**		**32**		**86**		**32**								
	C3 S2																
	C3 S3																
	C3 S4																
	C4 S1																
	C4 S2																
	C4 S3																
	C4 S4																

DAY PLANS (MM-3-3-1-#)

	HH	MM	CIRCUIT PLAN	C	O	S	CKT	ON/OFF
1	00	00					11(FRE)	ON
	06	00					11(FRE)	OFF
	06	00		1	1	1		
	23	00					11(FRE)	ON
2	00	00					11(FRE)	ON
	06	00					11(FRE)	OFF
	06	00		1	1	1		
	06	30		2	1	1		
	11	30		3	1	1		
	20	00		1	1	1		
	23	00					11(FRE)	ON

WEEK PLANS (MM-3-3-3)

Plan	SUN	MON	TUE	WED	THU	FRI	SAT
1	1	2	2	2	2	2	1
2							
3							
4							
5							

CIRCUIT OVERRIDES (MM-3-3-6)

For each ciruit specify TOD (time of day controlled), or manually ON or OFF. Default = TOD

CIRCUIT OVER-RIDES	Circuit	65	66	67	68	69	70	71	72
	Function	LL1	LL2	LL3	LL4	LL5	LL6	LL7	LL8
	State								
	Circuit	**73**	74	75	76	**77**	78	79	80
	Function	**CN1**	CN2	CN3	CN4	**WRM**	MIN	DIM	CVS
	State	**ON**				**ON**			

DAYLIGHT SAVINGS (MM-3-3-7)

DAY LIGHT SAVINGS	Spring		Fall	
	(0-12)	(0-5)	(0-12)	(0-5)
	Month	WOM	Month	WOM
	3	**2**	**11**	**1**

Enter Month and Week of Month for Spring Forward and Fall Back days (typical 4 - 1 and 10 - 5). Unit will adjust at 2AM on Sunday of week specified. Enter zero (or leave blank) if Daylight Savings not used.

SYNC REFERENCE MODE (MM-3-3-8)

Mode:	**0**	0 = Time dependent, 1 = C/O/S Event

	HH	MM	
Time Clock Reset:	**00**	**00**	TOD clock reset to by TBC input
Interrupter:		**N**	Y/N; Y = Interrupter pulses provided
Pulses:		**0**	0-6 = Number of interrupter pulses

TIME DEPENDENT CYCLE REFERENCES		HH	MM		HH	MM		HH	MM
	CYC 1:	**00**	**00**	CYC 2:	**00**	**00**	CYC 3:	**00**	**00**
	CYC 4:			CYC 5:			CYC 6:		

When mode = Time dependent, enter reference times of day for each cycle. Default = 00:00 = midnight = most commonly used reference.
When mode = C/O/S Event, cycle restarts on each COS change. Only use this mode for specific reasons. Time dependent most common used mode.

CLOSED LOOP ID (MM-3-5-1)

CLOSED LOOP ID	Master Type:	**1**	0 = None, 1 = 3000 Series Master, 2 = 3800 EL master
	Intersection ID		0-255
	Master Identification		0-255
	Allow Comm Xfer Between Ports 2 & 3		Y/N: Y = Incoming signal on Master port (2 or 3), gets echo'd on other port

COMM SET-UP (MM-3-5-2)

PG1 PORT ASSIGN	Master (CL) Port:		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used to receive Master Comm)
	Monitor Port		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used for Monitor Data Upload)
	Central Port:		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used for Direct Dial-up Modem)

PG2 PORT 2 SETUP	Data Rate:		1200, 2400, 4800, 9600, 14400, 19200
	Parity		0 = None, 1 = Odd, 2=Even
	Data bits		0 = 7 bits, 1 = 8 bits

PG3 PORT 3 SETUP	Data Rate:		1200, 2400, 4800, 9600, 14400, 19200
	Parity		0 = None, 1 = Odd, 2=Even
	Data bits		0 = 7 bits, 1 = 8 bits

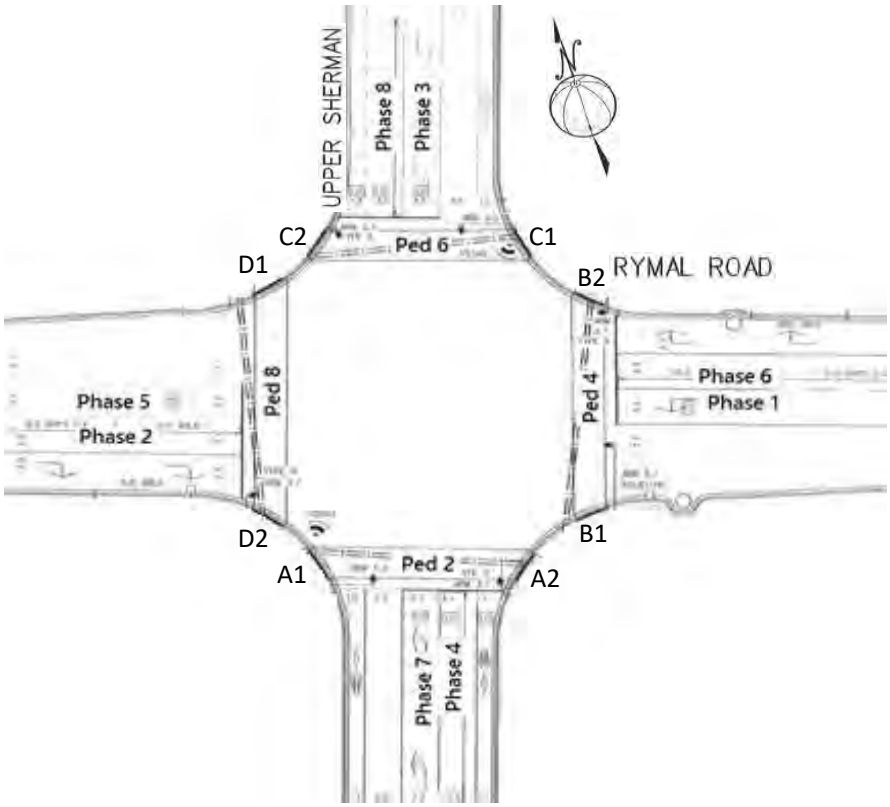
PG4	Modem Set-up String:		Up to 40 charaters; A-Z, or # @ = , ! ; % \ &

PHONE NUMBERS (MM-3-5-3)

PHONE NUM-BERS	Tone:		Y/N
	Phone 1:		Number & control characters (W , ; # ' / T P) if used
	Phone 2:		Number & control characters (W , ; # ' / T P) if used

City of Hamilton - Traffic
Traffic Signal Controller Timing Data

Intersection:	**Rymal Rd @ Upper Sherman Ave - Int #459**		
Controller Type:	**Intelight D4**	Revision:	**10032**
Programmed By:	**DLB/GD**	Installed By:	
Date:	**31-Aug-20**	Date:	14-SEPT-20
Reason for Timing Change:	**Added south leg of intersection/TS2 Cabinet**		
Communication:	**Radio**	System:	**KITS**
Operation Type:	**Fixed**	UPS:	
APS:	**Yes**	IP Address:	**10.240.101.53**



- ϕ1: **Rymal - WBLT**
- ϕ2: **Rymal - EB, South Xwalk**
- ϕ3: **Upper Sherman - SBLT**
- ϕ4: **Upper Sherman - NB, East Xwalk**
- ϕ5: **Rymal - EBLT**
- ϕ6: **Rymal - WB, North Xwalk**
- ϕ7: **Upper Sherman - NBLT**
- ϕ8: **Upper Sherman - SB, West Xwalk**

Flash Operation: Red/Red

Rymal @ Upper Sherman

Phase Timing

9/3/2020 4:05:32 PM

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Green	5	20	5	10	5	20	5	10	0	0	0	0	0	0	0	0
Veh Ext	1.0	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Green 1	10	80	10	30	10	80	10	30	0	0	0	0	0	0	0	0
Max Green 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Green 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Ext	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow	3.0	3.7	3.0	3.3	3.0	3.7	3.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Clr	0.0	2.4	0.0	3.0	0.0	2.4	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Adv Flash	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bike MG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	12	0	12	0	12	0	12	0	0	0	0	0	0	0	0
Ped Clr	0	12	0	16	0	12	0	16	0	0	0	0	0	0	0	0
Walk2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sol DW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early Wlk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Wlk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Initial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Min Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduce After	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TTReduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Max Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Revert	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neg Ped	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AP Disc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Ped Clr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Return Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rymal @ Upper Sherman

Phase Options

8/31/2020 10:55:15 AM

Phases	1-8								9-16							
Min Recalls																
Max Recalls		2		4		6		8								
Ped Recalls		2		4		6		8								
Soft Recall																
Dual Entry		2		4		6		8								
Red Rest																
Walk Rest		2		4		6		8								
Walk Expand																
Ped Recycle																
Sim Ped Term																
PC Thru Clr																
Guar Passage																
No Simult Gap																
Yel Lock																
Red Lock																
PhaseNext Lock	1	2	3	4	5	6	7	8								
No Term Call	1	2	3	4	5	6	7	8								
Cond Serv																
CS Enable																
Cond Reserve																
Reserve																
Veh Omit																
Ped Omit																
Perm Phase		2		4		6		8								
Protect Calls																
Protect Calls 2																
Flash Entry																
Flash Exit																
Flash Exit Yel																
Flash Exit Red																
Ped Scramble																
No Min Yel																
No Min Red Rev																
Max Scramble Walk																
Flash Yellow																
Flash FYA																
CNA 1																
CNA 2																

Rymal @ Upper Sherman

Phase Startup Options

8/31/2020 10:55:15 AM

Startup Flash	10	Mode	Yel->Red
Startup All Red	5	Yellow	0.0

Phases	1-8							9-16							
Startup Phases				4			8								
Startup Yellow															
Startup Red				4			8								
Startup No Walk															
Startup Next															
Startup Yel Fls															
Startup FYA															
No Veh Call															
No Ped Call															

Phase Startup Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Start Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Max Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Unit

Red Revert	4.0	Ped Protect	No	AdvFls in Flash	No

Rymal @ Upper Sherman

Ring Sequence / Conflicting Phases

8/31/2020 10:55:15 AM

Ringgroup 1

Ring 1	1	2	3	4	0	0	0	0	0	0	0	0	0	0	0	0
Ring 2	5	6	7	8	0	0	0	0	0	0	0	0	0	0	0	0

Ringgroup 2

Custom Sequences

Seq 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Conflicting Phases

	1-8							9-16							
Phase 1															
Phase 2															
Phase 3															
Phase 4															
Phase 5															
Phase 6															
Phase 7															
Phase 8															
Phase 9															
Phase 10															
Phase 11															
Phase 12															
Phase 13															
Phase 14															
Phase 15															
Phase 16															

Rymal @ Upper Sherman

Coordination Options

8/31/2020 10:55:15 AM

Sync Time	00:00	RTC Set Time	00:00
Transition Mode	Best 2	Ped Adjust	None
Trans Short %	15	Trans Long %	25
Offset Reference	Lag Grn	Short Cycles	0
Dual Entry	Normal	Overlap F/O	Disabled
Master Sync Mode	RTC	Master Sync Length	0
Adapt Thresh	0	Adapt Step	0
External Plan Max	0		
Hardwire No Match	Sched	Hardwire Sync Fail	0
Override Omit/Recall	No		

Phases	1-8	9-16
No Trans Recall		
Trans Ped Recall		
Trans Phases		

Rymal @ Upper Sherman

Coordination Pattern 1

8/31/2020 10:55:15 AM

Cycle	100	Ringgroup 1 - Offset 1	64	Offset 2	0	Offset 3	0
		Ringgroup 2 - Offset 1	0	Offset 2	0	Offset 3	0

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Splits	9	46	9	36	9	46	9	36	0	0	0	0	0	0	0	0
Split Ext	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Float Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perm Min Green	8	12	8	12	8	12	8	12	0	0	0	0	0	0	0	0
Min Trans Split	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Trans Split	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA Before	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA After	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Permissive Mode	Sing Band	Max Mode	Max Inh	Walk Rest	Opp Call
Ped Permissive	Yield				
Permissive Limit	1	Perm 2 Start	0	Perm 2 End	0
Alt Sequence		TOD Link	0		

Phases/Overlaps	1-8								9-16							
Coord Phases		2				6										
No Extend																
Float Enable																
Veh = Ped Perm																
Walk Rest																
Ped Recall																
Cond Ped Call																
Olap Ped Recall																
Ped Recycle																
Min Recall																
Max Recall																
Cond Serv																
Reservice																
Veh Omit																
Ped Omit																
Olap Omit																
Perm Reserve																
Perm 1 Phases																
Max Inhibit																
FYA Omit																
Adapt Phases																

Trans Mode	Default
Offset Ref	Default
Adaptive Mode	Disabled

Disable Priority	
Progression Phases	
Priority Alt Seq	
Reserve Extend	

Priority Timing-Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Priority Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recovery Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rymal @ Upper Sherman

Coordination Pattern 2

8/31/2020 10:55:15 AM

Cycle	120	Ringgroup 1 - Offset 1	0	Offset 2	0	Offset 3	0
		Ringgroup 2 - Offset 1	0	Offset 2	0	Offset 3	0

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Splits	9	66	9	36	9	66	9	36	0	0	0	0	0	0	0	0
Split Ext	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Float Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perm Min Green	8	12	8	12	8	12	8	12	0	0	0	0	0	0	0	0
Min Trans Split	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Trans Split	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA Before	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA After	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Permissive Mode	Sing Band	Max Mode	Max Inh	Walk Rest	Opp Call
Ped Permissive	Yield				
Permissive Limit	1	Perm 2 Start	0	Perm 2 End	0
Alt Sequence		TOD Link	0		

Phases/Overlaps	1-8								9-16							
Coord Phases		2				6										
No Extend																
Float Enable																
Veh = Ped Perm																
Walk Rest																
Ped Recall																
Cond Ped Call																
Olap Ped Recall																
Ped Recycle																
Min Recall																
Max Recall																
Cond Serv																
Reservice																
Veh Omit																
Ped Omit																
Olap Omit																
Perm Reserve																
Perm 1 Phases																
Max Inhibit																
FYA Omit																
Adapt Phases																

Trans Mode	Default
Offset Ref	Default
Adaptive Mode	Disabled

Disable Priority		
Progression Phases		
Priority Alt Seq		
Reserve Extend		

Priority Timing-Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Priority Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recovery Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rymal @ Upper Sherman

Coordination Pattern 3

8/31/2020 10:55:15 AM

Cycle	120	Ringgroup 1 - Offset 1	0	Offset 2	0	Offset 3	0
		Ringgroup 2 - Offset 1	0	Offset 2	0	Offset 3	0

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Splits	9	66	9	36	9	66	9	36	0	0	0	0	0	0	0	0
Split Ext	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Float Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perm Min Green	8	12	8	12	8	12	8	12	0	0	0	0	0	0	0	0
Min Trans Split	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Trans Split	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA Before	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA After	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Permissive Mode	Sing Band	Max Mode	Max Inh	Walk Rest	Opp Call
Ped Permissive	Yield				
Permissive Limit	1	Perm 2 Start	0	Perm 2 End	0
Alt Sequence		TOD Link	0		

Phases/Overlaps	1-8								9-16							
Coord Phases		2				6										
No Extend																
Float Enable																
Veh = Ped Perm																
Walk Rest																
Ped Recall																
Cond Ped Call																
Olap Ped Recall																
Ped Recycle																
Min Recall																
Max Recall																
Cond Serv																
Reservice																
Veh Omit																
Ped Omit																
Olap Omit																
Perm Reserve																
Perm 1 Phases																
Max Inhibit																
FYA Omit																
Adapt Phases																

Trans Mode	Default
Offset Ref	Default
Adaptive Mode	Disabled

Disable Priority		
Progression Phases		
Priority Alt Seq		
Reserve Extend		

Priority Timing-Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Priority Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recovery Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rymal @ Upper Sherman

TOD Pattern Events

8/31/2020 10:55:15 AM

	Time	DOW							Holidays								Mode	Pattern	Offset
Event 1	00:00	S	M	T	W	T	F	S									Free	0	0
Event 2	09:00	S						S									Sched	1	1
Event 3	20:00	S						S									Free	0	0
Event 4	06:30		M	T	W	T	F										Sched	2	1
Event 5	11:30		M	T	W	T	F										Sched	3	1
Event 6	20:00		M	T	W	T	F										Sched	1	1
Event 7	23:00		M	T	W	T	F										Free	0	0
Event 8	00:00																Sched	0	0
Event 9	00:00																Sched	0	0
Event 10	00:00																Sched	0	0
Event 11	00:00																Sched	0	0
Event 12	00:00																Sched	0	0
Event 13	00:00																Sched	0	0
Event 14	00:00																Sched	0	0
Event 15	00:00																Sched	0	0
Event 16	00:00																Sched	0	0
Event 17	00:00																Sched	0	0
Event 18	00:00																Sched	0	0
Event 19	00:00																Sched	0	0
Event 20	00:00																Sched	0	0
Event 21	00:00																Sched	0	0
Event 22	00:00																Sched	0	0
Event 23	00:00																Sched	0	0
Event 24	00:00																Sched	0	0
Event 25	00:00																Sched	0	0
Event 26	00:00																Sched	0	0
Event 27	00:00																Sched	0	0
Event 28	00:00																Sched	0	0
Event 29	00:00																Sched	0	0
Event 30	00:00																Sched	0	0
Event 31	00:00																Sched	0	0
Event 32	00:00																Sched	0	0

Rymal @ Upper Sherman

Detector Inputs (BIU 9)

8/31/2020 10:55:15 AM

	Det 1	Det 2	Det 3	Det 4	Det 5	Det 6	Det 7	Det 8
Function	VehDet	None	VehDet	None	VehDet	None	VehDet	None
Index	1	0	3	0	5	0	7	0
	Det 9	Det 10	Det 11	Det 12	Det 13	Det 14	Det 15	Det 16
Function	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

Detector Inputs (BIU 10)

	Det 17	Det 18	Det 19	Det 20	Det 21	Det 22	Det 23	Det 24
Function	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0
	Det 25	Det 26	Det 27	Det 28	Det 29	Det 30	Det 31	Det 32
Function	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

Rymal @ Upper Sherman

Detector Inputs (BIU 11)

8/31/2020 10:55:15 AM

	Det 33	Det 34	Det 35	Det 36	Det 37	Det 38	Det 39	Det 40
Function	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0
	Det 41	Det 42	Det 43	Det 44	Det 45	Det 46	Det 47	Det 48
Function	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

Detector Inputs (BIU 12)

	Det 49	Det 50	Det 51	Det 52	Det 53	Det 54	Det 55	Det 56
Function	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0
	Det 57	Det 58	Det 59	Det 60	Det 61	Det 62	Det 63	Det 64
Function	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

Rymal @ Upper Sherman

T/F Inputs (BIU 1)

8/31/2020 10:55:15 AM

	I/O 14	I/O 15	I/O 16	I/O 17	I/O 18	I/O 19	I/O 20	I/O 21
Input	Preempt	Preempt	None	None	AutoFlash	None	ManCtrl	IntAdv
Index	1	2	0	0	5	0	5	5
	I/O 22	I/O 23	I/O 24	IN 1	IN 2	IN 3	IN 4	IN 5
Input	MinRec	ExtStr	None	StopTm	StopTm	MaxII	MaxII	Force
Index	5	5	0	5	5	1	2	1
	IN 6	IN 7	IN 8	OPTO 1	OPTO 2	OPTO 3	OPTO 4	
Input	Force	None	None	PedDet	PedDet	PedDet	PedDet	
Index	2	0	0	1	2	3	4	

T/F Inputs (BIU 2)

	I/O 16	I/O 17	I/O 18	I/O 19	I/O 20	I/O 21	I/O 22	I/O 23
Input	Preempt	Preempt	Preempt	Preempt	None	None	None	None
Index	3	4	5	6	0	0	0	0
	I/O 24	IN 1	IN 2	IN 3	IN 4	IN 5	IN 6	IN 7
Input	None	MaxInh	MaxInh	LocFlash	MMUFlash	Alarm	Alarm	None
Index	0	1	2	5	5	1	2	0
	IN 8	OPTO 1	OPTO 2	OPTO 3	OPTO 4			
Input	None	PedDet	PedDet	PedDet	PedDet			
Index	0	5	6	7	8			

Rymal @ Upper Sherman

T/F Inputs (BIU 3)

8/31/2020 10:55:15 AM

	I/O 7	I/O 8	I/O 9	I/O 10	I/O 11	I/O 12	I/O 13	I/O 14
Input	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

	I/O 15	I/O 16	I/O 17	I/O 18	I/O 19	I/O 20	I/O 21	I/O 22
Input	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

	I/O 23	I/O 24	IN 1	IN 2	IN 3	IN 4	IN 5	IN 6
Input	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

	IN 7	IN 8	OPTO 1	OPTO 2	OPTO 3	OPTO 4
Input	None	None	None	None	None	None
Index	0	0	0	0	0	0

T/F Inputs (BIU 4)

	I/O 10	I/O 11	I/O 12	I/O 13	I/O 14	I/O 15	I/O 16	I/O 17
Input	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

	I/O 18	I/O 19	I/O 20	I/O 21	I/O 22	I/O 23	I/O 24	IN 1
Input	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

	IN 2	IN 3	IN 4	IN 5	IN 6	IN 7	IN 8	OPTO 1
Input	None	None	None	None	None	None	None	None
Index	0	0	0	0	0	0	0	0

	OPTO 2	OPTO 3	OPTO 4
Input	None	None	None
Index	0	0	0

Rymal @ Upper Sherman

Vehicle Detector 1

8/31/2020 10:55:15 AM

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Enabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	1	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	1	
XSwitch Phases		
Bike Call Phases		

Vehicle Detector 3

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Enabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	3	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	3	
XSwitch Phases		
Bike Call Phases		

Rymal @ Upper Sherman

Vehicle Detector 5

8/31/2020 10:55:15 AM

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Enabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8								9-16							
Call Phases					5											
Yellow Lock Phases																
Red Lock Phases																
Extend Phases					5											
XSwitch Phases																
Bike Call Phases																

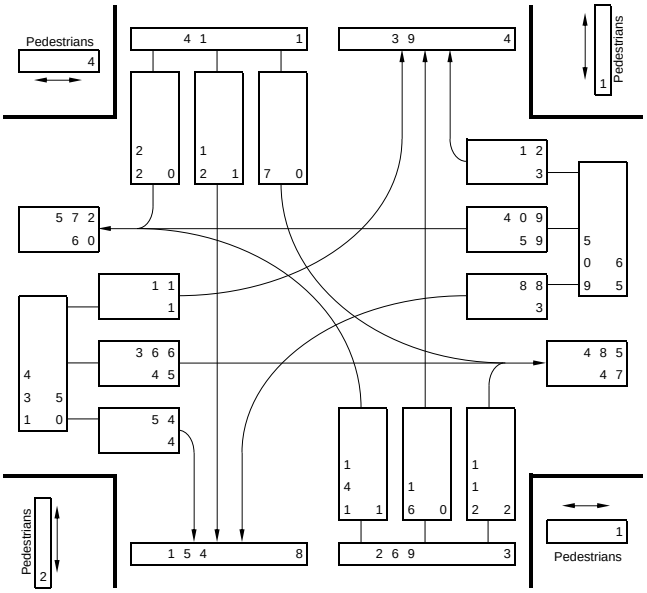
Vehicle Detector 7

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Enabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

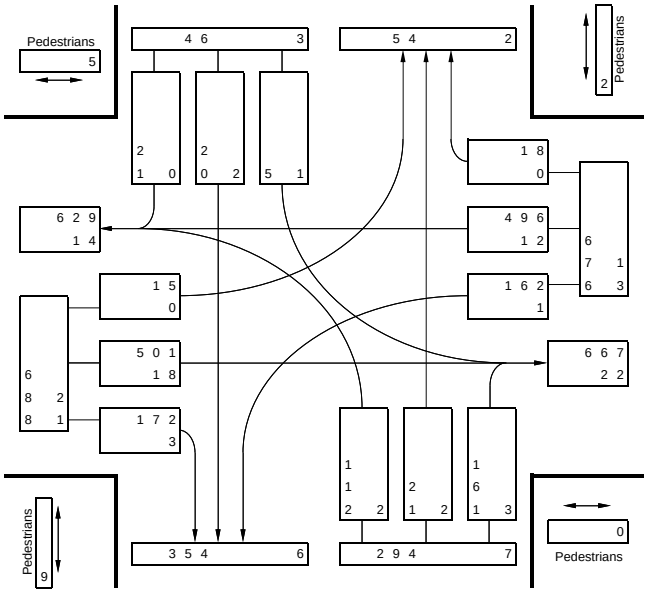
Phases	1-8								9-16							
Call Phases							7									
Yellow Lock Phases																
Red Lock Phases																
Extend Phases							7									
XSwitch Phases																
Bike Call Phases																

City of Hamilton **TURNING MOVEMENT FLOW CHART** Loc. Code: 7442

Intersection: **Rymal Rd E** **at** **Eva St / Miles Rd** Total Vehicles: 9,370 Date: Wednesday
Direction: (East/West) (North/South) M.V.E./Year: 6.658 Nov 27, 2019
Road Condition: Wet Weather: Overcast AWDT Factor: 2.09 Period: 7 hours
Comments:

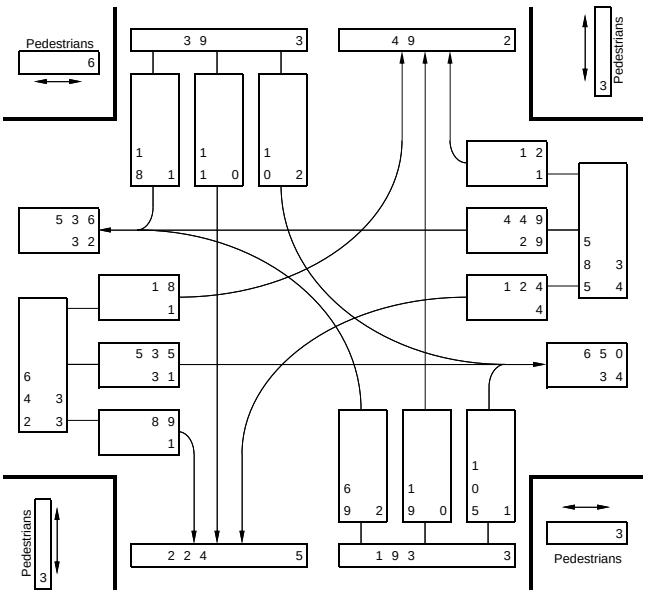


A.M. PEAK HOUR = 8:30 AM - 9:30 AM

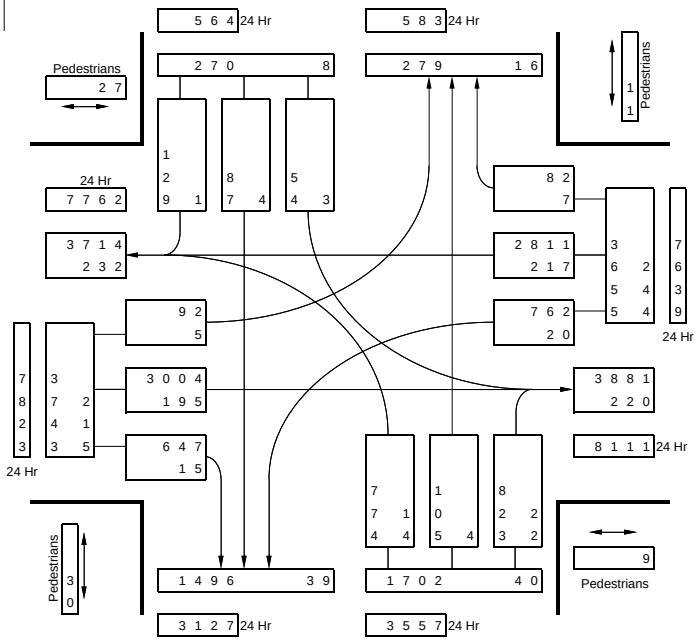


P.M. PEAK HOUR = 4:15 PM - 5:15 PM

N



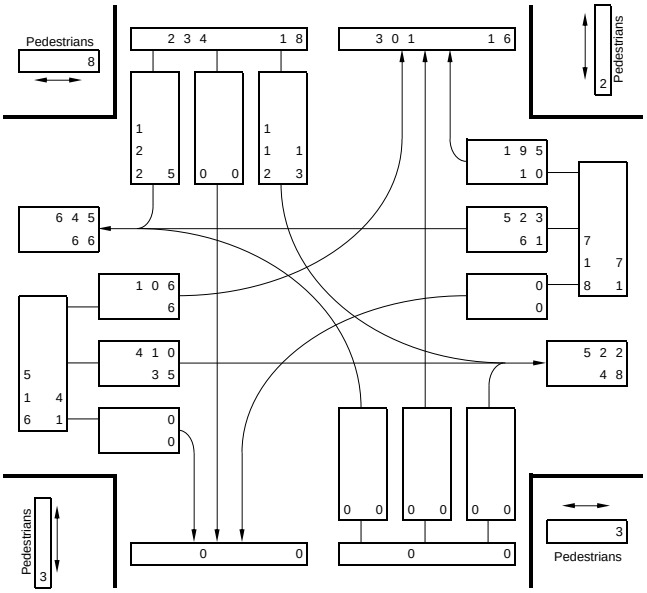
NORMAL HOUR = 2:30 PM - 3:30 PM



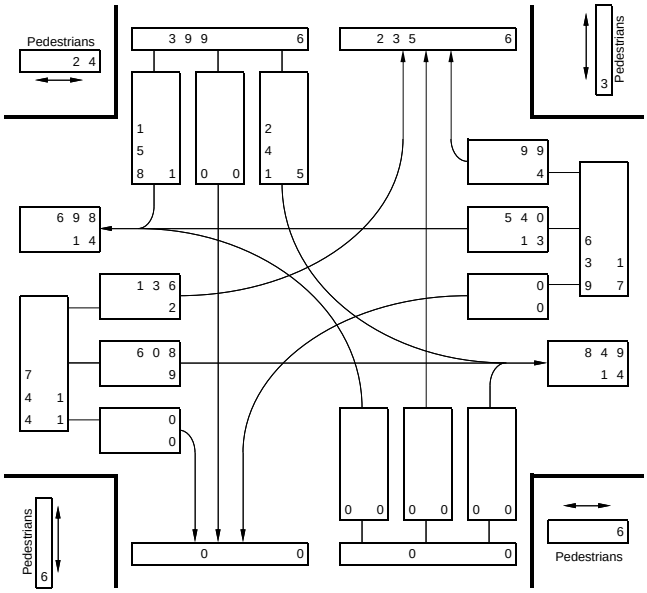
7 Hr & 24 Hr TOTAL VOLUMES

City of Hamilton **TURNING MOVEMENT FLOW CHART** Loc. Code: 6552

Intersection: **Rymal Rd E** **at** **Upper Sherman Ave** Total Vehicles: 9,787 Date: Monday
Direction: (East/West) (North/South) M.V.E./Year: 7.321 Apr 1, 2019
Road Condition: Dry Weather: Clear AWDT Factor: 2.2 Period: 7 hours
Comments:

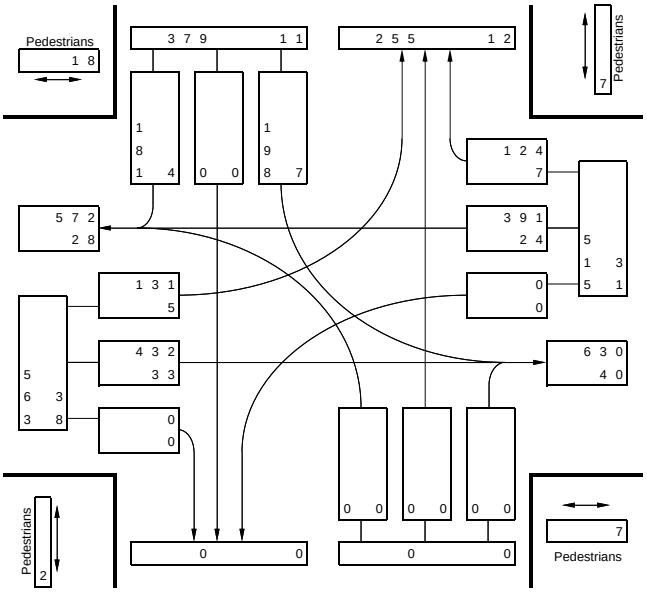


A.M. PEAK HOUR = 8:00 AM - 9:00 AM

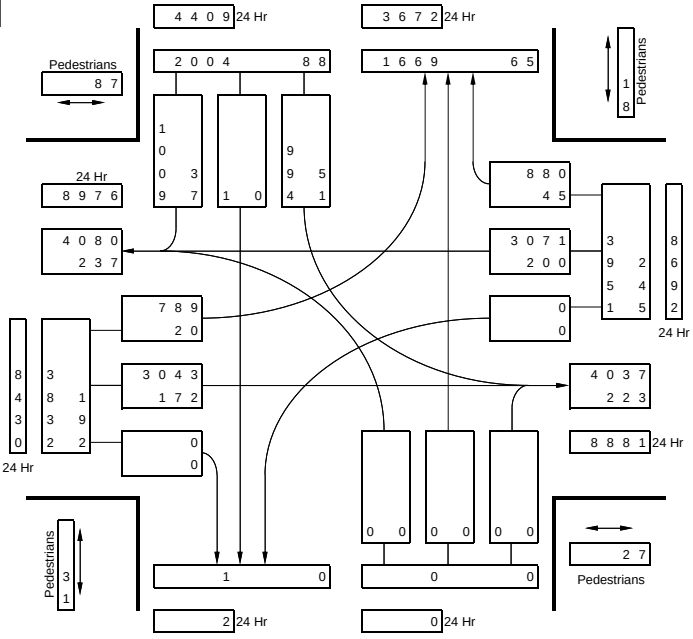


P.M. PEAK HOUR = 5:00 PM - 6:00 PM

N



NORMAL HOUR = 2:30 PM - 3:30 PM



7 Hr & 24 Hr TOTAL VOLUMES

Appendix C

Existing Traffic Operational Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	418	0	0	533	199	0	0	0	114	0	124
Future Volume (vph)	108	418	0	0	533	199	0	0	0	114	0	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0		0.0	10.0		0.0	35.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	10.0			10.0			35.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99					1.00	0.97	
Frt					0.959						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1703	1743	0	1863	1637	0	1863	1863	0	1612	1512	0
Flt Permitted	0.105									0.757		
Satd. Flow (perm)	188	1743	0	1863	1637	0	1863	1863	0	1279	1512	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					23						384	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		346.4			337.1			211.7			222.2	
Travel Time (s)		24.9			24.3			15.2			16.0	
Confl. Peds. (#/hr)	8					8				2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	2%	12%	5%	2%	2%	2%	12%	2%	4%
Adj. Flow (vph)	117	454	0	0	579	216	0	0	0	124	0	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	454	0	0	795	0	0	0	0	124	135	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes						Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Minimum Split (s)	9.5	30.1		22.5	30.1		9.5	34.3		22.5	34.3	
Total Split (s)	9.0	66.0		9.0	66.0		9.0	36.0		9.0	36.0	
Total Split (%)	7.5%	55.0%		7.5%	55.0%		7.5%	30.0%		7.5%	30.0%	
Maximum Green (s)	6.0	59.9		6.0	59.9		6.0	29.7		6.0	29.7	
Yellow Time (s)	3.0	3.7		3.0	3.7		3.0	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	1.0	-2.1		1.0	-2.1		1.0	-2.3		1.0	-2.3	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		12.0			12.0			12.0			12.0	
Flash Dont Walk (s)		12.0			12.0			16.0			16.0	
Pedestrian Calls (#/hr)		0			0			0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	67.0	62.0			62.0					37.0	32.0	
Actuated g/C Ratio	0.56	0.52			0.52					0.31	0.27	
v/c Ratio	0.70	0.50			0.93					0.30	0.20	
Control Delay	34.9	21.4			44.8					31.8	0.6	
Queue Delay	0.0	0.0			0.0					0.0	0.0	
Total Delay	34.9	21.4			44.8					31.8	0.6	
LOS	C	C			D					C	A	
Approach Delay		24.2			44.8						15.6	
Approach LOS		C			D						B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 130			
Control Type: Pretimed			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 32.9		Intersection LOS: C	
Intersection Capacity Utilization 79.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Rymal Rd E & Upper Sherman Ave

Queues
200558

1: Rymal Rd E & Upper Sherman Ave
Base 2020 AM Peak Hour

Lane Group	EBL	EBT	WBT	SBL	SBT
Lane Group Flow (vph)	117	454	795	124	135
v/c Ratio	0.70	0.50	0.93	0.30	0.20
Control Delay	34.9	21.4	44.8	31.8	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	21.4	44.8	31.8	0.6
Queue Length 50th (m)	12.0	71.0	172.9	21.8	0.0
Queue Length 95th (m)	#27.4	100.8	#263.7	37.5	0.0
Internal Link Dist (m)		322.4	313.1		198.2
Turn Bay Length (m)	10.0			35.0	
Base Capacity (vph)	168	900	856	408	684
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.70	0.50	0.93	0.30	0.20

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
200558

1: Rymal Rd E & Upper Sherman Ave
Base 2020 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	418	0	0	533	199	0	0	0	114	0	124
Future Volume (vph)	108	418	0	0	533	199	0	0	0	114	0	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0					4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00					1.00	1.00	
Frpb, ped/bikes	1.00	1.00			0.99					1.00	0.97	
Flpb, ped/bikes	1.00	1.00			1.00					1.00	1.00	
Frt	1.00	1.00			0.96					1.00	0.85	
Flt Protected	0.95	1.00			1.00					0.95	1.00	
Satd. Flow (prot)	1703	1743			1638					1606	1512	
Flt Permitted	0.11	1.00			1.00					0.76	1.00	
Satd. Flow (perm)	189	1743			1638					1280	1512	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	454	0	0	579	216	0	0	0	124	0	135
RTOR Reduction (vph)	0	0	0	0	11	0	0	0	0	0	99	0
Lane Group Flow (vph)	117	454	0	0	784	0	0	0	0	124	36	0
Confl. Peds. (#/hr)	8					8				2		3
Heavy Vehicles (%)	6%	9%	2%	2%	12%	5%	2%	2%	2%	12%	2%	4%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	65.9	59.9			59.9					35.7	29.7	
Effective Green, g (s)	63.9	62.0			62.0					33.7	32.0	
Actuated g/C Ratio	0.53	0.52			0.52					0.28	0.27	
Clearance Time (s)	3.0	6.1			6.1					3.0	6.3	
Lane Grp Cap (vph)	163	900			846					373	403	
v/s Ratio Prot	c0.03	0.26			c0.48					c0.01	0.02	
v/s Ratio Perm	0.35									c0.08		
v/c Ratio	0.72	0.50			0.93					0.33	0.09	
Uniform Delay, d1	23.0	19.0			26.9					33.7	33.1	
Progression Factor	1.00	1.00			1.00					1.00	1.00	
Incremental Delay, d2	23.7	2.0			17.5					2.4	0.4	
Delay (s)	46.7	21.0			44.4					36.1	33.5	
Level of Service	D	C			D					D	C	
Approach Delay (s)		26.2			44.4			0.0			34.7	
Approach LOS		C			D			A			C	

Intersection Summary

HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	452	67	90	524	12	181	16	114	7	12	27
Future Volume (vph)	13	452	67	90	524	12	181	16	114	7	12	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	10.0			10.0			7.5			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00			1.00			0.99		1.00	0.98	
Frt		0.981			0.997			0.950			0.896	
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1656	1668	0	1752	1657	0	0	1716	0	1805	1631	0
Flt Permitted	0.422			0.320				0.796		0.574		
Satd. Flow (perm)	729	1668	0	590	1657	0	0	1400	0	1089	1631	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			2			24			29	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		337.1			241.5			242.2			85.9	
Travel Time (s)		24.3			17.4			17.4			6.2	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	12%	7%	3%	14%	25%	1%	0%	2%	0%	8%	0%
Adj. Flow (vph)	14	491	73	98	570	13	197	17	124	8	13	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	564	0	98	583	0	0	338	0	8	42	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	27.7	27.7		9.5	27.7		31.7	31.7		31.7	31.7	
Total Split (s)	65.0	65.0		18.0	83.0		32.0	32.0		32.0	32.0	
Total Split (%)	56.5%	56.5%		15.7%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	59.3	59.3		15.0	77.3		26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	-1.7	-1.7		1.0	-1.7			-1.7		-1.7	-1.7	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	0.2	0.2		2.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	69.6	69.6		79.2	79.2			27.8		27.8	27.8	
Actuated g/C Ratio	0.61	0.61		0.69	0.69			0.24		0.24	0.24	
v/c Ratio	0.03	0.56		0.21	0.51			0.95		0.03	0.10	
Control Delay	10.0	16.2		7.1	10.5			76.7		33.7	16.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	10.0	16.2		7.1	10.5			76.7		33.7	16.9	
LOS	A	B		A	B			E		C	B	
Approach Delay		16.0			10.0			76.7			19.6	
Approach LOS		B			B			E			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 11 (10%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 26.1		Intersection LOS: C	
Intersection Capacity Utilization 79.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Miles Rd/Eva St & Rymal Rd E

Queues
2: Miles Rd/Eva St & Rymal Rd E

200558
Base 2020 AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	14	564	98	583	338	8	42
v/c Ratio	0.03	0.56	0.21	0.51	0.95	0.03	0.10
Control Delay	10.0	16.2	7.1	10.5	76.7	33.7	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	16.2	7.1	10.5	76.7	33.7	16.9
Queue Length 50th (m)	1.3	73.5	6.9	59.8	74.1	1.5	2.4
Queue Length 95th (m)	4.2	110.4	12.6	85.8	#132.7	5.7	11.8
Internal Link Dist (m)		313.1		217.5	218.2		61.9
Turn Bay Length (m)	20.0		20.0			20.0	
Base Capacity (vph)	440	1012	547	1141	359	265	419
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.56	0.18	0.51	0.94	0.03	0.10

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
2: Miles Rd/Eva St & Rymal Rd E

200558
Base 2020 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	452	67	90	524	12	181	16	114	7	12	27
Future Volume (vph)	13	452	67	90	524	12	181	16	114	7	12	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.95		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1642	1667		1751	1656			1710		1802	1632	
Flt Permitted	0.42	1.00		0.32	1.00			0.80		0.57	1.00	
Satd. Flow (perm)	729	1667		591	1656			1402		1090	1632	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	491	73	98	570	13	197	17	124	8	13	29
RTOR Reduction (vph)	0	4	0	0	1	0	0	18	0	0	22	0
Lane Group Flow (vph)	14	560	0	98	582	0	0	320	0	8	20	0
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Heavy Vehicles (%)	9%	12%	7%	3%	14%	25%	1%	0%	2%	0%	8%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	67.9	67.9		77.5	77.5			26.1		26.1	26.1	
Effective Green, g (s)	69.6	69.6		76.5	79.2			27.8		27.8	27.8	
Actuated g/C Ratio	0.61	0.61		0.67	0.69			0.24		0.24	0.24	
Clearance Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Vehicle Extension (s)	0.2	0.2		2.0	0.2			3.0		3.0	3.0	
Lane Grp Cap (vph)	441	1008		449	1140			338		263	394	
v/s Ratio Prot		c0.34		0.01	c0.35						0.01	
v/s Ratio Perm	0.02			0.13				c0.23		0.01		
v/c Ratio	0.03	0.56		0.22	0.51			0.95		0.03	0.05	
Uniform Delay, d1	9.1	13.5		8.9	8.6			42.9		33.3	33.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.2		0.1	1.6			34.8		0.0	0.1	
Delay (s)	9.3	15.7		9.0	10.2			77.6		33.4	33.5	
Level of Service	A	B		A	B			E		C	C	
Approach Delay (s)		15.6			10.1			77.6			33.5	
Approach LOS		B			B			E			C	

Intersection Summary				
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	79.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Intersection: 1: Rymal Rd E & Upper Sherman Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	TR
Maximum Queue (m)	20.8	252.0	288.4	48.7	45.0
Average Queue (m)	17.4	128.7	177.3	20.3	17.1
95th Queue (m)	23.9	249.7	293.0	38.9	34.3
Link Distance (m)		336.0	316.0		211.8
Upstream Blk Time (%)		1	1		
Queuing Penalty (veh)		0	5		
Storage Bay Dist (m)	10.0			35.0	
Storage Blk Time (%)	69	38	49	3	1
Queuing Penalty (veh)	289	41	0	4	1

Intersection: 2: Miles Rd/Eva St & Rymal Rd E

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (m)	22.8	147.3	29.9	119.0	122.1	9.7	23.7
Average Queue (m)	3.1	56.1	14.5	52.1	67.0	2.1	7.7
95th Queue (m)	14.0	114.9	29.6	107.0	108.5	8.1	18.2
Link Distance (m)		316.0		231.1	231.8		75.5
Upstream Blk Time (%)				0			
Queuing Penalty (veh)				0			
Storage Bay Dist (m)	20.0		20.0			20.0	
Storage Blk Time (%)	0	20	2	18			1
Queuing Penalty (veh)	0	3	10	16			0

Network Summary

Network wide Queuing Penalty: 368

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	620	0	0	551	101	0	0	0	161	0	246
Future Volume (vph)	139	620	0	0	551	101	0	0	0	161	0	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0		0.0	10.0		0.0	35.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	10.0			10.0			35.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99					1.00	0.97	
Frt					0.977						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1787	1881	0	1900	1803	0	1900	1900	0	1770	1557	0
Flt Permitted	0.169									0.757		
Satd. Flow (perm)	318	1881	0	1900	1803	0	1900	1900	0	1404	1557	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					11						374	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		346.4			337.1			211.7			222.2	
Travel Time (s)		24.9			24.3			15.2			16.0	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	0%	0%	2%	4%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	151	674	0	0	599	110	0	0	0	175	0	267
Shared Lane Traffic (%)												
Lane Group Flow (vph)	151	674	0	0	709	0	0	0	0	175	267	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes						Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Minimum Split (s)	9.0	30.1		22.5	30.1		11.0	34.3		22.5	34.3	
Total Split (s)	9.0	66.0		9.0	66.0		9.0	36.0		9.0	36.0	
Total Split (%)	7.5%	55.0%		7.5%	55.0%		7.5%	30.0%		7.5%	30.0%	
Maximum Green (s)	6.0	59.9		6.0	59.9		6.0	29.7		6.0	29.7	
Yellow Time (s)	3.0	3.7		3.0	3.7		3.0	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	1.0	-2.1		1.0	-2.1		1.0	-2.3		1.0	-2.3	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		12.0			12.0			12.0			12.0	
Flash Dont Walk (s)		12.0			12.0			16.0			16.0	
Pedestrian Calls (#/hr)		0			0			0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	67.0	62.0			62.0					37.0	32.0	
Actuated g/C Ratio	0.56	0.52			0.52					0.31	0.27	
v/c Ratio	0.63	0.69			0.76					0.39	0.39	
Control Delay	25.3	26.6			29.1					33.7	1.8	
Queue Delay	0.0	0.0			0.0					0.0	0.0	
Total Delay	25.3	26.6			29.1					33.7	1.8	
LOS	C	C			C					C	A	
Approach Delay		26.3			29.1						14.4	
Approach LOS		C			C						B	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 130			
Control Type: Pretimed			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 24.7		Intersection LOS: C	
Intersection Capacity Utilization 76.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Rymal Rd E & Upper Sherman Ave

Lane Group	EBL	EBT	WBT	SBL	SBT
Lane Group Flow (vph)	151	674	709	175	267
v/c Ratio	0.63	0.69	0.76	0.39	0.39
Control Delay	25.3	26.6	29.1	33.7	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	26.6	29.1	33.7	1.8
Queue Length 50th (m)	15.8	121.4	132.7	31.5	0.0
Queue Length 95th (m)	26.0	167.0	184.9	50.6	0.0
Internal Link Dist (m)		322.4	313.1		198.2
Turn Bay Length (m)	10.0			35.0	
Base Capacity (vph)	238	971	936	448	689
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.63	0.69	0.76	0.39	0.39

Intersection Summary

HCM Signalized Intersection Capacity Analysis 200558
1: Rymal Rd E & Upper Sherman Ave Base 2020 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	620	0	0	551	101	0	0	0	161	0	246
Future Volume (vph)	139	620	0	0	551	101	0	0	0	161	0	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0					4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00					1.00	1.00	
Frpb, ped/bikes	1.00	1.00			0.99					1.00	0.97	
Flpb, ped/bikes	1.00	1.00			1.00					1.00	1.00	
Frt	1.00	1.00			0.98					1.00	0.85	
Flt Protected	0.95	1.00			1.00					0.95	1.00	
Satd. Flow (prot)	1787	1881			1803					1764	1557	
Flt Permitted	0.17	1.00			1.00					0.76	1.00	
Satd. Flow (perm)	318	1881			1803					1406	1557	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	674	0	0	599	110	0	0	0	175	0	267
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	196	0
Lane Group Flow (vph)	151	674	0	0	704	0	0	0	0	175	71	0
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Heavy Vehicles (%)	1%	1%	0%	0%	2%	4%	0%	0%	0%	2%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	65.9	59.9			59.9					35.7	29.7	
Effective Green, g (s)	63.9	62.0			62.0					33.7	32.0	
Actuated g/C Ratio	0.53	0.52			0.52					0.28	0.27	
Clearance Time (s)	3.0	6.1			6.1					3.0	6.3	
Lane Grp Cap (vph)	230	971			931					409	415	
v/s Ratio Prot	c0.03	0.36			c0.39					c0.02	0.05	
v/s Ratio Perm	0.32									c0.10		
v/c Ratio	0.66	0.69			0.76					0.43	0.17	
Uniform Delay, d1	20.9	21.9			23.0					34.7	33.8	
Progression Factor	1.00	1.00			1.00					1.00	1.00	
Incremental Delay, d2	13.7	4.1			5.7					3.3	0.9	
Delay (s)	34.7	25.9			28.7					37.9	34.7	
Level of Service	C	C			C					D	C	
Approach Delay (s)		27.5			28.7			0.0			36.0	
Approach LOS		C			C			A			D	

Intersection Summary				
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	76.3%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

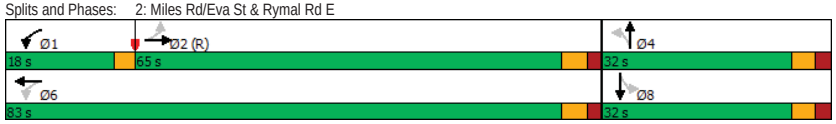
Lanes, Volumes, Timings 200558
2: Miles Rd/Eva St & Rymal Rd E Base 2020 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	569	195	165	515	18	116	21	164	5	20	21
Future Volume (vph)	17	569	195	165	515	18	116	21	164	5	20	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	10.0			10.0			7.5			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00			0.98		1.00	0.98	
Frt		0.962			0.995			0.927			0.923	
Flt Protected	0.950			0.950				0.981		0.950		
Satd. Flow (prot)	1805	1766	0	1787	1853	0	0	1662	0	1504	1638	0
Flt Permitted	0.446			0.148				0.854		0.442		
Satd. Flow (perm)	842	1766	0	278	1853	0	0	1437	0	699	1638	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			4			49			23	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		337.1			241.5			242.2			85.9	
Travel Time (s)		24.3			17.4			17.4			6.2	
Confl. Peds. (#/hr)	5					5	9		2	2		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	2%	1%	2%	0%	2%	10%	2%	20%	10%	0%
Adj. Flow (vph)	18	618	212	179	560	20	126	23	178	5	22	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	830	0	179	580	0	0	327	0	5	45	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	27.7	27.7		9.5	27.7		31.7	31.7		31.7	31.7	
Total Split (s)	65.0	65.0		18.0	83.0		32.0	32.0		32.0	32.0	
Total Split (%)	56.5%	56.5%		15.7%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	59.3	59.3		15.0	77.3		26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	-1.7	-1.7		1.0	-1.7			-1.7		-1.7	-1.7	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	0.2	0.2		2.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	67.8	67.8		80.6	80.6			26.4		26.4	26.4	
Actuated g/C Ratio	0.59	0.59		0.70	0.70			0.23		0.23	0.23	
v/c Ratio	0.04	0.79		0.58	0.45			0.89		0.03	0.11	
Control Delay	12.2	25.9		13.8	9.0			62.8		34.0	20.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	12.2	25.9		13.8	9.0			62.8		34.0	20.9	
LOS	B	C		B	A			E		C	C	
Approach Delay		25.6			10.2			62.8			22.2	
Approach LOS		C			B			E			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 11 (10%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 25.7		Intersection LOS: C	
Intersection Capacity Utilization 85.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Miles Rd/Eva St & Rymal Rd E



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	18	830	179	580	327	5	45
v/c Ratio	0.04	0.79	0.58	0.45	0.89	0.03	0.11
Control Delay	12.2	25.9	13.8	9.0	62.8	34.0	20.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.2	25.9	13.8	9.0	62.8	34.0	20.9
Queue Length 50th (m)	1.7	141.0	13.3	55.8	64.0	0.9	4.0
Queue Length 95th (m)	5.8	#250.4	21.4	78.4	#114.7	4.3	13.8
Internal Link Dist (m)		313.1		217.5	218.2		61.9
Turn Bay Length (m)	20.0		20.0			20.0	
Base Capacity (vph)	496	1051	378	1299	386	170	416
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.79	0.47	0.45	0.85	0.03	0.11

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	569	195	165	515	18	116	21	164	5	20	21
Future Volume (vph)	17	569	195	165	515	18	116	21	164	5	20	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			0.99		1.00	1.00	
Frt	1.00	0.96		1.00	0.99			0.93		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1794	1766		1787	1852			1650		1501	1639	
Flt Permitted	0.45	1.00		0.15	1.00			0.85		0.44	1.00	
Satd. Flow (perm)	842	1766		278	1852			1436		699	1639	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	618	212	179	560	20	126	23	178	5	22	23
RTOR Reduction (vph)	0	9	0	0	1	0	0	38	0	0	18	0
Lane Group Flow (vph)	18	821	0	179	579	0	0	289	0	5	27	0
Confl. Peds. (#/hr)	5					5	9		2	2		9
Heavy Vehicles (%)	0%	4%	2%	1%	2%	0%	2%	10%	2%	20%	10%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	66.2	66.2		78.9	78.9			24.7		24.7	24.7	
Effective Green, g (s)	67.9	67.9		77.9	80.6			26.4		26.4	26.4	
Actuated g/C Ratio	0.59	0.59		0.68	0.70			0.23		0.23	0.23	
Clearance Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Vehicle Extension (s)	0.2	0.2		2.0	0.2			3.0		3.0	3.0	
Lane Grp Cap (vph)	497	1042		302	1298			329		160	376	
v/s Ratio Prot		c0.46		c0.04	0.31						0.02	
v/s Ratio Perm	0.02			0.36				c0.20		0.01		
v/c Ratio	0.04	0.79		0.59	0.45			0.88		0.03	0.07	
Uniform Delay, d1	9.9	18.0		16.3	7.5			42.8		34.4	34.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.1	6.0		2.1	1.1			22.3		0.1	0.1	
Delay (s)	10.0	24.1		18.4	8.6			65.1		34.5	34.8	
Level of Service	A	C		B	A			E		C	C	
Approach Delay (s)		23.8			10.9			65.1			34.8	
Approach LOS		C			B			E			C	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 1: Rymal Rd E & Upper Sherman Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	TR
Maximum Queue (m)	19.9	347.2	157.6	53.8	60.9
Average Queue (m)	16.6	278.2	96.5	24.4	29.7
95th Queue (m)	24.3	423.2	144.9	43.3	51.5
Link Distance (m)		336.0	316.0		211.8
Upstream Blk Time (%)		33			
Queuing Penalty (veh)		0			
Storage Bay Dist (m)	10.0			35.0	
Storage Blk Time (%)	56	45	45	5	8
Queuing Penalty (veh)	346	62	0	13	13

Intersection: 2: Miles Rd/Eva St & Rymal Rd E

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (m)	21.5	193.6	29.9	155.3	114.9	11.4	28.1
Average Queue (m)	3.2	94.6	23.0	54.9	60.2	1.8	8.6
95th Queue (m)	14.9	176.4	34.7	110.9	101.2	7.9	21.3
Link Distance (m)		316.0		231.1	231.8		75.5
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	20.0		20.0			20.0	
Storage Blk Time (%)	0	30	22	16		0	2
Queuing Penalty (veh)	0	5	117	27		0	0

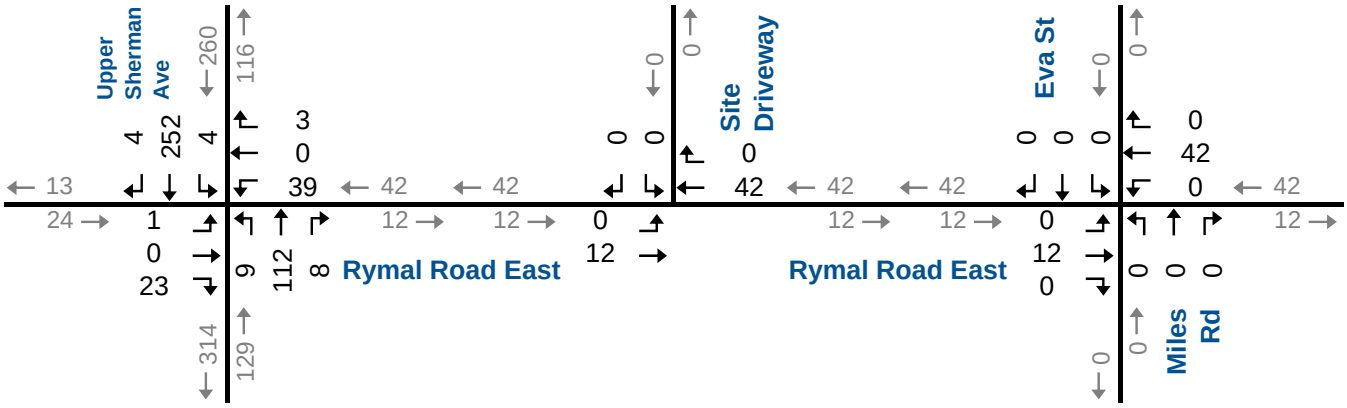
Network Summary

Network wide Queuing Penalty: 584

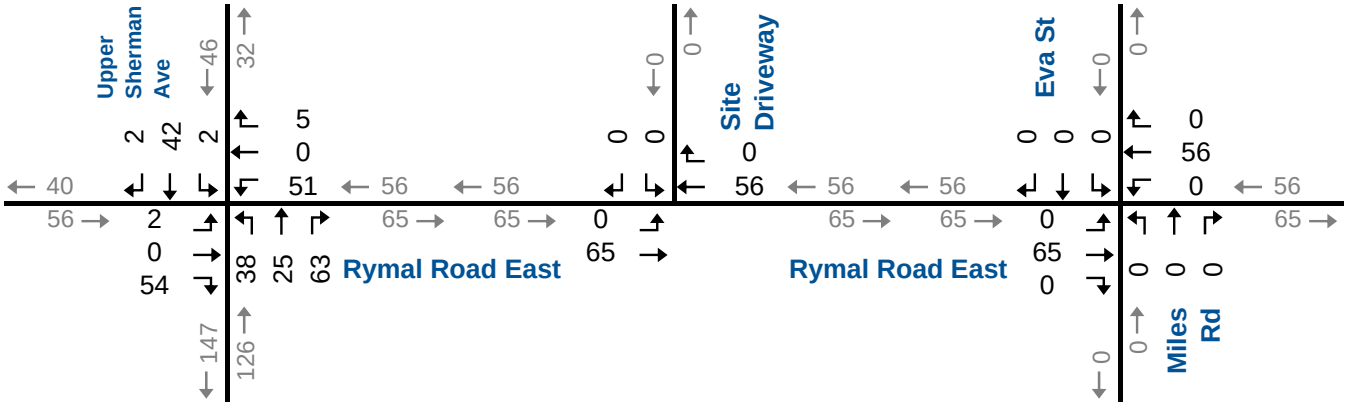
Appendix D

Background Development Trip Assignment

AM Peak Hour



PM Peak Hour



2028 Background Development Traffic Volumes

705-713 Rymal Road East, Hamilton
200558

Appendix D

Appendix E

Background Traffic Operation

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	490	23	39	625	236	9	112	8	138	252	149
Future Volume (vph)	128	490	23	39	625	236	9	112	8	138	252	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0		25.0	10.0		25.0	35.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	10.0			10.0			35.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						0.96				1.00	0.99	
Frt			0.850			0.850		0.990			0.944	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1743	1615	1805	1696	1538	1805	1881	0	1612	1750	0
Flt Permitted	0.192			0.304			0.139			0.605		
Satd. Flow (perm)	344	1743	1615	578	1696	1477	264	1881	0	1023	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			97		3			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		346.4			337.1			211.7			222.2	
Travel Time (s)		24.9			24.3			15.2			16.0	
Confl. Peds. (#/hr)	8					8				2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	0%	0%	12%	5%	0%	0%	0%	12%	0%	4%
Adj. Flow (vph)	139	533	25	42	679	257	10	122	9	150	274	162
Shared Lane Traffic (%)												
Lane Group Flow (vph)	139	533	25	42	679	257	10	131	0	150	436	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes						Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Minimum Split (s)	9.5	30.1	30.1	22.5	30.1	30.1	9.5	34.3		22.5	34.3	
Total Split (s)	9.0	66.0	66.0	9.0	66.0	66.0	9.0	36.0		9.0	36.0	
Total Split (%)	7.5%	55.0%	55.0%	7.5%	55.0%	55.0%	7.5%	30.0%		7.5%	30.0%	
Maximum Green (s)	6.0	59.9	59.9	6.0	59.9	59.9	6.0	29.7		6.0	29.7	
Yellow Time (s)	3.0	3.7	3.7	3.0	3.7	3.7	3.0	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.4	2.4	0.0	2.4	2.4	0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	1.0	-2.1	-2.1	1.0	-2.1	-2.1	1.0	-2.3		1.0	-2.3	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Walk Time (s)		12.0	12.0		12.0	12.0		12.0			12.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		16.0			16.0	
Pedestrian Calls (#/hr)		0	0		0	0		0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	67.0	62.0	62.0	67.0	62.0	62.0	37.0	32.0		37.0	32.0	
Actuated g/C Ratio	0.56	0.52	0.52	0.56	0.52	0.52	0.31	0.27		0.31	0.27	
v/c Ratio	0.56	0.59	0.03	0.11	0.78	0.32	0.07	0.26		0.44	0.90	
Control Delay	21.2	23.6	0.0	11.1	30.9	11.2	27.3	35.6		35.4	63.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	21.2	23.6	0.0	11.1	30.9	11.2	27.3	35.6		35.4	63.3	
LOS	C	C	A	B	C	B	C	D		D	E	
Approach Delay		22.3			24.9			35.0			56.1	
Approach LOS		C			C			C			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 120		
Control Type: Pretimed		
Maximum v/c Ratio: 0.90		
Intersection Signal Delay: 32.3	Intersection LOS: C	
Intersection Capacity Utilization 73.3%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 1: Rymal Rd E & Upper Sherman Ave

Queues
200558

1: Rymal Rd E & Upper Sherman Ave
Background 2028 AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	139	533	25	42	679	257	10	131	150	436
v/c Ratio	0.56	0.59	0.03	0.11	0.78	0.32	0.07	0.26	0.44	0.90
Control Delay	21.2	23.6	0.0	11.1	30.9	11.2	27.3	35.6	35.4	63.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	23.6	0.0	11.1	30.9	11.2	27.3	35.6	35.4	63.3
Queue Length 50th (m)	14.5	88.8	0.0	4.1	131.1	20.8	1.7	25.0	26.9	99.5
Queue Length 95th (m)	24.3	124.9	0.0	9.1	184.8	38.7	5.6	42.7	44.4	#161.0
Internal Link Dist (m)		322.4			313.1			187.7		198.2
Turn Bay Length (m)	10.0		25.0	10.0		25.0	35.0		35.0	
Base Capacity (vph)	248	900	875	373	876	810	145	503	339	484
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.59	0.03	0.11	0.78	0.32	0.07	0.26	0.44	0.90

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
200558

1: Rymal Rd E & Upper Sherman Ave
Background 2028 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	490	23	39	625	236	9	112	8	138	252	149
Future Volume (vph)	128	490	23	39	625	236	9	112	8	138	252	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703	1743	1615	1805	1696	1477	1805	1880		1608	1751	
Flt Permitted	0.19	1.00	1.00	0.30	1.00	1.00	0.14	1.00		0.60	1.00	
Satd. Flow (perm)	344	1743	1615	578	1696	1477	265	1880		1024	1751	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	139	533	25	42	679	257	10	122	9	150	274	162
RTOR Reduction (vph)	0	0	12	0	0	47	0	2	0	0	18	0
Lane Group Flow (vph)	139	533	13	42	679	210	10	129	0	150	418	0
Confl. Peds. (#/hr)	8					8				2		3
Heavy Vehicles (%)	6%	9%	0%	0%	12%	5%	0%	0%	0%	12%	0%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	65.9	59.9	59.9	65.9	59.9	59.9	35.7	29.7		35.7	29.7	
Effective Green, g (s)	63.9	62.0	62.0	63.9	62.0	62.0	33.7	32.0		33.7	32.0	
Actuated g/C Ratio	0.53	0.52	0.52	0.53	0.52	0.52	0.28	0.27		0.28	0.27	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.3		3.0	6.3	
Lane Grp Cap (vph)	239	900	834	358	876	763	138	501		311	466	
v/s Ratio Prot	c0.02	0.31		0.00	c0.40		0.00	0.07		c0.02	c0.24	
v/s Ratio Perm	0.28		0.01	0.06		0.14	0.02			0.11		
v/c Ratio	0.58	0.59	0.02	0.12	0.78	0.28	0.07	0.26		0.48	0.90	
Uniform Delay, d1	19.3	20.2	14.1	15.2	23.4	16.3	33.6	34.6		35.6	42.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.9	2.9	0.0	0.7	6.6	0.9	1.0	1.2		5.3	22.7	
Delay (s)	29.2	23.1	14.2	15.9	30.0	17.2	34.7	35.9		40.9	65.1	
Level of Service	C	C	B	B	C	B	C	D		D	E	
Approach Delay (s)		24.0			26.1			35.8			58.9	
Approach LOS		C			C			D			E	

Intersection Summary

HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	542	79	105	656	14	212	19	134	8	14	32
Future Volume (vph)	15	542	79	105	656	14	212	19	134	8	14	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	10.0			10.0			7.5			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00			1.00			0.99		1.00	0.98	
Frt		0.981			0.997			0.950			0.895	
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1656	1668	0	1752	1657	0	0	1716	0	1805	1630	0
Flt Permitted	0.330			0.248				0.793		0.567		
Satd. Flow (perm)	571	1668	0	457	1657	0	0	1395	0	1076	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			2			24			35	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		337.1			241.5			242.2			85.9	
Travel Time (s)		24.3			17.4			17.4			6.2	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	12%	7%	3%	14%	25%	1%	0%	2%	0%	8%	0%
Adj. Flow (vph)	16	589	86	114	713	15	230	21	146	9	15	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	675	0	114	728	0	0	397	0	9	50	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	27.7	27.7		9.5	27.7		31.7	31.7		31.7	31.7	
Total Split (s)	65.0	65.0		18.0	83.0		32.0	32.0		32.0	32.0	
Total Split (%)	56.5%	56.5%		15.7%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	59.3	59.3		15.0	77.3		26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	-1.7	-1.7		1.0	-1.7			-1.7		-1.7	-1.7	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	0.2	0.2		2.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	69.0	69.0		79.0	79.0			28.0		28.0	28.0	
Actuated g/C Ratio	0.60	0.60		0.69	0.69			0.24		0.24	0.24	
v/c Ratio	0.05	0.67		0.30	0.64			1.11		0.03	0.12	
Control Delay	10.5	19.6		8.1	13.2			120.0		33.9	16.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	10.5	19.6		8.1	13.2			120.0		33.9	16.4	
LOS	B	B		A	B			F		C	B	
Approach Delay		19.4			12.6			120.0			19.1	
Approach LOS		B			B			F			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 11 (10%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.11			
Intersection Signal Delay: 36.6		Intersection LOS: D	
Intersection Capacity Utilization 89.7%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Miles Rd/Eva St & Rymal Rd E

Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	16	675	114	728	397	9	50
v/c Ratio	0.05	0.67	0.30	0.64	1.11	0.03	0.12
Control Delay	10.5	19.6	8.1	13.2	120.0	33.9	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.5	19.6	8.1	13.2	120.0	33.9	16.4
Queue Length 50th (m)	1.5	99.3	8.2	86.5	~103.4	1.6	2.7
Queue Length 95th (m)	4.9	149.4	14.3	124.2	#166.1	6.1	13.0
Internal Link Dist (m)		313.1		217.5	218.2		61.9
Turn Bay Length (m)	20.0		20.0			20.0	
Base Capacity (vph)	342	1004	471	1138	357	261	423
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.67	0.24	0.64	1.11	0.03	0.12

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	542	79	105	656	14	212	19	134	8	14	32
Future Volume (vph)	15	542	79	105	656	14	212	19	134	8	14	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.95		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1646	1668		1752	1657			1710		1802	1630	
Flt Permitted	0.33	1.00		0.25	1.00			0.79		0.57	1.00	
Satd. Flow (perm)	572	1668		457	1657			1396		1076	1630	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	589	86	114	713	15	230	21	146	9	15	35
RTOR Reduction (vph)	0	4	0	0	1	0	0	18	0	0	26	0
Lane Group Flow (vph)	16	671	0	114	727	0	0	379	0	9	24	0
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Heavy Vehicles (%)	9%	12%	7%	3%	14%	25%	1%	0%	2%	0%	8%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	67.3	67.3		77.3	77.3			26.3		26.3	26.3	
Effective Green, g (s)	69.0	69.0		76.3	79.0			28.0		28.0	28.0	
Actuated g/C Ratio	0.60	0.60		0.66	0.69			0.24		0.24	0.24	
Clearance Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Vehicle Extension (s)	0.2	0.2		2.0	0.2			3.0		3.0	3.0	
Lane Grp Cap (vph)	343	1000		370	1138			339		261	396	
v/s Ratio Prot		c0.40		0.02	c0.44						0.01	
v/s Ratio Perm	0.03			0.19				c0.27		0.01		
v/c Ratio	0.05	0.67		0.31	0.64			1.12		0.03	0.06	
Uniform Delay, d1	9.5	15.4		10.9	10.0			43.5		33.2	33.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	3.6		0.2	2.8			84.5		0.1	0.1	
Delay (s)	9.7	19.0		11.0	12.8			128.0		33.2	33.5	
Level of Service	A	B		B	B			F		C	C	
Approach Delay (s)		18.8			12.6			128.0			33.4	
Approach LOS		B			B			F			C	

Intersection Summary				
HCM 2000 Control Delay	38.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.7%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Intersection: 1: Rymal Rd E & Upper Sherman Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (m)	21.6	310.2	75.0	19.7	251.6	75.0	10.4	43.9	69.9	210.0
Average Queue (m)	17.5	185.4	16.6	7.4	130.6	46.5	2.4	18.2	49.2	132.9
95th Queue (m)	23.8	338.0	65.5	18.9	220.9	95.5	8.6	36.2	89.4	232.4
Link Distance (m)		336.0			316.0			198.0		208.3
Upstream Blk Time (%)		8			0					13
Queuing Penalty (veh)		0			0					0
Storage Bay Dist (m)	10.0		25.0	10.0		25.0	35.0		35.0	
Storage Blk Time (%)	60	44		13	45	2		2	12	60
Queuing Penalty (veh)	307	67		111	124	15		0	47	82

Intersection: 2: Miles Rd/Eva St & Rymal Rd E

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (m)	22.6	182.1	29.9	154.3	176.7	10.0	26.5
Average Queue (m)	3.4	75.7	16.4	68.8	110.7	1.8	9.1
95th Queue (m)	13.9	149.0	31.0	129.3	204.9	7.7	20.3
Link Distance (m)		316.0		231.1	231.8		75.5
Upstream Blk Time (%)					3		
Queuing Penalty (veh)					0		
Storage Bay Dist (m)	20.0		20.0			20.0	
Storage Blk Time (%)	0	24	5	21		0	2
Queuing Penalty (veh)	0	4	33	22		0	0

Network Summary

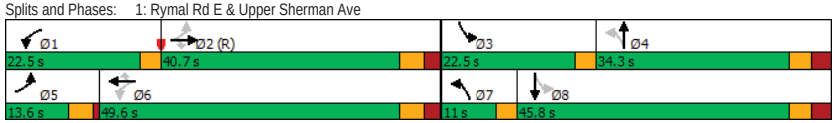
Network wide Queuing Penalty: 813

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	726	54	51	646	123	38	25	63	191	42	290
Future Volume (vph)	165	726	54	51	646	123	38	25	63	191	42	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0		15.0	10.0		25.0	35.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	10.0			10.0			35.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97			0.96	1.00	0.98		1.00	0.98	
Frt			0.850			0.850		0.893			0.869	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1881	1615	1805	1863	1553	1805	1667	0	1770	1599	0
Flt Permitted	0.119			0.106			0.462			0.583		
Satd. Flow (perm)	224	1881	1571	201	1863	1491	875	1667	0	1082	1599	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			153			125		68			315	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		346.4			337.1			211.7			222.2	
Travel Time (s)		24.9			24.3			15.2			16.0	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	0%	0%	2%	4%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	179	789	59	55	702	134	41	27	68	208	46	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	789	59	55	702	134	41	95	0	208	361	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes						Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Minimum Split (s)	9.5	30.1	30.1	22.5	30.1	30.1	11.0	34.3		22.5	34.3	
Total Split (s)	13.6	40.7	40.7	22.5	49.6	49.6	11.0	34.3		22.5	45.8	
Total Split (%)	11.3%	33.9%	33.9%	18.8%	41.3%	41.3%	9.2%	28.6%		18.8%	38.2%	
Maximum Green (s)	9.1	34.6	34.6	19.5	43.5	43.5	8.0	28.0		19.5	39.5	
Yellow Time (s)	3.5	3.7	3.7	3.0	3.7	3.7	3.0	3.3		3.0	3.3	
All-Red Time (s)	1.0	2.4	2.4	0.0	2.4	2.4	0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	1.0	-2.1	0.0	1.0	-2.1	0.0	1.0	-2.3		1.0	-2.3	
Total Lost Time (s)	5.5	4.0	6.1	4.0	4.0	6.1	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Walk Time (s)		12.0	12.0		12.0	12.0		12.0			12.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		16.0			16.0	
Pedestrian Calls (#/hr)		0	0		0	0		0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	43.3	36.7	34.6	59.2	45.6	43.5	37.3	30.3		52.8	41.8	
Actuated g/C Ratio	0.36	0.31	0.29	0.49	0.38	0.36	0.31	0.25		0.44	0.35	
v/c Ratio	0.96	1.37	0.11	0.16	0.99	0.22	0.13	0.20		0.36	0.47	
Control Delay	85.5	212.3	0.4	17.1	69.7	6.2	21.3	14.0		23.4	7.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	85.5	212.3	0.4	17.1	69.7	6.2	21.3	14.0		23.4	7.3	
LOS	F	F	A	B	E	A	C	B		C	A	
Approach Delay		178.0			56.9			16.2			13.2	
Approach LOS		F			E			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 140			
Control Type: Pretimed			
Maximum v/c Ratio: 1.37			
Intersection Signal Delay: 92.7		Intersection LOS: F	
Intersection Capacity Utilization 86.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Rymal Rd E & Upper Sherman Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	179	789	59	55	702	134	41	95	208	361
v/c Ratio	0.96	1.37	0.11	0.16	0.99	0.22	0.13	0.20	0.36	0.47
Control Delay	85.5	212.3	0.4	17.1	69.7	6.2	21.3	14.0	23.4	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.5	212.3	0.4	17.1	69.7	6.2	21.3	14.0	23.4	7.3
Queue Length 50th (m)	27.1	~258.6	0.0	6.9	171.2	1.4	5.7	5.1	32.1	7.6
Queue Length 95th (m)	#74.4	#335.5	0.0	14.3	#254.3	14.8	12.7	19.2	50.0	31.7
Internal Link Dist (m)		322.4			313.1			187.7		198.2
Turn Bay Length (m)	10.0		15.0	10.0		25.0	35.0		35.0	
Base Capacity (vph)	186	575	561	346	707	620	326	471	582	762
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	1.37	0.11	0.16	0.99	0.22	0.13	0.20	0.36	0.47

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	726	54	51	646	123	38	25	63	191	42	290
Future Volume (vph)	165	726	54	51	646	123	38	25	63	191	42	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	4.0	6.1	4.0	4.0	6.1	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1881	1571	1805	1863	1491	1802	1667		1766	1599	
Flt Permitted	0.12	1.00	1.00	0.11	1.00	1.00	0.46	1.00		0.58	1.00	
Satd. Flow (perm)	224	1881	1571	202	1863	1491	877	1667		1085	1599	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	789	59	55	702	134	41	27	68	208	46	315
RTOR Reduction (vph)	0	0	42	0	0	80	0	51	0	0	205	0
Lane Group Flow (vph)	179	789	17	55	702	54	41	44	0	208	156	0
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Heavy Vehicles (%)	1%	1%	0%	0%	2%	4%	0%	0%	0%	2%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	43.7	34.6	34.6	57.1	43.5	43.5	36.0	28.0		50.5	39.5	
Effective Green, g (s)	41.7	36.7	34.6	56.1	45.6	43.5	34.0	30.3		49.5	41.8	
Actuated g/C Ratio	0.35	0.31	0.29	0.47	0.38	0.36	0.28	0.25		0.41	0.35	
Clearance Time (s)	4.5	6.1	6.1	3.0	6.1	6.1	3.0	6.3		3.0	6.3	
Lane Grp Cap (vph)	183	575	452	341	707	540	302	420		552	556	
v/s Ratio Prot	c0.07	c0.42		0.02	c0.38		0.01	0.03		c0.06	0.10	
v/s Ratio Perm	0.27		0.01	0.05		0.04	0.03			c0.10		
v/c Ratio	0.98	1.37	0.04	0.16	0.99	0.10	0.14	0.11		0.38	0.28	
Uniform Delay, d1	33.9	41.6	30.7	22.4	37.0	25.3	31.6	34.4		23.6	28.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	61.1	178.3	0.2	1.0	32.2	0.4	0.9	0.5		2.0	1.3	
Delay (s)	95.0	220.0	30.9	23.4	69.2	25.7	32.5	34.9		25.6	29.5	
Level of Service	F	F	C	C	E	C	C	C		C	C	
Approach Delay (s)		187.3			59.8			34.2			28.1	
Approach LOS		F			E			C			C	

Intersection Summary				
HCM 2000 Control Delay	101.5	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5	
Intersection Capacity Utilization	86.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	732	228	193	659	21	136	25	192	6	23	25
Future Volume (vph)	20	732	228	193	659	21	136	25	192	6	23	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	10.0			10.0			7.5			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			0.98		1.00	0.98	
Frt		0.964			0.995			0.927			0.922	
Flt Protected	0.950			0.950				0.981		0.950		
Satd. Flow (prot)	1805	1769	0	1787	1853	0	0	1662	0	1504	1637	0
Flt Permitted	0.350			0.062				0.851		0.425		
Satd. Flow (perm)	662	1769	0	117	1853	0	0	1432	0	672	1637	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			3			49			27	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		337.1			241.5			242.2			85.9	
Travel Time (s)		24.3			17.4			17.4			6.2	
Confl. Peds. (#/hr)	5					5	9		2	2		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	2%	1%	2%	0%	2%	10%	2%	20%	10%	0%
Adj. Flow (vph)	22	796	248	210	716	23	148	27	209	7	25	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	1044	0	210	739	0	0	384	0	7	52	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
2: Miles Rd/Eva St & Rymal Rd E

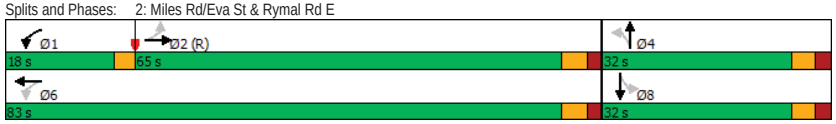
200558
Background 2028 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	27.7	27.7		9.5	27.7		31.7	31.7		31.7	31.7	
Total Split (s)	65.0	65.0		18.0	83.0		32.0	32.0		32.0	32.0	
Total Split (%)	56.5%	56.5%		15.7%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	59.3	59.3		15.0	77.3		26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	-1.7	-1.7		1.0	-1.7			-1.7		-1.7	-1.7	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	0.2	0.2		2.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	63.7	63.7		79.0	79.0			28.0		28.0	28.0	
Actuated g/C Ratio	0.55	0.55		0.69	0.69			0.24		0.24	0.24	
v/c Ratio	0.06	1.06		0.86	0.58			1.00		0.04	0.12	
Control Delay	13.6	70.9		57.4	11.6			84.0		34.3	20.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	13.6	70.9		57.4	11.6			84.0		34.3	20.5	
LOS	B	E		E	B			F		C	C	
Approach Delay		69.7			21.7			84.0			22.2	
Approach LOS		E			C			F			C	

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 11 (10%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 52.3 Intersection LOS: D
Intersection Capacity Utilization 100.5% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 2: Miles Rd/Eva St & Rymal Rd E



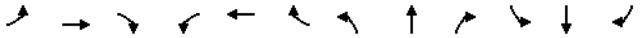
Queues
2: Miles Rd/Eva St & Rymal Rd E

200558
Background 2028 PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	22	1044	210	739	384	7	52
v/c Ratio	0.06	1.06	0.86	0.58	1.00	0.04	0.12
Control Delay	13.6	70.9	57.4	11.6	84.0	34.3	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	70.9	57.4	11.6	84.0	34.3	20.5
Queue Length 50th (m)	2.4	~274.2	31.4	81.6	81.6	1.3	4.6
Queue Length 95th (m)	6.9	#361.5	#65.8	113.8	#147.2	5.3	14.9
Internal Link Dist (m)		313.1		217.5	218.2		61.9
Turn Bay Length (m)	20.0		20.0			20.0	
Base Capacity (vph)	366	989	283	1273	385	163	419
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	1.06	0.74	0.58	1.00	0.04	0.12

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	732	228	193	659	21	136	25	192	6	23	25
Future Volume (vph)	20	732	228	193	659	21	136	25	192	6	23	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	1.00	
Frt	1.00	0.96		1.00	1.00			0.93		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1798	1770		1787	1853			1650		1502	1637	
Flt Permitted	0.35	1.00		0.06	1.00			0.85		0.43	1.00	
Satd. Flow (perm)	662	1770		116	1853			1431		672	1637	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	796	248	210	716	23	148	27	209	7	25	27
RTOR Reduction (vph)	0	9	0	0	1	0	0	37	0	0	20	0
Lane Group Flow (vph)	22	1035	0	210	738	0	0	347	0	7	32	0
Confl. Peds. (#/hr)	5					5	9		2	2		9
Heavy Vehicles (%)	0%	4%	2%	1%	2%	0%	2%	10%	2%	20%	10%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	62.0	62.0		77.3	77.3			26.3		26.3	26.3	
Effective Green, g (s)	63.7	63.7		76.3	79.0			28.0		28.0	28.0	
Actuated g/C Ratio	0.55	0.55		0.66	0.69			0.24		0.24	0.24	
Clearance Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Vehicle Extension (s)	0.2	0.2		2.0	0.2			3.0		3.0	3.0	
Lane Grp Cap (vph)	366	980		241	1272			348		163	398	
v/s Ratio Prot		c0.58		c0.09	0.40						0.02	
v/s Ratio Perm	0.03			0.49				c0.24		0.01		
v/c Ratio	0.06	1.06		0.87	0.58			1.00		0.04	0.08	
Uniform Delay, d1	11.8	25.6		36.7	9.4			43.5		33.3	33.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	44.6		26.6	1.9			47.1		0.1	0.1	
Delay (s)	12.2	70.3		63.3	11.3			90.6		33.4	33.6	
Level of Service	B	E		E	B			F		C	C	
Approach Delay (s)		69.1			22.8			90.6			33.6	
Approach LOS		E			C			F			C	

Intersection Summary			
HCM 2000 Control Delay	53.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 1: Rymal Rd E & Upper Sherman Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (m)	20.3	351.9	45.0	19.8	320.8	75.0	20.0	30.3	64.7	89.9
Average Queue (m)	16.3	341.5	13.5	9.1	314.7	40.4	6.8	10.5	28.1	38.5
95th Queue (m)	24.3	346.1	45.3	20.3	343.5	94.9	16.1	22.4	51.4	69.0
Link Distance (m)		336.0			316.0			198.0		208.3
Upstream Blk Time (%)		92			18					
Queuing Penalty (veh)		0			145					
Storage Bay Dist (m)	10.0		15.0	10.0		25.0	35.0		35.0	
Storage Blk Time (%)	51	69	0	23	63	0	0	0	5	12
Queuing Penalty (veh)	396	150	1	180	110	2	0	0	15	24

Intersection: 2: Miles Rd/Eva St & Rymal Rd E

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (m)	20.6	145.3	30.0	246.2	248.1	12.1	25.2
Average Queue (m)	3.0	70.3	28.2	218.8	177.3	1.6	9.8
95th Queue (m)	12.9	130.8	35.2	293.7	302.2	7.6	21.4
Link Distance (m)		316.0		231.1	231.8		75.5
Upstream Blk Time (%)				61	52		
Queuing Penalty (veh)				0	0		
Storage Bay Dist (m)	20.0		20.0			20.0	
Storage Blk Time (%)	0	23	18	56		0	3
Queuing Penalty (veh)	0	5	121	108		0	0

Network Summary

Network wide Queuing Penalty: 1257

Appendix F

Total Traffic Operation

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	491	23	39	631	239	9	112	8	139	252	149
Future Volume (vph)	128	491	23	39	631	239	9	112	8	139	252	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0		25.0	10.0		25.0	35.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	10.0			10.0			35.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						0.96				1.00	0.99	
Frt			0.850			0.850		0.990			0.944	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1743	1615	1805	1696	1538	1805	1881	0	1612	1750	0
Flt Permitted	0.187			0.304			0.139			0.605		
Satd. Flow (perm)	335	1743	1615	578	1696	1477	264	1881	0	1023	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			97		3			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		346.4			223.7			211.7			222.2	
Travel Time (s)		24.9			16.1			15.2			16.0	
Confl. Peds. (#/hr)	8					8				2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	0%	0%	12%	5%	0%	0%	0%	12%	0%	4%
Adj. Flow (vph)	139	534	25	42	686	260	10	122	9	151	274	162
Shared Lane Traffic (%)												
Lane Group Flow (vph)	139	534	25	42	686	260	10	131	0	151	436	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes						Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Minimum Split (s)	9.5	30.1	30.1	22.5	30.1	30.1	9.5	34.3		22.5	34.3	
Total Split (s)	9.0	66.0	66.0	9.0	66.0	66.0	9.0	36.0		9.0	36.0	
Total Split (%)	7.5%	55.0%	55.0%	7.5%	55.0%	55.0%	7.5%	30.0%		7.5%	30.0%	
Maximum Green (s)	6.0	59.9	59.9	6.0	59.9	59.9	6.0	29.7		6.0	29.7	
Yellow Time (s)	3.0	3.7	3.7	3.0	3.7	3.7	3.0	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.4	2.4	0.0	2.4	2.4	0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	1.0	-2.1	-2.1	1.0	-2.1	-2.1	1.0	-2.3		1.0	-2.3	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Walk Time (s)		12.0	12.0		12.0	12.0		12.0			12.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		16.0			16.0	
Pedestrian Calls (#/hr)		0	0		0	0		0			0	

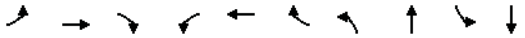
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	67.0	62.0	62.0	67.0	62.0	62.0	37.0	32.0		37.0	32.0	
Actuated g/C Ratio	0.56	0.52	0.52	0.56	0.52	0.52	0.31	0.27		0.31	0.27	
v/c Ratio	0.57	0.59	0.03	0.11	0.78	0.32	0.07	0.26		0.45	0.90	
Control Delay	21.7	23.6	0.0	11.1	31.4	11.3	27.3	35.6		35.5	63.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	21.7	23.6	0.0	11.1	31.4	11.3	27.3	35.6		35.5	63.3	
LOS	C	C	A	B	C	B	C	D		D	E	
Approach Delay		22.4			25.2			35.0			56.1	
Approach LOS		C			C			C			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 120			
Control Type: Pretimed			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 32.5		Intersection LOS: C	
Intersection Capacity Utilization 73.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Rymal Rd E & Upper Sherman Ave

Queues
200558

1: Rymal Rd E & Upper Sherman Ave
Total 2028 AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	139	534	25	42	686	260	10	131	151	436
v/c Ratio	0.57	0.59	0.03	0.11	0.78	0.32	0.07	0.26	0.45	0.90
Control Delay	21.7	23.6	0.0	11.1	31.4	11.3	27.3	35.6	35.5	63.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	23.6	0.0	11.1	31.4	11.3	27.3	35.6	35.5	63.3
Queue Length 50th (m)	14.5	89.1	0.0	4.1	133.2	21.3	1.7	25.0	27.0	99.5
Queue Length 95th (m)	24.3	125.2	0.0	9.1	187.9	39.4	5.6	42.7	44.9	#161.0
Internal Link Dist (m)		322.4			199.7			187.7		198.2
Turn Bay Length (m)	10.0		25.0	10.0		25.0	35.0		35.0	
Base Capacity (vph)	244	900	875	373	876	810	145	503	339	484
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.59	0.03	0.11	0.78	0.32	0.07	0.26	0.45	0.90

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
200558

1: Rymal Rd E & Upper Sherman Ave
Total 2028 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	491	23	39	631	239	9	112	8	139	252	149
Future Volume (vph)	128	491	23	39	631	239	9	112	8	139	252	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703	1743	1615	1805	1696	1477	1805	1880		1608	1751	
Flt Permitted	0.19	1.00	1.00	0.30	1.00	1.00	0.14	1.00		0.60	1.00	
Satd. Flow (perm)	334	1743	1615	577	1696	1477	265	1880		1024	1751	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	139	534	25	42	686	260	10	122	9	151	274	162
RTOR Reduction (vph)	0	0	12	0	0	47	0	2	0	0	18	0
Lane Group Flow (vph)	139	534	13	42	686	213	10	129	0	151	418	0
Confl. Peds. (#/hr)	8					8				2		3
Heavy Vehicles (%)	6%	9%	0%	0%	12%	5%	0%	0%	0%	12%	0%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	65.9	59.9	59.9	65.9	59.9	59.9	35.7	29.7		35.7	29.7	
Effective Green, g (s)	63.9	62.0	62.0	63.9	62.0	62.0	33.7	32.0		33.7	32.0	
Actuated g/C Ratio	0.53	0.52	0.52	0.53	0.52	0.52	0.28	0.27		0.28	0.27	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.3		3.0	6.3	
Lane Grp Cap (vph)	234	900	834	358	876	763	138	501		311	466	
v/s Ratio Prot	c0.02	0.31		0.00	c0.40		0.00	0.07		c0.02	c0.24	
v/s Ratio Perm	0.29		0.01	0.06		0.14	0.02			0.12		
v/c Ratio	0.59	0.59	0.02	0.12	0.78	0.28	0.07	0.26		0.49	0.90	
Uniform Delay, d1	19.5	20.2	14.1	15.3	23.5	16.4	33.6	34.6		35.6	42.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.6	2.9	0.0	0.7	6.9	0.9	1.0	1.2		5.3	22.7	
Delay (s)	30.1	23.1	14.2	15.9	30.5	17.3	34.7	35.9		41.0	65.1	
Level of Service	C	C	B	B	C	B	C	D		D	E	
Approach Delay (s)		24.2			26.4			35.8			58.9	
Approach LOS		C			C			D			E	

Intersection Summary

HCM 2000 Control Delay	34.2	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	73.6%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	547	81	105	657	14	213	19	134	8	14	32
Future Volume (vph)	15	547	81	105	657	14	213	19	134	8	14	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	10.0			10.0			7.5			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00			1.00			0.99		1.00	0.98	
Frt		0.981			0.997			0.951			0.895	
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1656	1668	0	1752	1657	0	0	1718	0	1805	1630	0
Flt Permitted	0.329			0.243				0.792		0.569		
Satd. Flow (perm)	569	1668	0	448	1657	0	0	1395	0	1079	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			2			24			35	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		113.4			241.5			242.2			85.9	
Travel Time (s)		8.2			17.4			17.4			6.2	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	12%	7%	3%	14%	25%	1%	0%	2%	0%	8%	0%
Adj. Flow (vph)	16	595	88	114	714	15	232	21	146	9	15	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	683	0	114	729	0	0	399	0	9	50	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	27.7	27.7		9.5	27.7		31.7	31.7		31.7	31.7	
Total Split (s)	65.0	65.0		18.0	83.0		32.0	32.0		32.0	32.0	
Total Split (%)	56.5%	56.5%		15.7%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	59.3	59.3		15.0	77.3		26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	-1.7	-1.7		1.0	-1.7			-1.7		-1.7	-1.7	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	0.2	0.2		2.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	69.0	69.0		79.0	79.0			28.0		28.0	28.0	
Actuated g/C Ratio	0.60	0.60		0.69	0.69			0.24		0.24	0.24	
v/c Ratio	0.05	0.68		0.30	0.64			1.12		0.03	0.12	
Control Delay	10.5	19.9		8.2	13.3			121.8		33.9	16.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	10.5	19.9		8.2	13.3			121.8		33.9	16.4	
LOS	B	B		A	B			F		C	B	
Approach Delay		19.7			12.6			121.8			19.1	
Approach LOS		B			B			F			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 11 (10%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.12			
Intersection Signal Delay: 37.1		Intersection LOS: D	
Intersection Capacity Utilization 89.9%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Miles Rd/Eva St & Rymal Rd E

Queues
2: Miles Rd/Eva St & Rymal Rd E

200558
Total 2028 AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	16	683	114	729	399	9	50
v/c Ratio	0.05	0.68	0.30	0.64	1.12	0.03	0.12
Control Delay	10.5	19.9	8.2	13.3	121.8	33.9	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.5	19.9	8.2	13.3	121.8	33.9	16.4
Queue Length 50th (m)	1.5	101.2	8.2	86.8	~104.4	1.6	2.7
Queue Length 95th (m)	4.9	152.5	14.3	124.7	#167.7	6.1	13.0
Internal Link Dist (m)		89.4		217.5	218.2		61.9
Turn Bay Length (m)	20.0		20.0			20.0	
Base Capacity (vph)	341	1004	466	1138	357	262	423
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.68	0.24	0.64	1.12	0.03	0.12

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 Signalized Intersection Capacity Analysis
2: Miles Rd/Eva St & Rymal Rd E

200558
Total 2028 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	547	81	105	657	14	213	19	134	8	14	32
Future Volume (vph)	15	547	81	105	657	14	213	19	134	8	14	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.95		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1646	1667		1752	1657			1711		1802	1630	
Flt Permitted	0.33	1.00		0.24	1.00			0.79		0.57	1.00	
Satd. Flow (perm)	570	1667		448	1657			1395		1079	1630	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	595	88	114	714	15	232	21	146	9	15	35
RTOR Reduction (vph)	0	4	0	0	1	0	0	18	0	0	26	0
Lane Group Flow (vph)	16	679	0	114	728	0	0	381	0	9	24	0
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Heavy Vehicles (%)	9%	12%	7%	3%	14%	25%	1%	0%	2%	0%	8%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	67.3	67.3		77.3	77.3			26.3		26.3	26.3	
Effective Green, g (s)	69.0	69.0		76.3	79.0			28.0		28.0	28.0	
Actuated g/C Ratio	0.60	0.60		0.66	0.69			0.24		0.24	0.24	
Clearance Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Vehicle Extension (s)	0.2	0.2		2.0	0.2			3.0		3.0	3.0	
Lane Grp Cap (vph)	342	1000		365	1138			339		262	396	
v/s Ratio Prot		c0.41		0.02	c0.44						0.01	
v/s Ratio Perm	0.03			0.19				c0.27		0.01		
v/c Ratio	0.05	0.68		0.31	0.64			1.12		0.03	0.06	
Uniform Delay, d1	9.5	15.5		11.0	10.1			43.5		33.2	33.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	3.7		0.2	2.8			86.6		0.1	0.1	
Delay (s)	9.7	19.2		11.2	12.8			130.1		33.2	33.5	
Level of Service	A	B		B	B			F		C	C	
Approach Delay (s)		19.0			12.6			130.1			33.4	
Approach LOS		B			B			F			C	

Intersection Summary

HCM 2000 Control Delay	38.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	636	900	2	7	9
Future Volume (vph)	2	636	900	2	7	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	10.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.925	
Flt Protected	0.950				0.978	
Satd. Flow (prot)	1805	1810	1810	0	1719	0
Flt Permitted	0.950				0.978	
Satd. Flow (perm)	1805	1810	1810	0	1719	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		223.7	113.4		85.6	
Travel Time (s)		16.1	8.2		6.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	5%	0%	0%	0%
Adj. Flow (vph)	2	691	978	2	8	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	691	980	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane		Yes	Yes			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.5%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	636	900	2	7	9
Future Volume (Veh/h)	2	636	900	2	7	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	691	978	2	8	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		224	113			
pX, platoon unblocked	0.75				0.86	0.75
vC, conflicting volume	980				1674	979
vC1, stage 1 conf vol					979	
vC2, stage 2 conf vol					695	
vCu, unblocked vol	806				1045	805
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	97
cM capacity (veh/h)	620				313	289

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	2	691	980	18
Volume Left	2	0	0	8
Volume Right	0	0	2	10
cSH	620	1700	1700	299
Volume to Capacity	0.00	0.41	0.58	0.06
Queue Length 95th (m)	0.1	0.0	0.0	1.5
Control Delay (s)	10.8	0.0	0.0	17.8
Lane LOS	B			C
Approach Delay (s)	0.0		0.0	17.8
Approach LOS				C

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		57.5%	ICU Level of Service	B
Analysis Period (min)		15		

Intersection: 1: Rymal Rd E & Upper Sherman Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (m)	20.8	293.2	74.2	19.7	208.5	75.0	12.0	45.0	69.9	201.9
Average Queue (m)	17.4	136.9	8.7	6.9	133.2	44.5	2.4	19.1	46.4	119.2
95th Queue (m)	23.4	258.6	43.7	18.0	210.4	93.5	8.8	37.2	86.6	218.6
Link Distance (m)		336.0			206.2			198.0		208.3
Upstream Blk Time (%)		1			1					12
Queuing Penalty (veh)		0			8					0
Storage Bay Dist (m)	10.0		25.0	10.0		25.0	35.0		35.0	
Storage Blk Time (%)	60	43		11	45	2		2	9	57
Queuing Penalty (veh)	307	66		98	125	15		0	38	79

Intersection: 2: Miles Rd/Eva St & Rymal Rd E

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (m)	25.2	96.9	30.0	148.6	177.9	11.0	28.1
Average Queue (m)	3.9	60.0	17.3	71.4	107.9	1.9	9.4
95th Queue (m)	14.4	104.9	31.6	124.2	205.1	8.1	20.8
Link Distance (m)		92.9		231.1	231.8		75.5
Upstream Blk Time (%)		2		0	7		
Queuing Penalty (veh)		13		0	0		
Storage Bay Dist (m)	20.0		20.0			20.0	
Storage Blk Time (%)	0	23	5	22		0	2
Queuing Penalty (veh)	1	3	35	23		0	0

Intersection: 3: Rymal Rd E & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (m)	8.1	57.6	51.7	15.1
Average Queue (m)	0.5	6.3	3.8	4.3
95th Queue (m)	3.9	31.6	24.7	12.0
Link Distance (m)		206.2	92.9	75.2
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (m)	10.0			
Storage Blk Time (%)	0	3		
Queuing Penalty (veh)	3	0		

Network Summary

Network wide Queuing Penalty: 814

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	733	54	51	650	124	38	25	63	194	42	290
Future Volume (vph)	165	733	54	51	650	124	38	25	63	194	42	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0		15.0	10.0		25.0	35.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	10.0			10.0			35.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97			0.96	1.00	0.98		1.00	0.98	
Frt			0.850			0.850		0.893			0.869	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1881	1615	1805	1863	1553	1805	1667	0	1770	1599	0
Flt Permitted	0.119			0.106			0.462			0.583		
Satd. Flow (perm)	224	1881	1571	201	1863	1491	875	1667	0	1082	1599	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			153			125		68			315	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		346.4			217.3			211.7			222.2	
Travel Time (s)		24.9			15.6			15.2			16.0	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	0%	0%	2%	4%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	179	797	59	55	707	135	41	27	68	211	46	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	797	59	55	707	135	41	95	0	211	361	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes						Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Minimum Split (s)	9.5	30.1	30.1	22.5	30.1	30.1	11.0	34.3		22.5	34.3	
Total Split (s)	13.6	40.7	40.7	22.5	49.6	49.6	11.0	34.3		22.5	45.8	
Total Split (%)	11.3%	33.9%	33.9%	18.8%	41.3%	41.3%	9.2%	28.6%		18.8%	38.2%	
Maximum Green (s)	9.1	34.6	34.6	19.5	43.5	43.5	8.0	28.0		19.5	39.5	
Yellow Time (s)	3.5	3.7	3.7	3.0	3.7	3.7	3.0	3.3		3.0	3.3	
All-Red Time (s)	1.0	2.4	2.4	0.0	2.4	2.4	0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	1.0	-2.1	0.0	1.0	-2.1	0.0	1.0	-2.3		1.0	-2.3	
Total Lost Time (s)	5.5	4.0	6.1	4.0	4.0	6.1	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Walk Time (s)		12.0	12.0		12.0	12.0		12.0			12.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		16.0			16.0	
Pedestrian Calls (#/hr)		0	0		0	0		0			0	

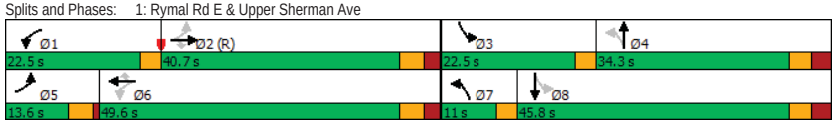
Lanes, Volumes, Timings
1: Rymal Rd E & Upper Sherman Ave

200558
Total 2028 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	43.3	36.7	34.6	59.2	45.6	43.5	37.3	30.3		52.8	41.8	
Actuated g/C Ratio	0.36	0.31	0.29	0.49	0.38	0.36	0.31	0.25		0.44	0.35	
v/c Ratio	0.96	1.39	0.11	0.16	1.00	0.22	0.13	0.20		0.36	0.47	
Control Delay	85.5	218.1	0.4	17.1	71.5	6.3	21.3	14.0		23.5	7.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	85.5	218.1	0.4	17.1	71.5	6.3	21.3	14.0		23.5	7.3	
LOS	F	F	A	B	E	A	C	B		C	A	
Approach Delay		182.7			58.4			16.2			13.2	
Approach LOS		F			E			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 140			
Control Type: Pretimed			
Maximum v/c Ratio: 1.39			
Intersection Signal Delay: 95.2		Intersection LOS: F	
Intersection Capacity Utilization 86.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Rymal Rd E & Upper Sherman Ave



Queues
1: Rymal Rd E & Upper Sherman Ave

200558
Total 2028 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	179	797	59	55	707	135	41	95	211	361
v/c Ratio	0.96	1.39	0.11	0.16	1.00	0.22	0.13	0.20	0.36	0.47
Control Delay	85.5	218.1	0.4	17.1	71.5	6.3	21.3	14.0	23.5	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.5	218.1	0.4	17.1	71.5	6.3	21.3	14.0	23.5	7.3
Queue Length 50th (m)	27.1	~262.7	0.0	6.9	173.4	1.6	5.7	5.1	32.6	7.6
Queue Length 95th (m)	#74.4	#339.6	0.0	14.3	#256.9	15.2	12.7	19.2	50.8	31.7
Internal Link Dist (m)		322.4			193.3			187.7		198.2
Turn Bay Length (m)	10.0		15.0	10.0		25.0	35.0		35.0	
Base Capacity (vph)	186	575	561	346	707	620	326	471	582	762
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	1.39	0.11	0.16	1.00	0.22	0.13	0.20	0.36	0.47

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 Signalized Intersection Capacity Analysis 200558
1: Rymal Rd E & Upper Sherman Ave Total 2028 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	733	54	51	650	124	38	25	63	194	42	290
Future Volume (vph)	165	733	54	51	650	124	38	25	63	194	42	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	4.0	6.1	4.0	4.0	6.1	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1881	1571	1805	1863	1491	1802	1667		1766	1599	
Flt Permitted	0.12	1.00	1.00	0.11	1.00	1.00	0.46	1.00		0.58	1.00	
Satd. Flow (perm)	224	1881	1571	202	1863	1491	877	1667		1085	1599	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	797	59	55	707	135	41	27	68	211	46	315
RTOR Reduction (vph)	0	0	42	0	0	80	0	51	0	0	205	0
Lane Group Flow (vph)	179	797	17	55	707	55	41	44	0	211	156	0
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Heavy Vehicles (%)	1%	1%	0%	0%	2%	4%	0%	0%	0%	2%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	43.7	34.6	34.6	57.1	43.5	43.5	36.0	28.0		50.5	39.5	
Effective Green, g (s)	41.7	36.7	34.6	56.1	45.6	43.5	34.0	30.3		49.5	41.8	
Actuated g/C Ratio	0.35	0.31	0.29	0.47	0.38	0.36	0.28	0.25		0.41	0.35	
Clearance Time (s)	4.5	6.1	6.1	3.0	6.1	6.1	3.0	6.3		3.0	6.3	
Lane Grp Cap (vph)	183	575	452	341	707	540	302	420		552	556	
v/s Ratio Prot	c0.07	c0.42		0.02	c0.38		0.01	0.03		c0.06	0.10	
v/s Ratio Perm	0.27		0.01	0.05		0.04	0.03			c0.10		
v/c Ratio	0.98	1.39	0.04	0.16	1.00	0.10	0.14	0.11		0.38	0.28	
Uniform Delay, d1	33.9	41.6	30.7	22.4	37.2	25.3	31.6	34.4		23.6	28.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	61.1	184.3	0.2	1.0	33.8	0.4	0.9	0.5		2.0	1.3	
Delay (s)	95.0	226.0	30.9	23.4	71.0	25.7	32.5	34.9		25.6	29.5	
Level of Service	F	F	C	C	E	C	C	C		C	C	
Approach Delay (s)		192.2			61.3			34.2			28.1	
Approach LOS		F			E			C			C	

Intersection Summary				
HCM 2000 Control Delay	104.0	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5	
Intersection Capacity Utilization	86.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings 200558
2: Miles Rd/Eva St & Rymal Rd E Total 2028 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	735	230	193	664	21	138	25	192	6	23	25
Future Volume (vph)	20	735	230	193	664	21	138	25	192	6	23	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	10.0			10.0			7.5			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			0.98		1.00	0.98	
Frt		0.964			0.995			0.927			0.922	
Flt Protected	0.950			0.950				0.981		0.950		
Satd. Flow (prot)	1805	1769	0	1787	1853	0	0	1663	0	1504	1637	0
Flt Permitted	0.346			0.062				0.850		0.427		
Satd. Flow (perm)	655	1769	0	117	1853	0	0	1430	0	675	1637	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			3			49			27	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.8			241.5			242.2			85.9	
Travel Time (s)		8.6			17.4			17.4			6.2	
Confl. Peds. (#/hr)	5					5	9		2	2		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	2%	1%	2%	0%	2%	10%	2%	20%	10%	0%
Adj. Flow (vph)	22	799	250	210	722	23	150	27	209	7	25	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	1049	0	210	745	0	0	386	0	7	52	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
2: Miles Rd/Eva St & Rymal Rd E

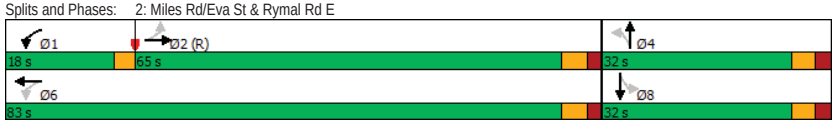
200558
Total 2028 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	27.7	27.7		9.5	27.7		31.7	31.7		31.7	31.7	
Total Split (s)	65.0	65.0		18.0	83.0		32.0	32.0		32.0	32.0	
Total Split (%)	56.5%	56.5%		15.7%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	59.3	59.3		15.0	77.3		26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	-1.7	-1.7		1.0	-1.7			-1.7		-1.7	-1.7	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	0.2	0.2		2.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	63.7	63.7		79.0	79.0			28.0		28.0	28.0	
Actuated g/C Ratio	0.55	0.55		0.69	0.69			0.24		0.24	0.24	
v/c Ratio	0.06	1.06		0.86	0.59			1.00		0.04	0.12	
Control Delay	13.6	72.5		57.4	11.7			85.2		34.3	20.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	13.6	72.5		57.4	11.7			85.2		34.3	20.5	
LOS	B	E		E	B			F		C	C	
Approach Delay		71.3			21.7			85.2			22.2	
Approach LOS		E			C			F			C	

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 11 (10%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 53.2 Intersection LOS: D
Intersection Capacity Utilization 100.9% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 2: Miles Rd/Eva St & Rymal Rd E



Queues
2: Miles Rd/Eva St & Rymal Rd E

200558
Total 2028 PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	22	1049	210	745	386	7	52
v/c Ratio	0.06	1.06	0.86	0.59	1.00	0.04	0.12
Control Delay	13.6	72.5	57.4	11.7	85.2	34.3	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	72.5	57.4	11.7	85.2	34.3	20.5
Queue Length 50th (m)	2.4	~276.7	31.4	82.8	~82.6	1.3	4.6
Queue Length 95th (m)	6.9	#364.0	#65.8	115.2	#148.3	5.3	14.9
Internal Link Dist (m)		95.8		217.5	218.2		61.9
Turn Bay Length (m)	20.0		20.0			20.0	
Base Capacity (vph)	362	989	283	1273	385	164	419
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	1.06	0.74	0.59	1.00	0.04	0.12

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.

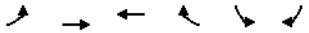
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	735	230	193	664	21	138	25	192	6	23	25
Future Volume (vph)	20	735	230	193	664	21	138	25	192	6	23	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	1.00	
Frt	1.00	0.96		1.00	1.00			0.93		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1798	1770		1787	1853			1650		1502	1637	
Flt Permitted	0.35	1.00		0.06	1.00			0.85		0.43	1.00	
Satd. Flow (perm)	654	1770		116	1853			1430		675	1637	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	799	250	210	722	23	150	27	209	7	25	27
RTOR Reduction (vph)	0	9	0	0	1	0	0	37	0	0	20	0
Lane Group Flow (vph)	22	1040	0	210	744	0	0	349	0	7	32	0
Confl. Peds. (#/hr)	5					5	9		2	2		9
Heavy Vehicles (%)	0%	4%	2%	1%	2%	0%	2%	10%	2%	20%	10%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	62.0	62.0		77.3	77.3			26.3		26.3	26.3	
Effective Green, g (s)	63.7	63.7		76.3	79.0			28.0		28.0	28.0	
Actuated g/C Ratio	0.55	0.55		0.66	0.69			0.24		0.24	0.24	
Clearance Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Vehicle Extension (s)	0.2	0.2		2.0	0.2			3.0		3.0	3.0	
Lane Grp Cap (vph)	362	980		241	1272			348		164	398	
v/s Ratio Prot		c0.59		c0.09	0.40						0.02	
v/s Ratio Perm	0.03			0.49				c0.24		0.01		
v/c Ratio	0.06	1.06		0.87	0.58			1.00		0.04	0.08	
Uniform Delay, d1	11.8	25.6		36.7	9.4			43.5		33.3	33.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	46.3		26.6	2.0			48.9		0.1	0.1	
Delay (s)	12.2	72.0		63.3	11.4			92.4		33.4	33.6	
Level of Service	B	E		E	B			F		C	C	
Approach Delay (s)		70.7			22.8			92.4			33.6	
Approach LOS		E			C			F			C	

Intersection Summary			
HCM 2000 Control Delay	54.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	980	820	7	5	5
Future Volume (vph)	10	980	820	7	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	10.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.999		0.932	
Flt Protected	0.950				0.976	
Satd. Flow (prot)	1805	1810	1808	0	1728	0
Flt Permitted	0.950				0.976	
Satd. Flow (perm)	1805	1810	1808	0	1728	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		217.3	119.8		78.5	
Travel Time (s)		15.6	8.6		5.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	5%	0%	0%	0%
Adj. Flow (vph)	11	1065	891	8	5	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	1065	899	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane		Yes	Yes			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	980	820	7	5	5
Future Volume (Veh/h)	10	980	820	7	5	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	1065	891	8	5	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		217	120			
pX, platoon unblocked	0.78				0.73	0.78
vC, conflicting volume	899				1982	895
vC1, stage 1 conf vol					895	
vC2, stage 2 conf vol					1087	
vCu, unblocked vol	725				1469	720
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	98				98	99
cM capacity (veh/h)	688				228	334

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	11	1065	899	10
Volume Left	11	0	0	5
Volume Right	0	0	8	5
cSH	688	1700	1700	271
Volume to Capacity	0.02	0.63	0.53	0.04
Queue Length 95th (m)	0.4	0.0	0.0	0.9
Control Delay (s)	10.3	0.0	0.0	18.8
Lane LOS	B			C
Approach Delay (s)	0.1		0.0	18.8
Approach LOS				C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 1: Rymal Rd E & Upper Sherman Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (m)	19.8	351.1	45.0	19.7	204.2	75.0	18.9	34.6	67.0	96.4
Average Queue (m)	16.2	341.6	14.8	10.0	200.9	44.8	7.1	11.2	30.2	41.9
95th Queue (m)	24.1	346.2	47.0	20.9	210.5	98.6	16.5	25.6	57.1	73.4
Link Distance (m)		336.0			199.9			198.0		208.3
Upstream Blk Time (%)		92			36					
Queuing Penalty (veh)		0			294					
Storage Bay Dist (m)	10.0		15.0	10.0		25.0	35.0		35.0	
Storage Blk Time (%)	50	67	0	22	63	0		0	6	15
Queuing Penalty (veh)	390	148	1	171	110	2		0	20	29

Intersection: 2: Miles Rd/Eva St & Rymal Rd E

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (m)	23.2	103.5	30.0	247.5	240.2	14.0	28.1
Average Queue (m)	3.5	67.9	27.3	219.2	171.8	1.7	10.7
95th Queue (m)	13.8	117.1	36.5	293.5	296.9	8.8	23.6
Link Distance (m)		99.2		231.1	231.8		75.5
Upstream Blk Time (%)		3		61	46		
Queuing Penalty (veh)		32		0	0		
Storage Bay Dist (m)	20.0		20.0			20.0	
Storage Blk Time (%)	0	25	22	53		0	4
Queuing Penalty (veh)	0	5	147	102		0	0

Intersection: 3: Rymal Rd E & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (m)	10.1	53.3	104.6	17.2
Average Queue (m)	1.0	8.5	94.6	3.9
95th Queue (m)	6.0	35.2	126.7	12.7
Link Distance (m)		199.9	99.2	68.1
Upstream Blk Time (%)			19	
Queuing Penalty (veh)			158	
Storage Bay Dist (m)	10.0			
Storage Blk Time (%)	2	4		
Queuing Penalty (veh)	22	0		

Network Summary

Network wide Queuing Penalty: 1631

Appendix G

Sensitivity Traffic Operation

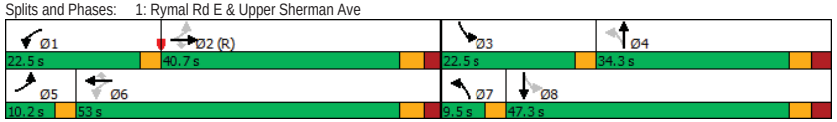
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	491	23	39	631	239	9	112	8	139	252	149
Future Volume (vph)	128	491	23	39	631	239	9	112	8	139	252	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0		25.0	10.0		25.0	35.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	10.0			10.0			35.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						0.96				1.00	0.99	
Frt			0.850			0.850		0.990			0.944	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1743	1615	1805	1696	1538	1805	1881	0	1612	1750	0
Flt Permitted	0.177			0.356			0.206			0.453		
Satd. Flow (perm)	317	1743	1615	676	1696	1477	391	1881	0	766	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			139			112		3			28	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		346.4			223.7			211.7			222.2	
Travel Time (s)		24.9			16.1			15.2			16.0	
Confl. Peds. (#/hr)	8					8				2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	0%	0%	12%	5%	0%	0%	0%	12%	0%	4%
Adj. Flow (vph)	139	534	25	42	686	260	10	122	9	151	274	162
Shared Lane Traffic (%)												
Lane Group Flow (vph)	139	534	25	42	686	260	10	131	0	151	436	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes						Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Detector Phase	5	2	2	1	6	6	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	9.5	30.1	30.1	22.5	30.1	30.1	9.5	34.3		22.5	34.3	
Total Split (s)	10.2	40.7	40.7	22.5	53.0	53.0	9.5	34.3		22.5	47.3	
Total Split (%)	8.5%	33.9%	33.9%	18.8%	44.2%	44.2%	7.9%	28.6%		18.8%	39.4%	
Maximum Green (s)	7.2	34.6	34.6	19.5	46.9	46.9	6.5	28.0		19.5	41.0	
Yellow Time (s)	3.0	3.7	3.7	3.0	3.7	3.7	3.0	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.4	2.4	0.0	2.4	2.4	0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	1.0	-2.1	-2.1	1.0	-2.1	-2.1	1.0	-2.3		1.0	-2.3	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	0.2	0.2	1.0	0.2	0.2	1.0	0.2		1.0	0.2	
Recall Mode	None	C-Max	C-Max	None	None	None	None	None		None	None	
Walk Time (s)		12.0	12.0		12.0	12.0		12.0			12.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		16.0			16.0	
Pedestrian Calls (#/hr)		0	0		0	0		0			0	
Act Effct Green (s)	76.0	69.8	69.8	69.0	64.7	64.7	24.4	20.4		35.5	33.9	
Actuated g/C Ratio	0.63	0.58	0.58	0.58	0.54	0.54	0.20	0.17		0.30	0.28	
v/c Ratio	0.48	0.53	0.03	0.10	0.75	0.31	0.08	0.41		0.50	0.85	
Control Delay	16.8	20.7	0.0	11.9	30.4	11.4	26.4	45.4		36.4	52.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	16.8	20.7	0.0	11.9	30.4	11.4	26.4	45.4		36.4	52.9	
LOS	B	C	A	B	C	B	C	D		D	D	
Approach Delay		19.2			24.6			44.1			48.7	
Approach LOS		B			C			D			D	
Queue Length 50th (m)	12.2	75.9	0.0	3.5	125.1	17.9	1.8	29.2		29.5	95.8	
Queue Length 95th (m)	30.2	151.6	0.0	11.3	#249.5	46.5	4.8	42.0		38.4	122.7	
Internal Link Dist (m)		322.4			199.7			187.7			198.2	
Turn Bay Length (m)	10.0		25.0	10.0		25.0	35.0			35.0		
Base Capacity (vph)	290	1013	996	604	914	847	149	486		357	650	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.48	0.53	0.03	0.07	0.75	0.31	0.07	0.27		0.42	0.67	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 30.0		Intersection LOS: C	

Intersection Capacity Utilization 72.9% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rymal Rd E & Upper Sherman Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	491	23	39	631	239	9	112	8	139	252	149
Future Volume (vph)	128	491	23	39	631	239	9	112	8	139	252	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703	1743	1615	1805	1696	1477	1805	1880		1609	1751	
Flt Permitted	0.18	1.00	1.00	0.36	1.00	1.00	0.21	1.00		0.45	1.00	
Satd. Flow (perm)	317	1743	1615	676	1696	1477	392	1880		768	1751	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	139	534	25	42	686	260	10	122	9	151	274	162
RTOR Reduction (vph)	0	0	11	0	0	54	0	2	0	0	20	0
Lane Group Flow (vph)	139	534	14	42	686	206	10	129	0	151	416	0
Confl. Peds. (#/hr)	8					8				2		3
Heavy Vehicles (%)	6%	9%	0%	0%	12%	5%	0%	0%	0%	12%	0%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	72.0	64.7	64.7	64.5	60.2	60.2	21.4	20.4		35.6	31.6	
Effective Green, g (s)	71.0	66.8	66.8	62.5	62.3	62.3	19.4	22.7		34.6	33.9	
Actuated g/C Ratio	0.59	0.56	0.56	0.52	0.52	0.52	0.16	0.19		0.29	0.28	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.3		3.0	6.3	
Vehicle Extension (s)	1.0	0.2	0.2	1.0	0.2	0.2	1.0	0.2		1.0	0.2	
Lane Grp Cap (vph)	277	970	899	383	880	766	63	355		299	494	
v/s Ratio Prot	c0.03	0.31		0.00	c0.40			0.07		c0.05	c0.24	
v/s Ratio Perm	0.26		0.01	0.05		0.14	0.03			0.10		
v/c Ratio	0.50	0.55	0.02	0.11	0.78	0.27	0.16	0.36		0.51	0.84	
Uniform Delay, d1	17.4	17.0	11.9	15.0	23.3	16.1	43.3	42.3		33.8	40.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.2	0.0	0.0	4.0	0.1	0.4	0.2		0.5	11.8	
Delay (s)	17.9	19.3	11.9	15.0	27.3	16.2	43.7	42.6		34.3	52.4	
Level of Service	B	B	B	B	C	B	D	D		C	D	
Approach Delay (s)		18.7			23.9			42.7			47.7	
Approach LOS		B			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	72.9%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	547	81	105	657	14	213	19	134	8	14	32
Future Volume (vph)	15	547	81	105	657	14	213	19	134	8	14	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	0		0	1		0
Taper Length (m)	10.0			10.0			7.5			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.97		1.00			0.99		1.00	0.98	
Frt			0.850		0.997			0.951			0.895	
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1656	1696	1509	1752	1657	0	0	1718	0	1805	1630	0
Flt Permitted	0.278			0.246				0.792		0.554		
Satd. Flow (perm)	483	1696	1468	454	1657	0	0	1395	0	1050	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			88		2			28			35	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		113.4			241.5			242.2			85.9	
Travel Time (s)		8.2			17.4			17.4			6.2	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	12%	7%	3%	14%	25%	1%	0%	2%	0%	8%	0%
Adj. Flow (vph)	16	595	88	114	714	15	232	21	146	9	15	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	595	88	114	729	0	0	399	0	9	50	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6			4			8		
Detector Phase	2	2	2	1	6		7	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0		5.0	15.0		15.0	15.0	
Minimum Split (s)	27.7	27.7	27.7	9.5	27.7		9.5	31.7		31.7	31.7	
Total Split (s)	59.0	59.0	59.0	10.0	69.0		9.5	46.0		36.5	36.5	
Total Split (%)	51.3%	51.3%	51.3%	8.7%	60.0%		8.3%	40.0%		31.7%	31.7%	
Maximum Green (s)	53.3	53.3	53.3	7.0	63.3		6.5	40.3		30.8	30.8	
Yellow Time (s)	3.7	3.7	3.7	3.0	3.7		3.0	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0		0.0	2.4		2.4	2.4	
Lost Time Adjust (s)	-1.7	-1.7	0.0	1.0	-1.7			-1.7		-1.7	-1.7	
Total Lost Time (s)	4.0	4.0	5.7	4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes			Yes	Yes	
Vehicle Extension (s)	0.2	0.2	0.2	2.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	None	Max		None	None		None	None	
Walk Time (s)	10.0	10.0	10.0		10.0			10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0	12.0		12.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0	0		0			0		0	0	
Act Effct Green (s)	60.1	60.1	58.4	69.8	69.8			37.2		37.2	37.2	
Actuated g/C Ratio	0.52	0.52	0.51	0.61	0.61			0.32		0.32	0.32	
v/c Ratio	0.06	0.67	0.11	0.34	0.72			0.85		0.03	0.09	
Control Delay	17.0	26.4	4.0	13.5	22.4			50.5		24.1	11.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Total Delay	17.0	26.4	4.0	13.5	22.4			50.5		24.1	11.6	
LOS	B	C	A	B	C			D		C	B	
Approach Delay		23.4			21.2			50.5			13.5	
Approach LOS		C			C			D			B	
Queue Length 50th (m)	1.9	106.8	0.0	11.3	120.1			79.6		1.4	2.3	
Queue Length 95th (m)	6.4	156.9	9.0	21.0	182.9			118.1		5.1	10.8	
Internal Link Dist (m)		89.4			217.5			218.2			61.9	
Turn Bay Length (m)	20.0			20.0						20.0		
Base Capacity (vph)	252	885	788	345	1006			527		348	564	
Starvation Cap Reductn	0	0	0	0	0			0		0	0	
Spillback Cap Reductn	0	0	0	0	0			0		0	0	
Storage Cap Reductn	0	0	0	0	0			0		0	0	
Reduced v/c Ratio	0.06	0.67	0.11	0.33	0.72			0.76		0.03	0.09	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 27.6		Intersection LOS: C	

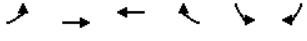
Intersection Capacity Utilization 89.9% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 2: Miles Rd/Eva St & Rymal Rd E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	547	81	105	657	14	213	19	134	8	14	32
Future Volume (vph)	15	547	81	105	657	14	213	19	134	8	14	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.7	4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.95		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1648	1696	1468	1752	1657			1711		1802	1630	
Flt Permitted	0.28	1.00	1.00	0.25	1.00			0.79		0.55	1.00	
Satd. Flow (perm)	482	1696	1468	453	1657			1395		1052	1630	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	595	88	114	714	15	232	21	146	9	15	35
RTOR Reduction (vph)	0	0	43	0	1	0	0	19	0	0	24	0
Lane Group Flow (vph)	16	595	45	114	728	0	0	380	0	9	26	0
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Heavy Vehicles (%)	9%	12%	7%	3%	14%	25%	1%	0%	2%	0%	8%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	58.4	58.4	58.4	68.1	68.1			35.5		35.5	35.5	
Effective Green, g (s)	60.1	60.1	58.4	67.1	69.8			37.2		37.2	37.2	
Actuated g/C Ratio	0.52	0.52	0.51	0.58	0.61			0.32		0.32	0.32	
Clearance Time (s)	5.7	5.7	5.7	3.0	5.7			5.7		5.7	5.7	
Vehicle Extension (s)	0.2	0.2	0.2	2.0	0.2			3.0		3.0	3.0	
Lane Grp Cap (vph)	251	886	745	328	1005			451		340	527	
v/s Ratio Prot		0.35		0.02	c0.44						0.02	
v/s Ratio Perm	0.03		0.03	0.19				c0.27		0.01		
v/c Ratio	0.06	0.67	0.06	0.35	0.72			0.84		0.03	0.05	
Uniform Delay, d1	13.6	20.2	14.4	14.4	15.9			36.2		26.5	26.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.5	4.0	0.2	0.2	4.5			13.4		0.0	0.0	
Delay (s)	14.0	24.2	14.5	14.6	20.4			49.6		26.6	26.8	
Level of Service	B	C	B	B	C			D		C	C	
Approach Delay (s)		22.8			19.6			49.6			26.8	
Approach LOS		C			B			D			C	

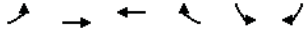
Intersection Summary				
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	89.9%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	636	900	2	7	9
Future Volume (vph)	2	636	900	2	7	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	10.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.925	
Flt Protected	0.950				0.978	
Satd. Flow (prot)	1805	1810	1810	0	1719	0
Flt Permitted	0.950				0.978	
Satd. Flow (perm)	1805	1810	1810	0	1719	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		223.7	113.4		85.6	
Travel Time (s)		16.1	8.2		6.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	5%	0%	0%	0%
Adj. Flow (vph)	2	691	978	2	8	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	691	980	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane		Yes	Yes			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	636	900	2	7	9
Future Volume (Veh/h)	2	636	900	2	7	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	691	978	2	8	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		224	113			
pX, platoon unblocked	0.69				0.81	0.69
vC, conflicting volume	980				1674	979
vC1, stage 1 conf vol					979	
vC2, stage 2 conf vol					695	
vCu, unblocked vol	743				1024	741
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	97
cM capacity (veh/h)	600				307	288

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	2	691	980	18
Volume Left	2	0	0	8
Volume Right	0	0	2	10
cSH	600	1700	1700	296
Volume to Capacity	0.00	0.41	0.58	0.06
Queue Length 95th (m)	0.1	0.0	0.0	1.5
Control Delay (s)	11.0	0.0	0.0	17.9
Lane LOS	B			C
Approach Delay (s)	0.0		0.0	17.9
Approach LOS				C

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		57.5%	ICU Level of Service	B
Analysis Period (min)		15		

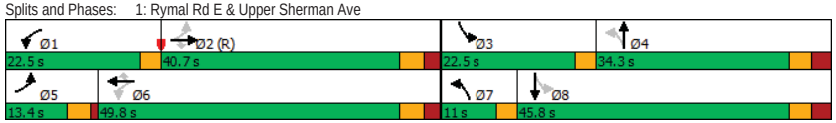
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	733	54	51	650	124	38	25	63	194	42	290
Future Volume (vph)	165	733	54	51	650	124	38	25	63	194	42	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0		15.0	10.0		25.0	35.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	10.0			10.0			35.0			35.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97			0.96	1.00	0.98		1.00	0.98	
Frt			0.850			0.850		0.893			0.869	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1881	1615	1805	1863	1553	1805	1667	0	1770	1599	0
Flt Permitted	0.162			0.228			0.417			0.390		
Satd. Flow (perm)	305	1881	1571	433	1863	1491	789	1667	0	724	1599	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			153			125		68			315	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		346.4			217.3			211.7			222.2	
Travel Time (s)		24.9			15.6			15.2			16.0	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	0%	0%	2%	4%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	179	797	59	55	707	135	41	27	68	211	46	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	797	59	55	707	135	41	95	0	211	361	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes						Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Detector Phase	5	2	2	1	6	6	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	12.0	12.0	8.0	10.0		8.0	12.0	
Minimum Split (s)	9.5	30.1	30.1	22.5	30.1	30.1	11.0	34.3		22.5	34.3	
Total Split (s)	13.4	40.7	40.7	22.5	49.8	49.8	11.0	34.3		22.5	45.8	
Total Split (%)	11.2%	33.9%	33.9%	18.8%	41.5%	41.5%	9.2%	28.6%		18.8%	38.2%	
Maximum Green (s)	8.9	34.6	34.6	19.5	43.7	43.7	8.0	28.0		19.5	39.5	
Yellow Time (s)	3.5	3.7	3.7	3.0	3.7	3.7	3.0	3.3		3.0	3.3	
All-Red Time (s)	1.0	2.4	2.4	0.0	2.4	2.4	0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	1.0	-2.1	0.0	1.0	-2.1	0.0	1.0	-2.3		1.0	-2.3	
Total Lost Time (s)	5.5	4.0	6.1	4.0	4.0	6.1	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	0.2	0.2	1.0	0.2	0.2	1.0	0.2		1.0	0.2	
Recall Mode	None	C-Max	C-Max	None	None	None	None	None		None	None	
Walk Time (s)		12.0	12.0		12.0	12.0		12.0			12.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		16.0			16.0	
Pedestrian Calls (#/hr)		0	0		0	0		0			0	
Act Effct Green (s)	79.8	74.6	72.5	67.6	63.3	61.2	19.3	12.3		30.7	21.9	
Actuated g/C Ratio	0.66	0.62	0.60	0.56	0.53	0.51	0.16	0.10		0.26	0.18	
v/c Ratio	0.50	0.68	0.06	0.19	0.72	0.16	0.22	0.41		0.68	0.66	
Control Delay	13.1	20.1	0.1	9.7	27.9	4.2	36.2	24.2		48.6	14.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	13.1	20.1	0.1	9.7	27.9	4.2	36.2	24.2		48.6	14.0	
LOS	B	C	A	A	C	A	D	C		D	B	
Approach Delay		17.8			23.2			27.8			26.8	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	15.3	126.7	0.0	4.2	128.8	1.2	7.7	6.2		44.1	9.9	
Queue Length 95th (m)	27.0	194.4	0.0	9.6	197.6	12.7	16.5	23.3		65.7	41.0	
Internal Link Dist (m)		322.4			193.3			187.7			198.2	
Turn Bay Length (m)	10.0		15.0	10.0		25.0	35.0			35.0		
Base Capacity (vph)	356	1169	1009	504	982	821	186	471		346	762	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.50	0.68	0.06	0.11	0.72	0.16	0.22	0.20		0.61	0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 22.5 (19%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 22.1		Intersection LOS: C	

Intersection Capacity Utilization 85.3% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: Rymal Rd E & Upper Sherman Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	733	54	51	650	124	38	25	63	194	42	290
Future Volume (vph)	165	733	54	51	650	124	38	25	63	194	42	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	4.0	6.1	4.0	4.0	6.1	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1881	1571	1805	1863	1491	1803	1667		1767	1599	
Flt Permitted	0.16	1.00	1.00	0.23	1.00	1.00	0.42	1.00		0.39	1.00	
Satd. Flow (perm)	304	1881	1571	433	1863	1491	791	1667		726	1599	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	797	59	55	707	135	41	27	68	211	46	315
RTOR Reduction (vph)	0	0	24	0	0	62	0	61	0	0	258	0
Lane Group Flow (vph)	179	797	35	55	707	73	41	34	0	211	103	0
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Heavy Vehicles (%)	1%	1%	0%	0%	2%	4%	0%	0%	0%	2%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	78.6	71.3	71.3	64.9	60.6	60.6	17.0	10.6		29.0	19.6	
Effective Green, g (s)	77.6	73.4	71.3	62.9	62.7	60.6	15.0	12.9		28.0	21.9	
Actuated g/C Ratio	0.65	0.61	0.59	0.52	0.52	0.51	0.12	0.11		0.23	0.18	
Clearance Time (s)	4.5	6.1	6.1	3.0	6.1	6.1	3.0	6.3		3.0	6.3	
Vehicle Extension (s)	3.0	0.2	0.2	1.0	0.2	0.2	1.0	0.2		1.0	0.2	
Lane Grp Cap (vph)	351	1150	933	264	973	752	144	179		294	291	
v/s Ratio Prot	c0.05	c0.42		0.01	c0.38		0.01	0.02		c0.09	0.06	
v/s Ratio Perm	0.28		0.02	0.10		0.05	0.02			c0.08		
v/c Ratio	0.51	0.69	0.04	0.21	0.73	0.10	0.28	0.19		0.72	0.36	
Uniform Delay, d1	16.5	15.7	10.1	16.3	22.1	15.5	47.1	48.8		40.2	42.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	3.4	0.1	0.1	2.3	0.0	0.4	0.2		6.8	0.3	
Delay (s)	17.6	19.2	10.2	16.4	24.4	15.5	47.5	49.0		47.0	43.2	
Level of Service	B	B	B	B	C	B	D	D		D	D	
Approach Delay (s)		18.4			22.5			48.6			44.6	
Approach LOS		B			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5	
Intersection Capacity Utilization	85.3%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	735	230	193	664	21	138	25	192	6	23	25
Future Volume (vph)	20	735	230	193	664	21	138	25	192	6	23	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		15.0	20.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	0		0	1		0
Taper Length (m)	10.0			10.0			7.5			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			0.98		1.00	0.98	
Frt			0.850		0.995			0.927			0.922	
Flt Protected	0.950			0.950				0.981		0.950		
Satd. Flow (prot)	1805	1827	1583	1787	1853	0	0	1663	0	1504	1637	0
Flt Permitted	0.313			0.095				0.850		0.452		
Satd. Flow (perm)	593	1827	1583	179	1853	0	0	1430	0	714	1637	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83		3			55			27	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.8			241.5			242.2			85.9	
Travel Time (s)		8.6			17.4			17.4			6.2	
Confl. Peds. (#/hr)	5					5	9		2	2		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	2%	1%	2%	0%	2%	10%	2%	20%	10%	0%
Adj. Flow (vph)	22	799	250	210	722	23	150	27	209	7	25	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	799	250	210	745	0	0	386	0	7	52	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6			4			8		
Detector Phase	2	2	2	1	6		7	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	27.7	27.7	27.7	9.5	27.7		9.5	31.7		31.7	31.7	
Total Split (s)	58.8	58.8	58.8	15.0	73.8		9.5	41.2		31.7	31.7	
Total Split (%)	51.1%	51.1%	51.1%	13.0%	64.2%		8.3%	35.8%		27.6%	27.6%	
Maximum Green (s)	53.1	53.1	53.1	12.0	68.1		6.5	35.5		26.0	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.0	3.7		3.0	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0		0.0	2.4		2.4	2.4	
Lost Time Adjust (s)	-1.7	-1.7	0.0	1.0	-1.7			-1.7		-1.7	-1.7	
Total Lost Time (s)	4.0	4.0	5.7	4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes			Yes	Yes	
Vehicle Extension (s)	0.2	0.2	0.2	2.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	None	Max		None	None		None	None	
Walk Time (s)	10.0	10.0	10.0		10.0			10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0	12.0		12.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0	0		0			0		0	0	
Act Effct Green (s)	59.1	59.1	57.4	73.6	73.6			33.4		33.4	33.4	
Actuated g/C Ratio	0.51	0.51	0.50	0.64	0.64			0.29		0.29	0.29	
v/c Ratio	0.07	0.85	0.30	0.80	0.63			0.85		0.03	0.11	
Control Delay	17.2	36.1	13.2	41.9	16.3			50.7		27.5	16.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Total Delay	17.2	36.1	13.2	41.9	16.3			50.7		27.5	16.5	
LOS	B	D	B	D	B			D		C	B	
Approach Delay		30.4			21.9			50.7			17.8	
Approach LOS		C			C			D			B	
Queue Length 50th (m)	2.8	171.1	23.3	24.9	105.6			72.3		1.1	4.1	
Queue Length 95th (m)	7.9	#255.5	42.3	#64.8	150.5			#119.0		4.7	13.3	
Internal Link Dist (m)		95.8			217.5			218.2			61.9	
Turn Bay Length (m)	20.0		15.0	20.0						20.0		
Base Capacity (vph)	304	939	832	271	1187			499		210	502	
Starvation Cap Reductn	0	0	0	0	0			0		0	0	
Spillback Cap Reductn	0	0	0	0	0			0		0	0	
Storage Cap Reductn	0	0	0	0	0			0		0	0	
Reduced v/c Ratio	0.07	0.85	0.30	0.77	0.63			0.77		0.03	0.10	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 30.0		Intersection LOS: C	

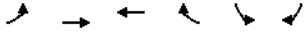
Intersection Capacity Utilization 90.4% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Miles Rd/Eva St & Rymal Rd E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	735	230	193	664	21	138	25	192	6	23	25
Future Volume (vph)	20	735	230	193	664	21	138	25	192	6	23	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.7	4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			0.99		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.93		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1799	1827	1583	1787	1853			1650		1502	1637	
Flt Permitted	0.31	1.00	1.00	0.10	1.00			0.85		0.45	1.00	
Satd. Flow (perm)	593	1827	1583	179	1853			1430		714	1637	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	799	250	210	722	23	150	27	209	7	25	27
RTOR Reduction (vph)	0	0	42	0	1	0	0	39	0	0	19	0
Lane Group Flow (vph)	22	799	208	210	744	0	0	347	0	7	33	0
Confl. Peds. (#/hr)	5					5	9		2	2		9
Heavy Vehicles (%)	0%	4%	2%	1%	2%	0%	2%	10%	2%	20%	10%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	57.4	57.4	57.4	71.9	71.9			31.7		31.7	31.7	
Effective Green, g (s)	59.1	59.1	57.4	70.9	73.6			33.4		33.4	33.4	
Actuated g/C Ratio	0.51	0.51	0.50	0.62	0.64			0.29		0.29	0.29	
Clearance Time (s)	5.7	5.7	5.7	3.0	5.7			5.7		5.7	5.7	
Vehicle Extension (s)	0.2	0.2	0.2	2.0	0.2			3.0		3.0	3.0	
Lane Grp Cap (vph)	304	938	790	257	1185			415		207	475	
v/s Ratio Prot		c0.44		c0.07	0.40						0.02	
v/s Ratio Perm	0.04		0.13	0.43				c0.24		0.01		
v/c Ratio	0.07	0.85	0.26	0.82	0.63			0.84		0.03	0.07	
Uniform Delay, d1	14.1	24.2	16.6	25.9	12.5			38.2		29.2	29.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.5	9.6	0.8	17.1	2.5			13.6		0.1	0.1	
Delay (s)	14.6	33.8	17.4	42.9	15.0			51.8		29.3	29.6	
Level of Service	B	C	B	D	B			D		C	C	
Approach Delay (s)		29.6			21.1			51.8			29.6	
Approach LOS		C			C			D			C	

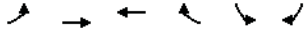
Intersection Summary				
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	90.4%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	980	820	7	5	5
Future Volume (vph)	10	980	820	7	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	10.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	10.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.999		0.932	
Flt Protected	0.950				0.976	
Satd. Flow (prot)	1805	1810	1808	0	1728	0
Flt Permitted	0.950				0.976	
Satd. Flow (perm)	1805	1810	1808	0	1728	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		217.3	119.8		78.5	
Travel Time (s)		15.6	8.6		5.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	5%	0%	0%	0%
Adj. Flow (vph)	11	1065	891	8	5	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	1065	899	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane		Yes	Yes			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 61.6%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	980	820	7	5	5
Future Volume (Veh/h)	10	980	820	7	5	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	1065	891	8	5	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		217	120			
pX, platoon unblocked	0.74				0.70	0.74
vC, conflicting volume	899				1982	895
vC1, stage 1 conf vol					895	
vC2, stage 2 conf vol					1087	
vCu, unblocked vol	692				1367	687
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	98				98	99
cM capacity (veh/h)	679				228	335

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	11	1065	899	10
Volume Left	11	0	0	5
Volume Right	0	0	8	5
cSH	679	1700	1700	271
Volume to Capacity	0.02	0.63	0.53	0.04
Queue Length 95th (m)	0.4	0.0	0.0	0.9
Control Delay (s)	10.4	0.0	0.0	18.8
Lane LOS	B			C
Approach Delay (s)	0.1		0.0	18.8
Approach LOS				C

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		61.6%	ICU Level of Service	B
Analysis Period (min)		15		