Appendix I

Multi-Modal Transportation Report

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CITY OF HAMILTON

Rymal Road (Upper James Street to Dartnall Road) Municipal Class EA

Multi-Modal Transportation Assessment

February 2025 – 20-3410

February 28, 2025

City of Hamilton
Public Works, Engineering Services
71 Main Street West
Hamilton, Ontario
L8P 4Y5

Attention: Megan Salvucci
Project Manager – Capital Infrastructure Planning

Rymal Road (Upper James Street to Dartnall Road) Municipal Class EA
Multi-Modal Transportation Assessment

Dear Megan Salvucci,

Please find enclosed a copy of our Multi-Modal Transportation Assessment prepared as part of the Municipal Class Environmental Assessment of Rymal Road between Upper James Street and Dartnall Road.

Should you have any questions or wish to discuss our findings, please contact me at (416) 229 4647, extension 2376, or at mwalters@dillon.ca.

Sincerely,

DILLON CONSULTING LIMITED



Mike Walters, P.Eng.
Associate

Enclosure

Our file: 20-3410

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1.0 Introduction

1.1 Purpose

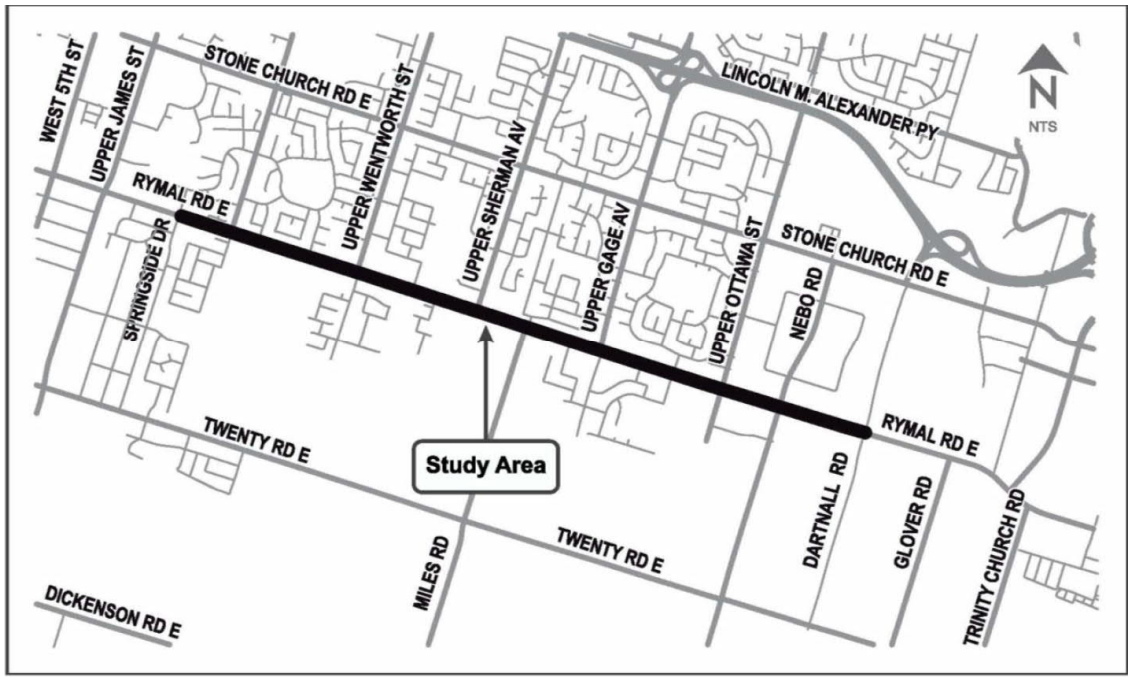
Dillon Consulting Limited (Dillon) has been retained by the City of Hamilton to undertake a Municipal Class Environmental Assessment (EA) of the Rymal Road corridor between Springside Avenue (east of Upper James Street) and Dartnall Road.

This report has been prepared to document existing roadway and multi-modal transportation conditions within the study area, including the recent collision history along the corridor; identify City policies and studies in place that may be applicable to the study area; estimate future traffic demand in the study area at a 2041 horizon; determine the ability of the existing road network to accommodate the projected 2041 traffic demand; identify roadway modifications that may be required to accommodate the projected traffic demand; and identify other gaps in multi-modal infrastructure within the corridor that may be addressed as part of any future roadway reconfiguration.

1.2 Study Area

The study area of the EA consists of a 5.2 kilometre section of the Rymal Road corridor from Upper James Street to Dartnall Road, including the area of influence of intersections along the corridor. There are 11 signalized intersections (including one intersection pedestrian signal) within the study area. **Figure 1** illustrates the extents of the EA study area.

Figure 1: Study Area



1.3 Scope of Analysis

This report includes the following components:

- A review of existing transportation condions within the study` area:
  - Existing roadway geometry, active transportation infrastructure and transit service;
  - Typical existing traffic volumes;
  - Existing active transportation activity; and
  - Existing intersection traffic operations;
- A review of the collision history along the Rymal Road corridor over a five-year period (2015–19) and identification of patterns potentially related to the existing roadway configuration;
- An estimate of future automobile traffic demand within the corridor and an assessment of the ability of the existing roadway to accommodate this demand; and
- Identification of gaps in the active transportation network that may warrant consideration in the development of potential design alternatives.

Traffic analyses and forecasts have been prepared for the AM and PM peak hours of a typical weekday.

Existing volumes and analyses reflect 2019 conditions to avoid atypical traffic patterns due to the COVID-19 pandemic experienced during the majority of 2020. Future volumes and analyses have been prepared for a 2041 horizon

2.0 Existing Conditions

2.1 Existing Road Network

Rymal Road is a major arterial road and the southernmost east-west arterial road within the urban area of Hamilton, approximately 2 kilometres south of the Lincoln Alexander Parkway. Combined with Garner Road to the west and Hamilton Road 20 (former Highway 20) to the east, it forms a continuous major arterial road corridor between Wilson Street (former Highway 2) in Ancaster and the Region of Niagara boundary at Westbrook Road. It has a posted speed limit of 60 km/h.

Rymal Road has historically had a continuous two- to three-lane cross-section for the majority of its length, save for short five-lane sections near Upper James Street and near Upper Centennial Parkway. Sidewalks were present in some sections in the study area but were not continuous. Since 2015, parts of Rymal Road to the west and east of the study area have been widened to a five-lane cross-section (Upper Paradise Road to West 5th Street; Fletcher Road). Some sections within the study area have also been widened in conjunction with sidewalk construction. The study area continues to operate with one lane per direction (plus a two-way centre left turn lane and auxiliary right turn lanes at some intersections), with the additional lanes currently hatched out for use as paved shoulders.

North-south arterial roads intersect with Rymal Road approximately every 800 metres (half-mile) and extend north into the urban area of the city. Every other arterial roadway provides access to the Lincoln Alexander Parkway, while others cross over the parkway via a grade separation. The concession road network in the rural area south of Rymal Road is irregular and does not match the arterial grid to the north; in some cases, urban arterial roads continue to the south of Rymal Road; in others, they continue south as local roads but do not extend into the rural area; in one case (Miles Road), they are offset from urban arterials and result in a "jog" along Rymal Road for north-south traffic.

Numerous local streets and private accesses intersect with Rymal Road. Private accesses include major driveways to commercial plazas; private roadways serving townhouse complexes; lower-volume commercial driveways serving single-tenant commercial and industrial lots; and single-family residential driveways. The majority of accesses permit full movements. A continuous two-way left turn lane exists along the full extent of the corridor to serve left turns to local streets and private driveways.

Table 1 documents the characteristics of major intersecting north-south roadways within the study area.

Table 1: Characteristics of Major Intersecting Streets

Location	North/South of Rymal	Classification	Lanes/ direction	Sidewalks	Bicycle lanes	Speed limit (km/h)
Upper James Street	Both sides	Major arterial	2	Both sides	No	50
Upper Wellington Street	North side	Minor arterial	1	Both sides	Yes	50*
	South side	Collector	1	Both sides	No	40
Upper Wentworth Street	North side	Minor arterial	2	Both sides	No	50*
	South side	Collector	1	Both sides	No	40
Upper Sherman Avenue	North side	Minor arterial	1	Both sides	Yes	50*
	South side	Collector	1	Both sides	Yes	50*
Miles Road	South side	Minor arterial	1	None	No	60
Upper Gage Avenue	North side	Minor arterial	1	Both sides	No	50
	South side	Collector	1	Both sides	No	50*
Upper Ottawa Street	North side	Minor arterial	2	Both sides	No	50*
	South side	Collector	1	None	No	50*
Nebo Road	North side	Collector	2	None	No	50*
	South side	Collector	1	None	No	60
Dartnall Road	North side	Major arterial	2	West side	No	50*
	South side	Minor arterial	2	East side	No	60

*No speed limit is posted; 50 km/h statutory speed limit applies

The following north-south roadways connect to the Lincoln Alexander Parkway, 2 kilometres north of Rymal Road:

- Upper James Street
- Upper Wentworth Street
- Upper Gage Avenue
- Dartnall Road

Traffic signals are installed at the following intersections with Rymal Road (from west to east):

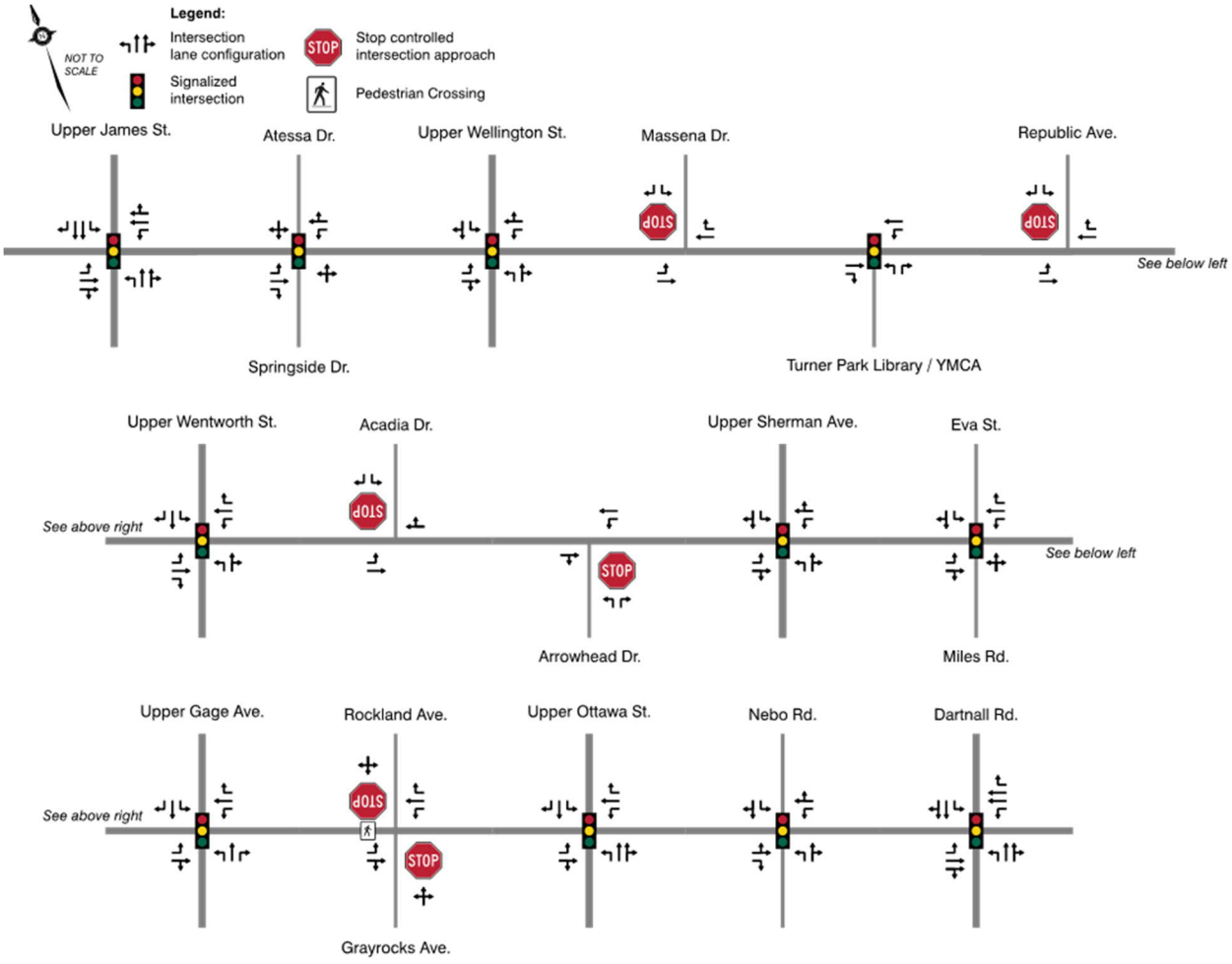
- Upper James Street
- Springside Avenue / Atessa Drive
- Upper Wellington Street
- Turner Park Library / YMCA Entrance
- Upper Wentworth Street
- Upper Sherman Avenue

- Miles Road / Eva Street
- Upper Gage Avenue
- Rockland Avenue / Grayrocks Avenue (intersection pedestrian signal)
- Upper Ottawa Street
- Nebo Road
- Dartnall Road

In addition to the locations listed above, traffic signals were installed at Arrowhead Drive in May 2022. The existing conditions analyses are based on the unsignalized configuration that existed at the time of the traffic counts. Future conditions analyses reflect the subsequent installation of traffic signals.

Figure 2 shows the lane configuration and traffic control in the study area that existed as of the outset of this study.

Figure 2: Existing Intersection Geometry and Traffic Control



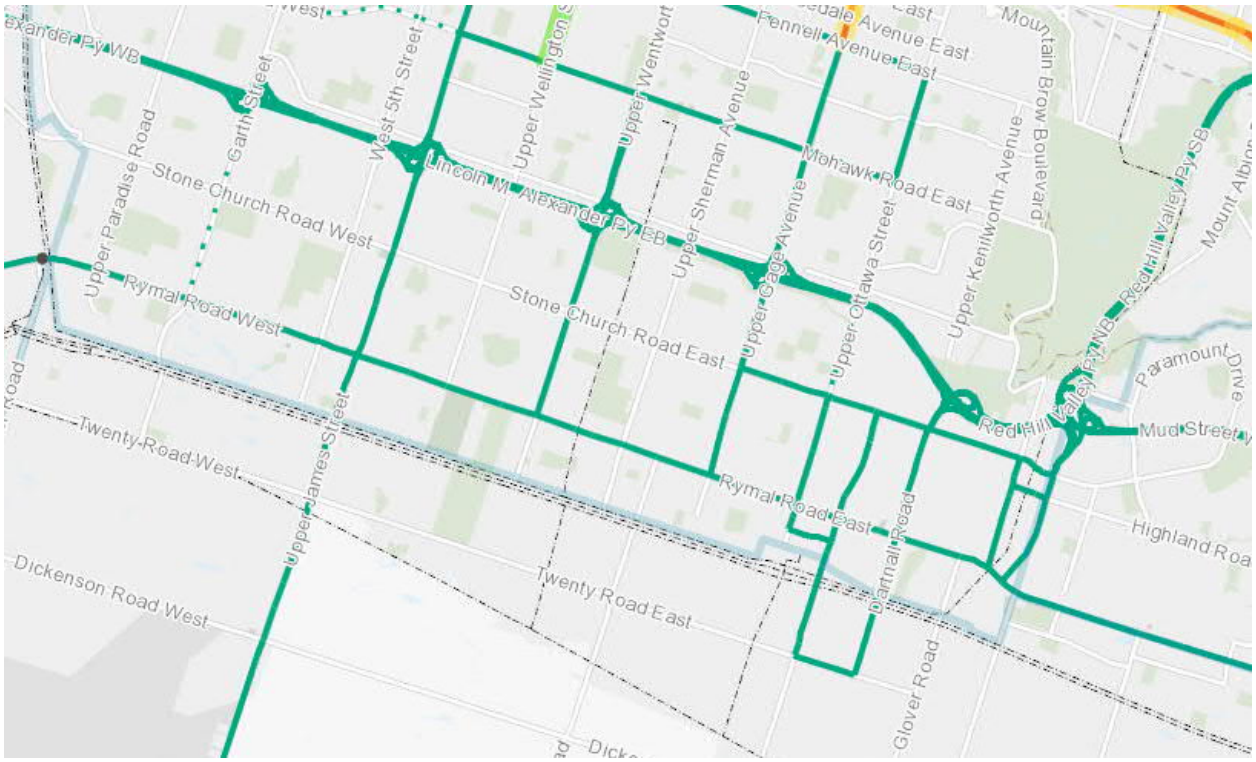
2.2 Truck Route Network

The entire Garner Road / Rymal Road corridor forms part of the City of Hamilton's truck route network (as shown in **Figure 3**) and is the only continuous east-west truck route south of the Lincoln Alexander Parkway.

The following other intersecting streets within the study area are also part of the designated truck route network:

- Upper James Street
- Upper Wentworth Street (north of Rymal Road)
- Upper Gage Avenue (north of Rymal Road)
- Upper Ottawa Street
- Nebo Road (as far south as Twenty Road East)
- Dartnall Road

Figure 3: Existing Truck Route Network



2.3 Existing Active Transportation Facilities

2.3.1 Sidewalks

Prior to 2016, the sidewalks along Rymal Road were discontinuous and had numerous gaps of significant length. Many of these gaps were filled by new sidewalks constructed in 2016 and 2017, and sidewalks now exist along both sides of Rymal Road between Upper James Street and Nebo Road, except as follows:

- A 100-metre gap on the north side, west of Atessa Drive;
- A 300-metre gap between Upper Sherman Avenue and Miles Road (south side); and
- A 125-metre gap on the south side, east of Upper Ottawa Street.

The position of the sidewalk within the roadway cross-section varies from location to location. In some locations, the sidewalk is positioned directly adjacent to the travel lanes; in some locations, it is positioned adjacent to the pavement but with an allowance for a paved shoulder to be converted to a second travel lane; in other locations, it is separated from the travel lanes by a grassed boulevard and/or gravel shoulder, with a setback of up to 11 metres.

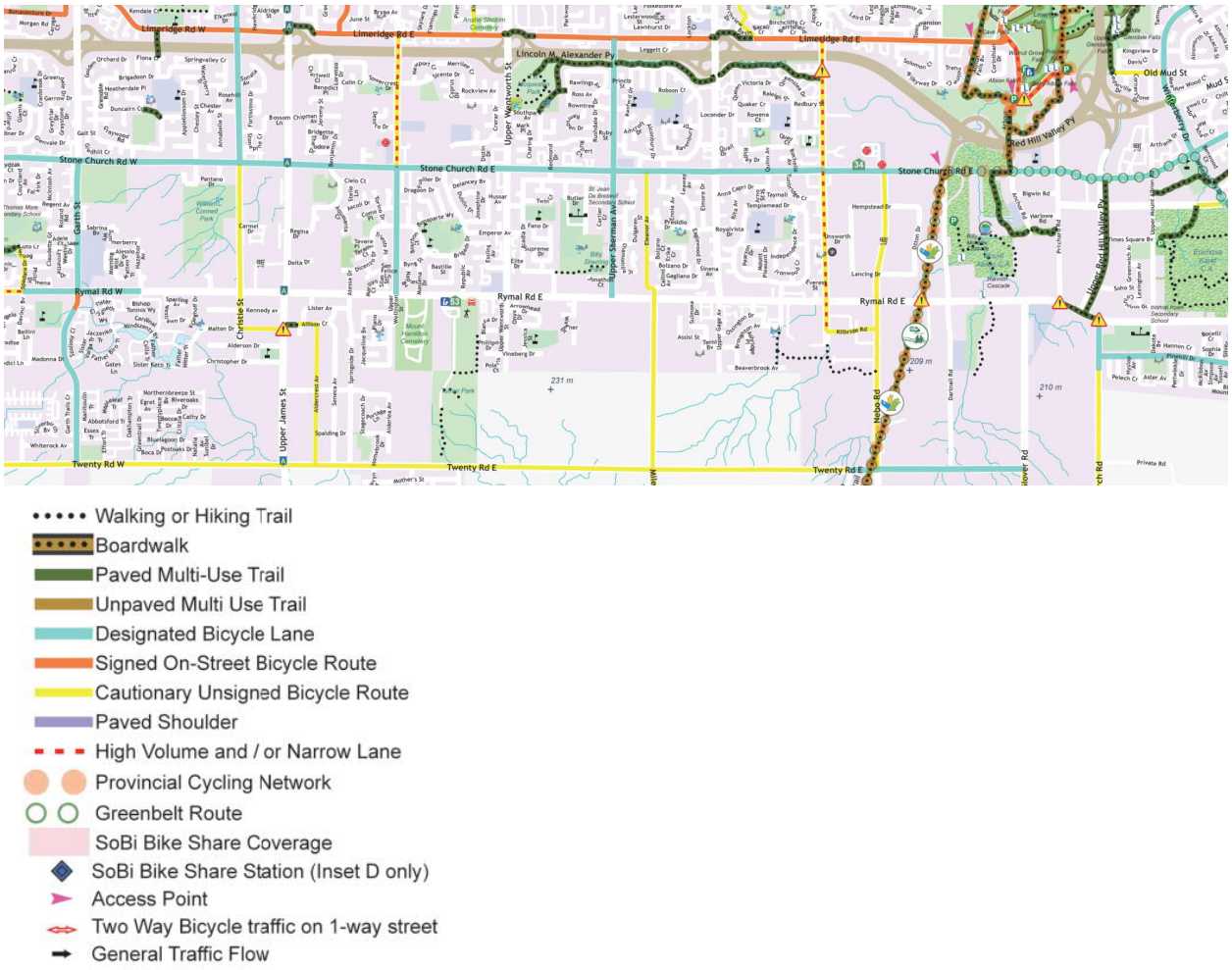
Between Nebo Road and Dartnall Road, Rymal Road has a predominantly rural cross-section without sidewalks, although sidewalks have recently been constructed in the vicinity of Dartnall Road (for approximately 50 metres on the north side, and approximately 185 metres on the south side).

East of Dartnall Road, sidewalks were constructed on both sides as part of road widening undertaken in 2015–2016.

2.3.2 Cycling Facilieąs

Figure 4 presents the existing cycling network in the study area. There are no dedicated cycling facilities along Rymal Road within the study area. There is a multi-use trail within the north boulevard for approximately 400-500 metres on either side of Garth Street; otherwise, there are no dedicated cycling facilities within the sections of Rymal Road that have been recently reconstructed west and east of the study area.

Figure 4: Exisng Cycling Neạtwork in Study Area



Source: City of Hamilton Bikeways Map (Urban), 2020

The closest east-west cycling corridor is Stone Church Road, 1 kilometre to the north, which has on-street bicycle lanes along its full extents.

Dedicated bicycle lanes exist north of Rymal Road on Upper Wellington Street and Upper Sherman Avenue. The Chippewa Rail Trail intersects with Rymal Road between Nebo Road and Dartnall Road. East of the study area, a multi-use path exists along the north side of Rymal Road between Pritchard Road and Trinity Church Road.

Bicycle racks are provided on HSR buses, providing alternative travel means for cyclists to bridge gaps on busier roadways without cycling infrastructure.

2.4 Existing Transit Service

The Hamilton Street Railway (HSR) operates transit service along Rymal Road, as well as along other north-south roadways within the study area.

Route 44 (Rymal) operates along the full extent of Rymal Road throughout the study area. To the west, it continues along Rymal Road and Garner Road westerly to the Ancaster Business Park at Wilson Street. To the east, it extends along Rymal Road to Upper Centennial Parkway, where it turns to the north, crosses the escarpment, and continues along Centennial Parkway to Confederation Plaza south of the Queen Elizabeth Way. It operates every 15 minutes during the weekday peak periods and every 30 minutes at most other times.

Rymal Road forms the southern boundary of the transit service area; with the exception of routes traveling on Upper James Street, all north-south routes extend as far south as Rymal Road before looping to return north. Routes 23 and 24, and Routes 25 and 26, are interlined to operate in two-way loops (e.g., Route 24 travels south along Upper Sherman Avenue to Rymal Road, then turns to the east toward Upper Gage Avenue where it returns north as Route 23, and vice versa).

The route network in the study area is illustrated in **Figure 5**. **Table 2** presents the typical headways (interval between buses) on Rymal Road and on intersecting north-south routes as of September 2023.

Figure 5: Existing HSR Route Network in Study Area

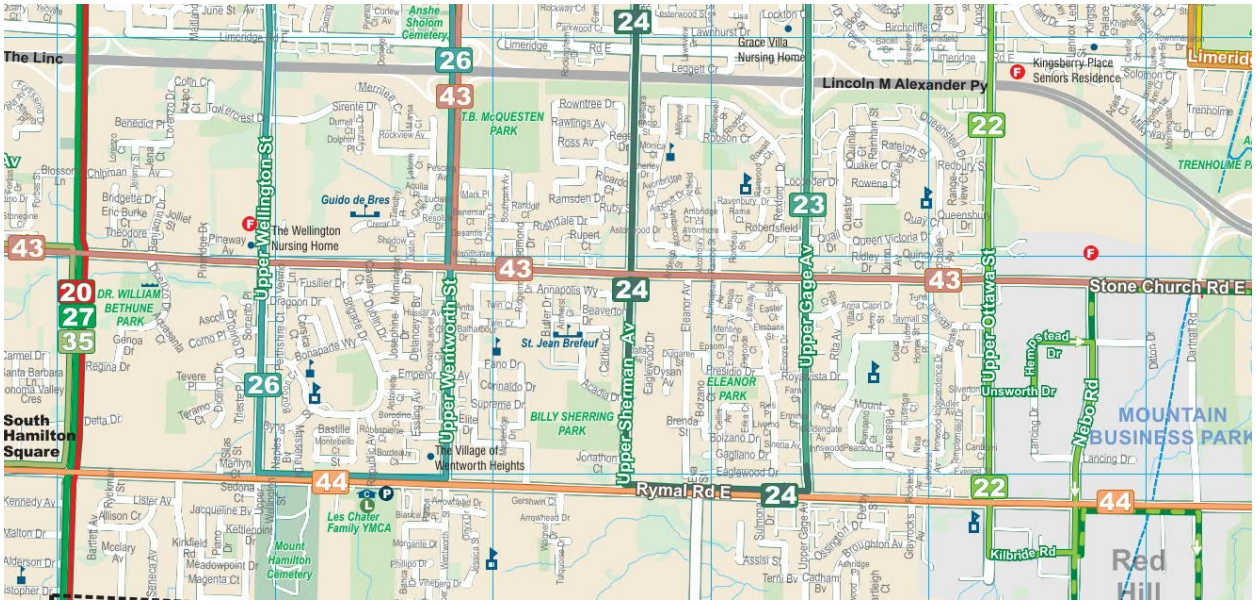


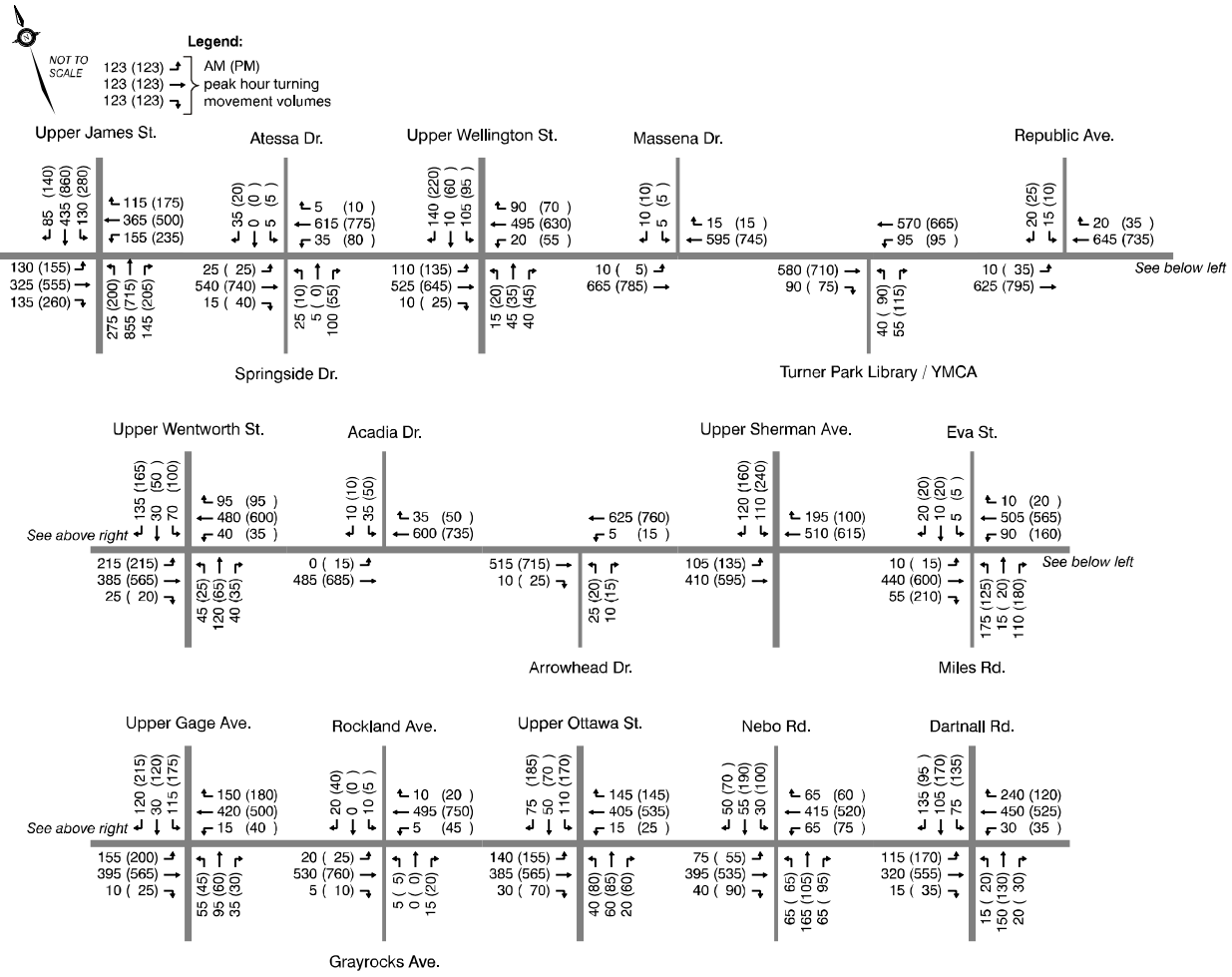
Table 2: Existing Transit Service Headways (September 2023)

Route	Weekday					Saturday					Sunday				
	AM	Mid	PM	Eve.	Late	Early	Morn.	Aft.	Eve.	Late	Early	Morn.	Aft.	Eve.	Late
44 Rymal	15	30	15	30	60	30	30	30	30	30	30	30	30	30	30
27 Upper James	15	20	15	30	30	30	20	20	30	30	30	30	30	40	40
20 "A" Line Express	10	20	10	15-30	30	30	15	15	30	30	30	20	20	30	30
25 Upper Wentworth 26 Upper Wellington	12-15	15	12	20	30	30	20	20	30	30	30	30	30	30	60
23 Upper Gage 24 Upper Sherman	15	20	15	30	30	30	20	20	30	30	30	30	30	30	60
22 Upper Ottawa	15	20	15	30	30	30	30	30	30	50	30	30	30	60	60

2.5 Exisng Traà ffic Volumes

A set of representative baseline traffic volumes was determined from traffic data provided by the City of Hamilton. Because 2020 traffic volumes may not reflect typical conditions due to the effect of the COVID-19 pandemic, 2019 was assumed as a base year. The count data included many intersections that were counted in 2019; older traffic counts were used to fill in data gaps. Variability was observed from one count to another, reflecting seasonal variation or other factors; adjustments were made to smooth out variability where the surveyed traffic volumes appeared to be atypically high or low compared to other nearby intersections. **Figure 6** presents the intersection turning movement volumes (rounded to the nearest five vehicles) that were established to represent typical existing (2019) conditions.

Figure 6: Existing Traffic Volumes



2.6 Existing Truck Activity

Trucks comprise the following percentage of traffic on Rymal Road:

- During the AM peak hour:
  - Approximately 7% of all traffic between Upper James Street and Upper Sherman Avenue; and
  - Approximately 10% of all traffic between Upper Sherman Avenue and Dartnall Road.
- During the PM peak hour:
  - Approximately 2% of all traffic between Upper James Street and Upper Ottawa Street; and
  - Approximately 5% of all traffic between Upper Ottawa Street and Nebo Road.
- During daytime hours on a typical weekday:
  - Approximately 4–6% of all traffic between Upper James Street and Nebo Road; and
  - Approximately 7–8% of all traffic between Nebo Road and Dartnall Road.

2.7 Existing Pedestrian and Cycling Activity

The intersection turning movement counts listed in **Section 2.5** also include the number of pedestrians crossing each leg of the intersection. **Table 3** lists the pedestrian activity at signalized intersections along the corridor during the AM and PM peak hours.

Table 3: Existing Pedestrian Crossing Activity at Signalized Intersections

Rymal Road at:	AM peak hour				PM peak hour			
	N leg	S leg	W leg	E leg	N leg	S leg	W leg	E leg
Upper James Street	14	17	16	31	12	14	23	20
Atessa Drive / Springside Drive	2	3	0	1	0	4	0	0
Upper Wellington Street	5	5	2	12	3	2	5	7
Upper Wentworth Street	19	7	17	15	38	7	25	10
Library / YMCA Driveway	0	0	9	3	0	2	9	23
Upper Sherman Avenue	8	3	3	2	24	6	6	3
Miles Road	4	1	2	1	5	0	9	2
Upper Gage Avenue	14	9	4	15	22	13	10	26
Rockland Avenue / Grayrocks Avenue (IPS)	10	0	4	0	13	3	5	0
Upper Ottawa Street	3	1	0	5	5	2	1	3
Nebo Road	9	4	13	4	4	5	10	3
Dartnall Road	0	0	3	0	1	1	6	0

Pedestrian activity is generally low at most intersections. The intersections with the most pedestrian activity are at Upper James Street, Upper Wentworth Street and Upper Gage Avenue, where an average of approximately one pedestrian was recorded as crossing in each direction per cycle. These correspond to intersections with adjacent commercial nodes (including supermarkets) as well as HSR transfer points. Other intersections experience lower levels of pedestrian activity. The IPS at Rockland Avenue / Grayrocks Avenue experiences a demand of approximately 4 to 5 pedestrians crossing Rymal Road per hour.

Starting in 2018, the City's intersection turning movement counts include a 7-hour total of cyclists on each intersection approach. **Table 4** indicates the total number of cyclists at those intersections where data are available. Cycling activity is currently minimal (an average of 2 cyclists per hour or fewer).

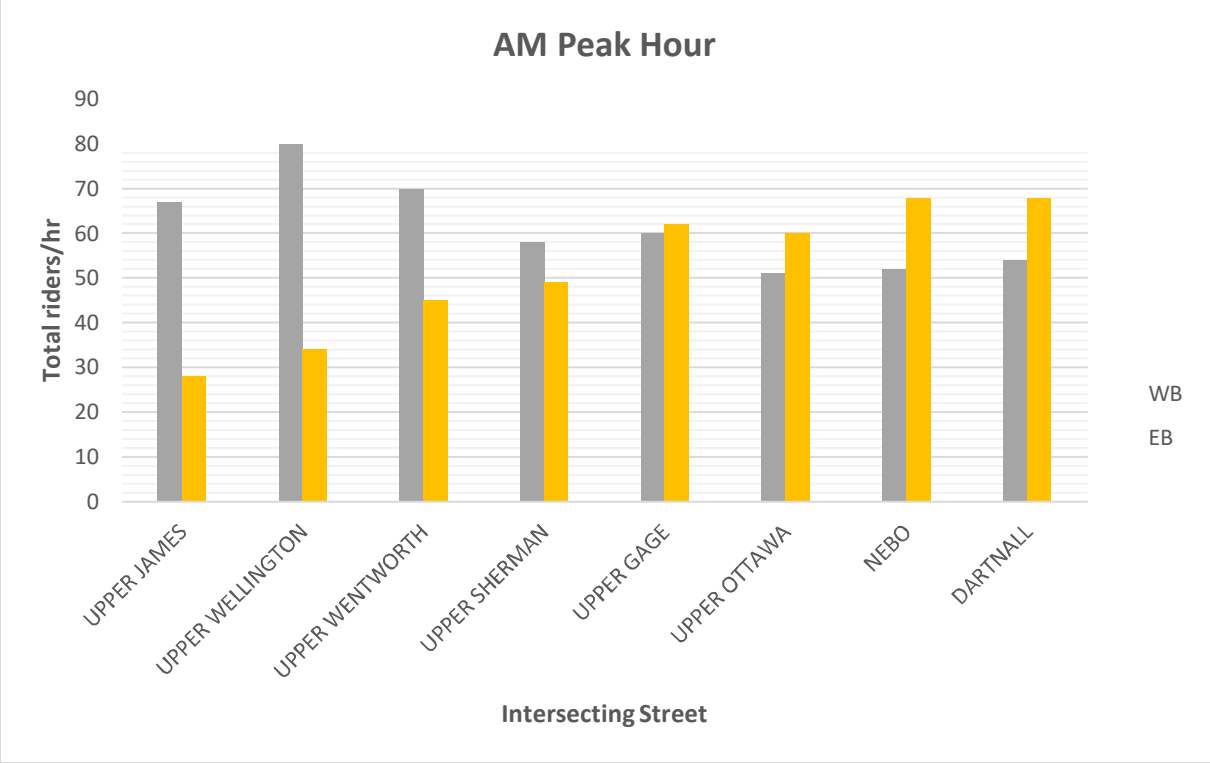
Table 4: Existing Cycling Activity

Rymal Road at:	Date	Total Cyclists (7 hours)				
		N leg	E leg	S leg	W leg	Total
Upper Wentworth Street	October 30, 2019	4	1	7	3	15
Arrowhead Drive	September 25, 2018	0	6	0	3	9
Upper Sherman Avenue	April 1, 2019	0	0	0	0	0
Eva Street / Miles Road	November 27, 2019	0	1	0	0	1
Upper Gage Avenue	April 10, 2019	2	2	3	2	9
Grayrocks Avenue / Rockland Avenue	November 26, 2019	1	2	0	0	3
Upper Ottawa Street	October 3, 2019	0	1	1	0	2
Nebo Road	November 26, 2019	0	0	0	0	0
Dartnall Road	November 26, 2019	0	0	1	1	2

2.8 Existing Transit Ridership

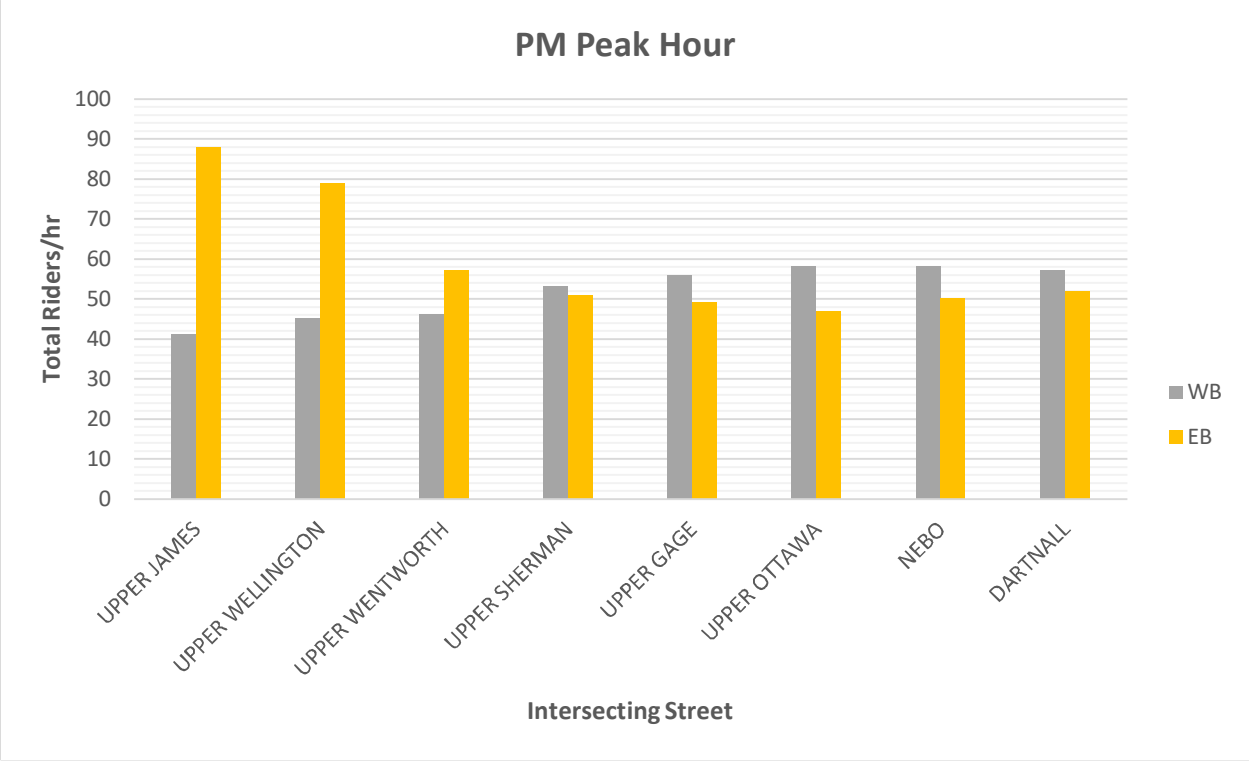
Historical (fall 2019, pre-COVID) ridership levels on the 44 Rymal route were provided by HSR. Ridership data were collected through automated passenger counting (APC) equipment that is installed on HSR buses. **Figure 7** and **Figure 8** illustrates the accumulated peak hour ridership by direction at major intersection along Rymal Road.

Figure 7: AM Peak Hour Ridership



During the AM peak hour, bus loading increases as buses travel westbound and eastbound through the study area; the maximum point ridership is approximately 80 passengers/hour westbound (departing Upper Wellington Street) and approximately 70 passengers/hour eastbound (approaching Dartnall Road). At a 15-minute headway, this would correspond to an average loading of up to 20 riders per bus.

Figure 8: PM Peak Hour Ridership



During the PM peak hour, bus loading decreases as buses travel westbound and eastbound through the study area; the maximum point ridership is approximately 90 passengers/hour eastbound (departing Upper James Street) and approximately 60 passengers/hour westbound (between Dartnall Road and Upper Ottawa Street). At a 15-minute headway, this would correspond to an average loading of up to 22 riders per bus.

2.9 Existing Intersection Operations

Intersection operational analyses were completed using Trafficware's Synchro software (version 10). At signalized intersections, the volume-to-capacity (v/c) ratio, average vehicular delay, level of service and 95th percentile queue were noted for each individual movement, and the average delay and level of service were noted for the intersection as a whole. At unsignalized (stop-controlled) intersections, the v/c ratio, delay, level of service and 95th percentile queue were noted for any stop-controlled movements. Level of service definitions are provided in **Appendix A**. Synchro reports are provided in **Appendix B**.

Table 5 presents the analysis results at signalized intersections. **Table 6** presents the results for unsignalized (stop-controlled) intersections. The IPS at Rocklands Avenue / Grayrocks Avenue was assessed as a signalized intersection, but with results shown only for the signal-controlled east-west movements.

Table 5: Existing Signalized Intersection Operations

Movement	AM Peak Hour				PM Peak Hour			
	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*
Rymal Road at Upper James Street								
EB left	0.35	C	20.2	29	0.51	C	24.3	34
EB through	0.41	C	25.0	52	0.70	C	32.3	100
WB left	0.43	C	22.0	34	1.00	F	83.5	80
WB through	0.43	C	26.8	56	0.58	C	29.9	81
NB left	0.60	C	23.7	58	0.73	C	33.3	43
NB through	0.88	D	43.5	157	0.82	D	39.4	124
SB left	0.68	D	36.5	33	1.13	F	122.7	110
SB through	0.42	C	31.6	57	0.75	D	38.7	120
SB right	0.16	A	5.7	10	0.25	B	11.8	23
Overall	—	**C**	**31.6**	—	—	**D**	**42.5**	—
Rymal Road at Atessa Drive / Springside Drive								
EB left	0.05	A	3.8	5	0.05	A	2.4	3
EB through	0.39	A	5.0	77	0.49	A	4.1	69
EB right	0.01	A	1.2	2	0.03	A	0.7	2
WB left	0.06	A	5.0	7	0.16	A	3.6	7
WB through	0.48	A	6.1	79	0.54	A	5.5	95
NB approach	0.54	C	22.1	25	0.39	C	23.5	17
SB approach	0.23	B	18.9	11	0.18	C	23.7	10
Overall	—	**A**	**7.4**	—	—	**A**	**5.6**	—
Rymal Road at Upper Wellington Street								
EB left	0.23	A	4.9	13	0.31	A	6.1	17
EB through	0.40	A	6.5	63	0.51	A	7.9	78
WB left	0.04	A	6.7	3	0.12	A	6.7	9
WB through	0.54	A	7.4	59	0.62	A	8.0	80
NB left	0.11	D	41.9	10	0.36	E	58.7	13
NB through	0.33	C	30.1	26	0.26	C	21.8	21
SB left	0.60	E	59.3	42	0.46	D	50.8	37
SB through	0.43	B	11.6	20	0.78	D	38.0	64
Overall	—	**B**	**12.2**	—	—	**B**	**15.0**	—

Movement	AM Peak Hour				PM Peak Hour			
	v/c	LOS	Delay (s/veh)	95th %ile queue (m)	v/c	LOS	Delay (s/veh)	95th %ile queue (m)
Rymal Road at Turner Park Library								
EB through	0.46	A	9.7	119	0.58	B	11.9	126
EB right	0.08	A	1.9	4	0.07	A	2.1	4
WB left	0.18	A	5.3	17	0.20	A	6.9	15
WB through	0.44	B	10.9	159	0.49	B	14.7	182
NB left	0.21	D	45.0	19	0.31	D	44.8	34
NB right	0.26	B	12.6	11	0.34	A	9.8	16
Overall	—	**B**	**10.5**	—	—	**B**	**13.8**	—
Rymal Road at Upper Wentworth Street								
EB left	0.44	A	4.7	6	0.49	A	6.4	9
EB through	0.32	A	3.0	11	0.48	A	3.3	21
EB right	0.03	A	0.3		0.02	A	0.1	
WB left	0.09	A	7.6	3	0.08	A	6.6	3
WB through	0.58	B	10.9	44	0.63	B	10.1	65
WB right	0.12	A	1.0		0.12	A	0.5	
NB left	0.19	D	38.3	20	0.12	D	36.6	13
NB through	0.48	D	42.3	54	0.31	C	32.4	32
SB left	0.44	D	48.0	31	0.45	D	46.7	38
SB through	0.10	D	36.1	15	0.16	D	37.5	21
SB right	0.36	A	8.2	16	0.42	A	8.3	18
Overall	—	**B**	**13.0**	—	—	**B**	**11.0**	—
Rymal Road at Upper Sherman Avenue								
EB left	0.31	A	7.0	15	0.47	B	10.4	19
EB through	0.32	A	7.8	79	0.50	B	11.5	142
WB left	0.00	A	0.0		0.00	A	0.0	
WB through	0.69	B	12.6	241	0.71	B	14.3	148
NB left	0.00	A	0.0		0.00	A	0.0	
NB through	0.00	A	0.0		0.00	A	0.0	
SB left	0.50	D	49.5	37	0.72	D	53.2	81
SB through	0.24	A	1.0		0.31	A	1.4	
Overall	—	**B**	**12.7**	—	—	**B**	**17.0**	—

Movement	AM Peak Hour				PM Peak Hour			
	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*
Rymal Road at Miles Road / Eva Street								
EB left	0.02	A	7.7	2	0.05	A	9.7	2
EB through	0.51	B	15.9	40	0.94	D	42.8	308
WB left	0.18	A	3.8	2	0.64	C	22.8	28
WB through	0.47	A	8.5	47	0.50	A	8.0	25
WB right	0.01	A	0.3		0.02	A	0.1	
NB approach	0.98	F	88.7	135	1.04	F	98.0	146
SB left	0.02	D	37.4	5	0.03	D	37.8	5
SB through	0.09	C	20.4	11	0.11	C	23.5	15
Overall	—	**C**	**27.6**	—	—	**D**	**39.1**	—
Rymal Road at Upper Gage Avenue								
EB left	0.25	A	3.6	16	0.36	A	2.0	7
EB through	0.34	A	7.0	81	0.46	A	3.7	41
WB left	0.03	B	11.1	5	0.09	B	13.2	11
WB through	0.43	B	14.1	92	0.46	B	16.6	113
WB right	0.16	A	3.2	13	0.19	A	4.7	18
NB left	0.28	D	45.2	25	0.21	D	41.2	20
NB through	0.32	D	45.5	37	0.17	D	40.0	25
NB right	0.12	A	4.9	5	0.09	A	3.0	3
SB left	0.62	E	59.3	47	0.76	E	65.9	67
SB through	0.11	D	40.9	15	0.36	D	44.0	44
SB right	0.41	B	10.7	17	0.48	A	8.7	21
Overall	—	**B**	**16.5**	—	—	**B**	**16.4**	—
Rymal Road at Upper Ottawa Street								
EB left	0.29	A	5.3	17	0.44	A	10.0	25
EB through	0.45	A	8.0	69	0.61	B	14.1	151
WB left	0.03	B	16.3	6	0.10	C	22.9	11
WB through	0.54	B	18.6	152	0.73	C	31.0	226
NB left	0.34	D	51.1	20	0.58	E	63.3	35
NB through	0.32	D	37.4	22	0.54	D	40.0	34
SB left	0.69	E	68.6	46	0.76	E	59.7	56
SB through	0.22	D	45.2	23	0.23	D	39.1	27
SB right	0.47	D	54.9	33	0.65	D	52.5	65
Overall	—	**C**	**22.7**	—	—	**C**	**30.6**	—

Movement	AM Peak Hour				PM Peak Hour			
	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*
Rymal Road at Nebo Road								
EB left	0.18	A	7.0	18	0.12	A	6.0	7
EB through	0.40	A	8.4	86	0.48	A	9.8	121
WB left	0.13	A	5.7	17	0.19	A	7.7	20
WB through	0.42	A	9.0	104	0.44	A	9.7	124
NB left	0.40	D	46.6	29	0.72	F	82.7	34
NB through	0.80	E	60.5	81	0.58	D	41.0	59
SB left	0.33	D	48.0	17	0.74	E	74.3	43
SB through	0.38	C	30.2	33	0.79	E	58.8	85
Overall	—	**C**	**20.5**	—	—	**C**	**25.0**	—
Rymal Road at Dartnall Road								
EB left	0.27	A	6.1	15	0.38	A	6.6	18
EB through	0.16	A	6.0	23	0.29	A	7.1	39
WB left	0.07	A	9.6	8	0.08	A	8.9	8
WB through	0.34	B	11.0	62	0.36	B	10.7	65
WB right	0.25	A	1.8	10	0.13	A	2.0	8
NB left	0.14	D	50.0	11	0.22	E	55.2	13
NB through	0.58	D	54.3	34	0.52	D	48.7	29
SB left	0.44	D	46.9	31	0.63	E	55.2	50
SB through	0.46	C	20.7	25	0.45	C	30.5	34
Overall	—	**B**	**16.1**	—	—	**B**	**17.8**	—

The signalized intersections along the corridor are all operating at good levels of service (LOS A to B) during the AM and PM peak hours, with the following exceptions:

- The intersections at Upper James Street and at Miles Road / Eva Street are operating at LOS C to D.
- The intersections at Upper Ottawa Street and at Nebo Road are operating at LOS C.

At most signalized intersections, the east-west movements on Rymal Road are operating at LOS A to B, while the side street movements are operating at poorer levels of service (mostly between LOS C and E, and in some cases LOS F). The poorer levels of service on the side street approaches reflect a long cycle length along the corridor (120 seconds) and timing plans that have been configured to favour east-west travel.

The only significant existing capacity constraint along the corridor is at the intersection with Miles Road/ Eva Street. This location experiences significant turning movement volumes to/from the south leg of the intersection; the northbound approach is at or near capacity during the AM and PM peak hours, and the westbound left turn is near capacity during the PM peak hour.

Table 6: Existing Unsignalized Intersection Operations

Movement	AM peak hour				PM peak hour			
	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*
Rymal Road at Massena Drive								
SB approach	0.02	C	15.2	1	0.03	C	18.2	1
Rymal Road at Republic Avenue								
SB left	0.07	C	21.9	2	0.05	C	23.9	1
SB right	0.05	B	13.3	1	0.06	B	14.1	2
Rymal Road at Arcadia Drive								
SB left	0.20	D	29.2	6	0.46	F	62.7	16
SB right	0.03	B	13.5	1	0.03	B	14.6	1
Rymal Road at Arrowhead Drive								
NB approach	0.16	D	25.2	5	0.26	E	43.3	8

During the AM peak hour, the unsignalized intersections that were included in the assessment are all operating at reasonable levels of service (LOS C to D for left turn or shared lanes; LOS B for right turn movements). During the PM peak hour, the left turn or shared lanes on Arcadia Drive and Arrowhead Drive are operating at poorer levels of service (LOS E to F), reflecting higher levels of delay. Notwithstanding, all unsignalized intersections included in the assessment have sufficient capacity to accommodate existing traffic volumes.

3.0 Collision Review

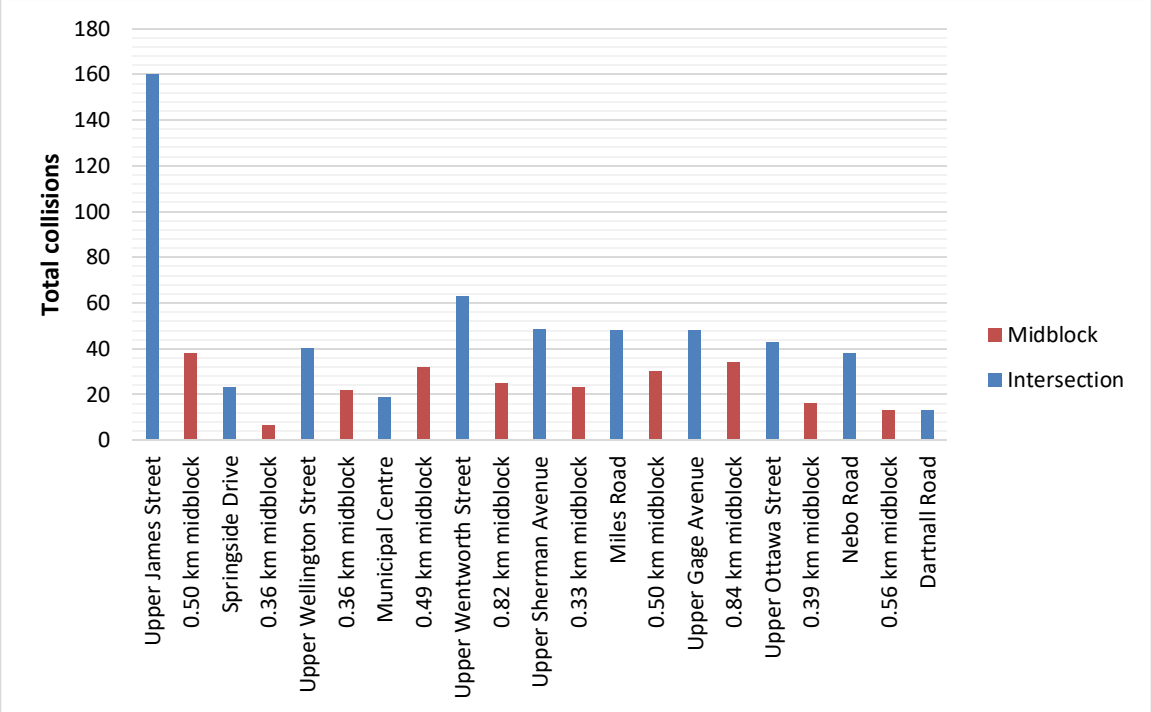
The City of Hamilton provided five years (2015 through 2019) of collision records for the Rymal Road corridor between Upper James Street and Dartnall Road, encompassing a total of 784 individual collisions. These collision records were reviewed to determine whether any patterns could be identified.

3.1 Collision Frequency by Location

Figure 9 presents the total number of collisions reported by location. Collisions occurred with the frequency at the main signalized intersections along the corridor. By a wide margin, the location experiencing the greatest number of collisions was the intersection with Upper James Street (160 collisions over five years); by comparison, the next highest location was the intersection with Upper Wentworth Street (63 collisions over the same five-year period).

There were 8 collisions reported at the intersection with Massena Drive; no other unsignalized experienced more than 6 collisions over this five-year period.

Figure 9: Geographic Distribution of Collisions



3.2 Collision Frequency by Year

On average, 156 collisions were reported each year within the study area. **Table 7** presents the collision frequency per year at each location and across the entire corridor.

Collisions occurred more frequently in 2019 (204 collisions, compared to an average of 145 per year in the preceding four years). The majority of this increase was in the section east of Upper James Street, and in the section between Upper Wellington Street and west of Upper Wentworth Street.

Table 7: Collision Frequency by Year

Location	2015	2016	2017	2018	2019	Total	Avg.
Upper James Street	36	37	28	28	31	**160**	**32.0**
0.50 km midblock	6	8	6	3	15	**38**	**7.6**
Springside Drive	5	4	6	3	5	**23**	**4.6**
0.36 km midblock	5	0	0	0	2	**7**	**1.4**
Upper Wellington Street	3	10	7	6	14	**40**	**8.0**
0.36 km midblock	3	6	0	2	11	**22**	**4.4**
Municipal Centre	1	2	2	5	9	**19**	**3.8**
0.49 km midblock	6	10	7	2	7	**32**	**6.4**
Upper Wentworth Street	8	13	14	13	15	**63**	**12.6**
0.82 km midblock	3	4	4	7	7	**25**	**5.0**
Upper Sherman Avenue	7	11	11	8	12	**49**	**9.8**
0.33 km midblock	5	5	2	5	6	**23**	**4.6**
Miles Road	14	6	9	7	12	**48**	**9.6**
0.50 km midblock	9	3	6	5	7	**30**	**6.0**
Upper Gage Avenue	10	7	8	11	12	**48**	**9.6**
0.84 km midblock	2	8	13	3	8	**34**	**6.8**
Upper Ottawa Street	3	6	11	10	13	**43**	**8.6**
0.39 km midblock	1	5	5	2	3	**16**	**3.2**
Nebo Road	10	4	11	8	5	**38**	**7.6**
0.56 km midblock	2	1	3	3	4	**13**	**2.6**
Dartnall Road	2	4	1	0	6	**13**	**2.6**
Total	**141**	**154**	**154**	**131**	**204**	**784**	**156.8**
% of total	**18%**	**20%**	**20%**	**17%**	**26%**	**100%**	**100%**

There was construction at various locations along the corridor in 2017, consisting of construction of sidewalks and/or paved shoulders. However, the overall collision frequency along the corridor that year was the same as the preceding year and did not appear to be affected by construction activities.

3.3 Collision Frequency by Month

Table 8 presents the collision frequency by month of the year. In most months, the collision frequency throughout the corridor was within 10% of the monthly average; October was slightly underrepresented.

Table 8: Collision Frequency by Month

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Upper James Street	24	13	12	12	14	14	11	5	13	11	14	17	160	13.3
0.50 km midblock	2	3	3	6	4	4	-	2	6	3	2	3	38	3.2
Springside Drive	2	2	3	1	3	1	2	1	1	1	2	4	23	1.9
0.36 km midblock	-	2	2	-	1	-	-	1	1	-	-	-	7	0.6
Upper Wellington Street	4	2	2	4	1	3	2	5	3	2	6	6	40	3.3
0.36 km midblock	2	2	1	4	3	2	1	2	3	2	-	-	22	1.8
Municipal Centre	-	-	2	1	2	1	3	1	3	-	1	5	19	1.6
0.49 km midblock	1	2	2	1	5	5	1	2	4	2	5	2	32	2.7
Upper Wentworth Street	6	3	7	4	4	6	5	4	6	6	4	8	63	5.3
0.82 km midblock	3	-	2	3	1	4	3	3	-	1	2	3	25	2.1
Upper Sherman Avenue	3	1	5	4	8	3	11	4	3	1	6	-	49	4.1
0.33 km midblock	2	1	3	5	2	3	1	1	2	1	2	-	23	1.9
Miles Road	2	2	4	4	5	2	4	6	5	3	6	5	48	4.0
0.50 km midblock	5	4	4	1	1	-	2	2	3	2	3	3	30	2.5
Upper Gage Avenue	5	6	5	5	3	4	1	3	4	5	4	3	48	4.0
0.84 km midblock	1	4	3	2	4	4	4	4	2	-	2	4	34	2.8
Upper Ottawa Street	3	3	7	2	3	2	2	2	5	6	6	2	43	3.6
0.39 km midblock	1	1	-	2	1	1	2	2	2	2	1	1	16	1.3
Nebo Road	5	2	1	2	1	4	3	4	3	6	2	5	38	3.2
0.56 km midblock	-	1	1	2	2	1	1	2	2	-	-	1	13	1.1
Dartnall Road	1	3	1	-	-	2	-	2	-	-	3	1	13	1.1
Total	**72**	**57**	**70**	**65**	**68**	**66**	**59**	**58**	**71**	**54**	**71**	**73**	**784**	**65.3**
% of total	**9%**	**7%**	**9%**	**8%**	**9%**	**8%**	**8%**	**7%**	**9%**	**7%**	**9%**	**9%**	**100%**	**100%**

3.4 Collision Frequency by Day of Week

Table 9 presents the collision frequency by day of week, as well as the average per weekday and per weekend day. Fridays and Saturdays were overrepresented (approximately 150 collisions each), while Monday was underrepresented (only 53 collisions).

Table 9: Collision Frequency by Day of the Week

Location	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total	Avg Mon-Fri	Avg Sat-Sun
Upper James Street	14	25	22	26	24	28	21	**160**	22.2	24.5
0.50 km midblock	4	5	7	6	9	3	4	**38**	6.2	3.5
Springside Drive	0	2	4	1	7	4	5	**23**	2.8	4.5
0.36 km midblock	1	0	1	3	1	1	0	**7**	1.2	0.5
Upper Wellington Street	7	5	6	3	4	10	5	**40**	5.0	7.5
0.36 km midblock	2	3	4	1	4	3	5	**22**	2.8	4.0
Municipal Centre	0	3	6	4	4	2	0	**19**	3.4	1.0
0.49 km midblock	0	3	6	4	8	3	8	**32**	4.2	5.5
Upper Wentworth Street	2	8	10	12	13	8	10	**63**	9.0	9.0
0.82 km midblock	4	1	2	5	9	3	1	**25**	4.2	2.0
Upper Sherman Avenue	2	5	6	8	8	13	7	**49**	5.8	10.0
0.33 km midblock	1	2	1	3	5	9	2	**23**	2.4	5.5
Miles Road	1	9	8	8	4	14	4	**48**	6.0	9.0
0.50 km midblock	3	2	3	7	8	6	1	**30**	4.6	3.5
Upper Gage Avenue	5	5	5	4	5	15	9	**48**	4.8	12.0
0.84 km midblock	0	7	3	5	8	7	4	**34**	4.6	5.5
Upper Ottawa Street	4	5	5	5	9	13	2	**43**	5.6	7.5
0.39 km midblock	1	1	3	1	2	2	6	**16**	1.6	4.0
Nebo Road	2	4	6	6	10	6	4	**38**	5.6	5.0
0.56 km midblock	0	3	2	1	2	5	0	**13**	1.6	2.5
Dartnall Road	0	1	4	3	4	1	0	**13**	2.4	0.5
Total	**53**	**99**	**114**	**116**	**148**	**156**	**98**	**784**	**106**	**127**
% of total	**7%**	**13%**	**15%**	**15%**	**19%**	**20%**	**13%**	**100%**		

3.5 Collision Frequency by Hour

Table 10 and **Table 11** present the collision frequency by hour (before noon and after noon, respectively).

Figure 10 presents the hourly collision profile graphically, as well as the eastbound and westbound hourly traffic profile (as measured between Nebo Road and Dartnall Road, where hourly traffic volumes were available). When comparing against traffic volumes, collision activity is understated in the morning, and overstated during the late afternoon and the PM peak period. (For example, the hour starting at 4:00 PM experiences approximately 8% of daily traffic but approximately 12% of all collisions.)

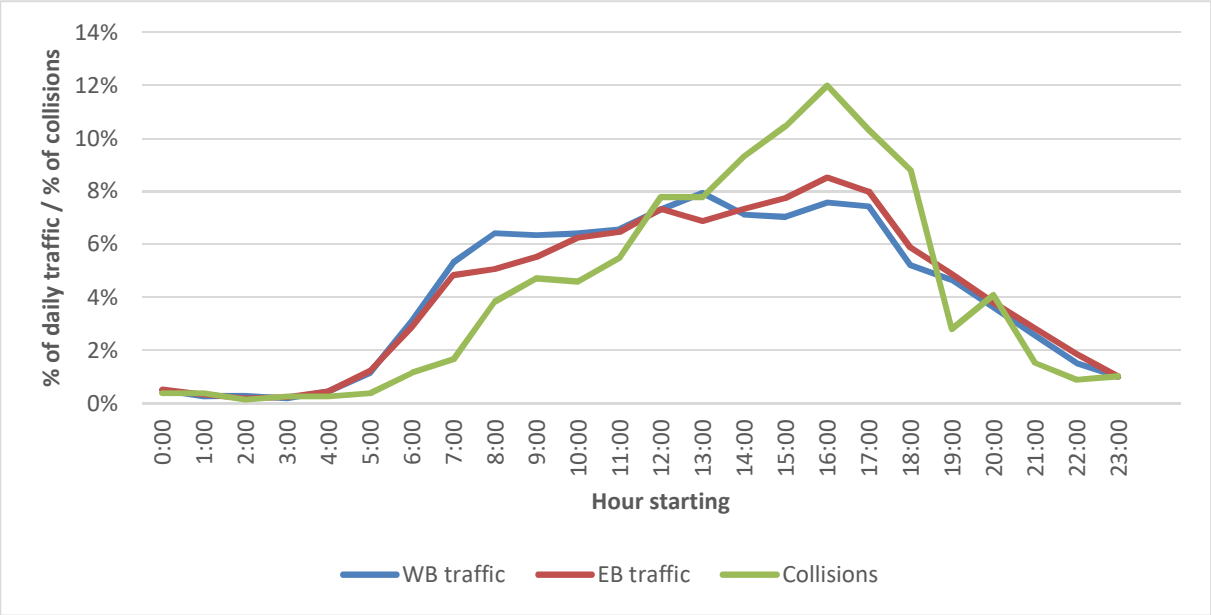
Table 10: Collision Frequency by Hour (AM)

Location	12AM	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM
Upper James Street	2	1	0	0	1	1	1	2	5	12	5	9
0.50 km midblock	0	0	0	0	0	0	0	0	3	2	1	2
Springside Drive	0	0	0	0	0	0	0	1	1	2	0	2
0.36 km midblock	0	0	0	0	0	0	0	0	2	0	1	0
Upper Wellington Street	0	0	0	1	0	0	0	0	0	3	1	0
0.36 km midblock	0	0	0	0	0	0	0	0	0	0	3	0
Municipal Centre	0	0	0	0	0	0	0	0	0	0	3	1
0.49 km midblock	0	0	0	0	0	0	0	0	0	0	3	3
Upper Wentworth Street	0	1	0	0	0	0	2	1	5	0	1	2
0.82 km midblock	0	1	0	1	0	0	0	0	3	0	2	1
Upper Sherman Avenue	0	0	0	0	1	0	1	2	2	1	3	1
0.33 km midblock	0	0	0	0	0	0	0	0	0	1	0	1
Miles Road	0	0	1	0	0	0	1	3	2	1	3	4
0.50 km midblock	0	0	0	0	0	0	0	0	2	1	1	2
Upper Gage Avenue	1	0	0	0	0	1	1	0	1	4	1	2
0.84 km midblock	0	0	0	0	0	0	0	0	2	1	1	5
Upper Ottawa Street	0	0	0	0	0	0	0	2	0	1	4	2
0.39 km midblock	0	0	0	0	0	0	0	0	0	2	2	0
Nebo Road	0	0	0	0	0	0	3	0	1	2	1	4
0.56 km midblock	0	0	0	0	0	1	0	0	1	3	0	1
Dartnall Road	0	0	0	0	0	0	0	2	0	1	0	1
Total	**3**	**3**	**1**	**2**	**2**	**3**	**9**	**13**	**30**	**37**	**36**	**43**
% of total	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**1%**	**2%**	**4%**	**5%**	**5%**	**5%**

Table 11: Collision Frequency by Hour (PM)

Location	12PM	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM	Total 24h
Upper James Street	15	14	14	20	11	18	15	3	5	3	1	2	**160**
0.50 km midblock	1	5	4	5	7	3	2	1	2	0	0	0	**38**
Springside Drive	1	0	2	4	4	1	3	2	0	0	0	0	**23**
0.36 km midblock	2	0	0	1	0	0	1	0	0	0	0	0	**7**
Upper Wellington Street	5	5	1	6	9	4	2	2	1	0	0	0	**40**
0.36 km midblock	3	2	1	0	4	3	4	0	1	0	1	0	**22**
Municipal Centre	3	1	0	1	3	2	3	1	1	0	0	0	**19**
0.49 km midblock	3	3	5	2	5	6	2	0	0	0	0	0	**32**
Upper Wentworth Street	6	5	8	5	12	6	4	1	1	2	0	1	**63**
0.82 km midblock	2	1	2	2	2	3	2	0	2	1	0	0	**25**
Upper Sherman Avenue	2	7	2	6	2	6	5	2	3	1	1	1	**49**
0.33 km midblock	0	0	4	5	7	5	0	0	0	0	0	0	**23**
Miles Road	4	4	6	1	4	7	5	1	1	0	0	0	**48**
0.50 km midblock	3	3	1	6	2	1	2	3	2	0	0	1	**30**
Upper Gage Avenue	2	2	7	5	3	6	4	0	3	2	1	2	**48**
0.84 km midblock	3	1	4	3	5	3	3	0	2	0	1	0	**34**
Upper Ottawa Street	0	2	6	4	5	5	5	3	3	1	0	0	**43**
0.39 km midblock	3	3	0	1	2	0	1	0	1	1	0	0	**16**
Nebo Road	2	1	4	3	6	1	4	1	2	1	1	1	**38**
0.56 km midblock	1	0	1	2	0	1	1	0	1	0	0	0	**13**
Dartnall Road	0	2	1	0	1	0	1	2	1	0	1	0	**13**
Total	**61**	**61**	**73**	**82**	**94**	**81**	**69**	**22**	**32**	**12**	**7**	**8**	**784**
% of total	**8%**	**8%**	**9%**	**10%**	**12%**	**10%**	**9%**	**3%**	**4%**	**2%**	**1%**	**1%**	**100%**

Figure 10: Traffic Profile vs. Collision Activity by Hour



Note: Hourly traffic profile as recorded between Nebo Road and Dartnall Road; collision activity reflects entire corridor

3.6 Collisions Involving Pedestrians or Cyclists

Table 12 isolates the total number of collisions involving vulnerable road users. Eleven reported collisions involved pedestrians, and 10 collisions involved cyclists.

Table 12: Collisions Involving Pedestrians or Cyclists

Location	Peds	Cyclists	Autos Only	Total
Upper James Street	0	1	159	**160**
0.50 km midblock	0	0	38	**38**
Springside Drive	0	0	23	**23**
0.36 km midblock	0	0	7	**7**
Upper Wellington Street	0	0	40	**40**
0.36 km midblock	0	0	22	**22**
Municipal Centre	0	1	18	**19**
0.49 km midblock	0	0	32	**32**
Upper Wentworth Street	5	0	58	**63**

Location	Peds	Cyclists	Autos Only	Total
0.82 km midblock	0	1	24	**25**
Upper Sherman Avenue	2	0	47	**49**
0.33 km midblock	0	1	22	**23**
Miles Road	1	2	45	**48**
0.50 km midblock	0	0	30	**30**
Upper Gage Avenue	0	1	47	**48**
0.84 km midblock	1	1	32	**34**
Upper Ottawa Street	1	2	40	**43**
0.39 km midblock	0	0	16	**16**
Nebo Road	0	0	38	**38**
0.56 km midblock	0	0	13	**13**
Dartnall Road	1	0	12	**13**
Total	**11**	**10**	**763**	**784**
% of total	**1%**	**1%**	**97%**	**100%**

Of the 11 pedestrian collisions, roughly half (5 collisions) were concentrated at the intersection with Upper Wentworth Street. One of these involved a van that lost control on icy pavement. The other four involved motorists that failed to yield to pedestrians while completing a turn (two southbound right turns; one southbound left turn; one eastbound left turn). The pedestrian collisions all resulted in non-fatal injuries.

The majority of the 10 cyclist collisions occurred in the 1.6-kilometre section between Upper Sherman Avenue and Upper Ottawa Street. Within that section, the collisions were relatively evenly distributed, with no more than 2 collisions reported at any one location. Although the number of cycling collisions can be considered to be low on an absolute basis (only 2 per year), this is offset by the low level of existing cycling activity within the corridor (on average, 2 cyclists per hour or fewer where cyclists have been included in intersection traffic counts). Roughly half (4 collisions) were due to drivers failing to yield the right of way. The other six involved motorists that were following too close and making improper turns with one instance of a motorist driving properly. Of the 10 cyclist collisions, 8 collisions resulted in non-fatal injuries with the remaining collisions resulting in property damage only.

3.7 Collision Frequency by Severity

Table 13 breaks down the severity of the collisions within the corridor.

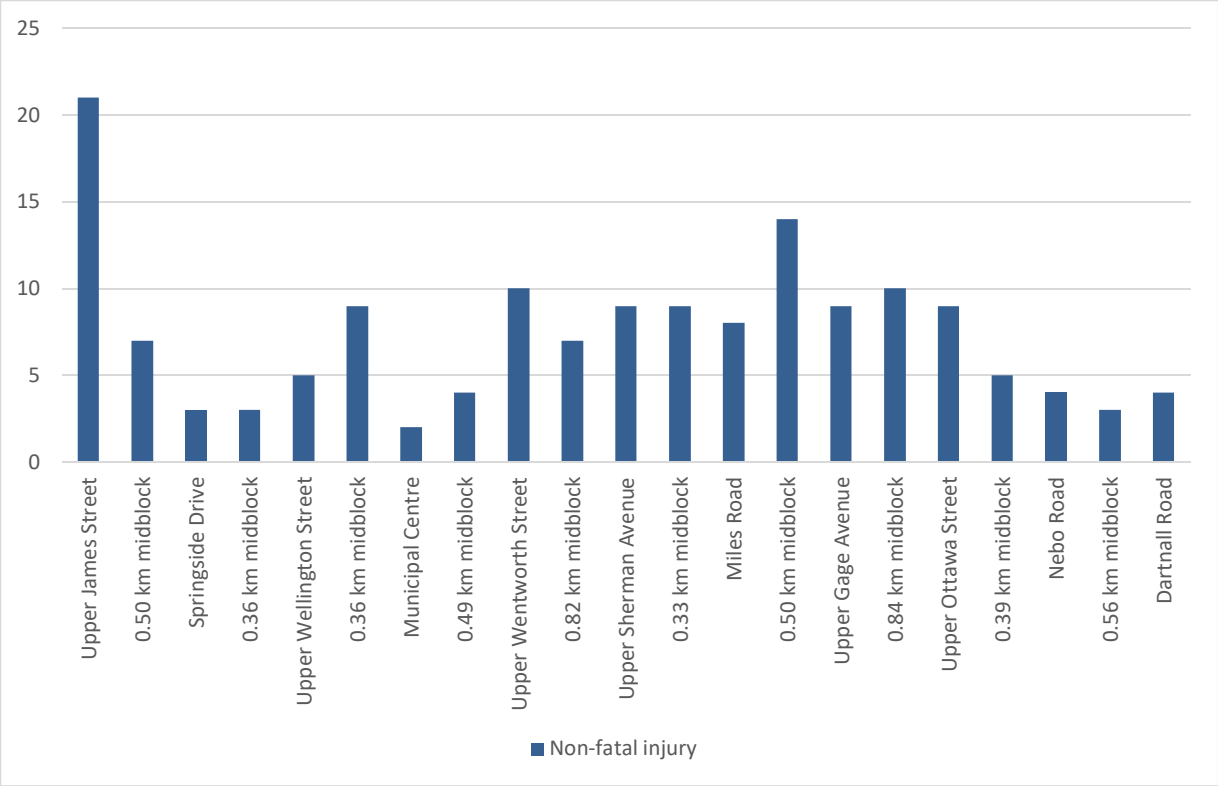
- 67% of the collisions were non-reportable;
- 20% resulted in non-fatal injury;
- 13% resulted in property damage only (PDO); and
- No collisions resulted in a fatality.

Table 13: Collision Frequency by Severity

Location	Non-Fatal Injury	Property Damage Only	Non-Reportable	Total
Upper James Street	21	25	114	**160**
0.50 km midblock	7	7	24	**38**
Springside Drive	3	2	18	**23**
0.36 km midblock	3	0	4	**7**
Upper Wellington Street	5	2	33	**40**
0.36 km midblock	9	2	11	**22**
Municipal Centre	2	1	16	**19**
0.49 km midblock	4	4	24	**32**
Upper Wentworth Street	10	8	45	**63**
0.82 km midblock	7	6	12	**25**
Upper Sherman Avenue	9	4	36	**49**
0.33 km midblock	9	3	11	**23**
Miles Road	8	8	32	**48**
0.50 km midblock	14	6	10	**30**
Upper Gage Avenue	9	3	36	**48**
0.84 km midblock	10	8	16	**34**
Upper Ottawa Street	9	2	32	**43**
0.39 km midblock	5	4	7	**16**
Nebo Road	4	4	30	**38**
0.56 km midblock	3	2	8	**13**
Dartnall Road	4	1	8	**13**
Total	**155**	**102**	**527**	**784**
% of total	**20%**	**13%**	**67%**	**100%**

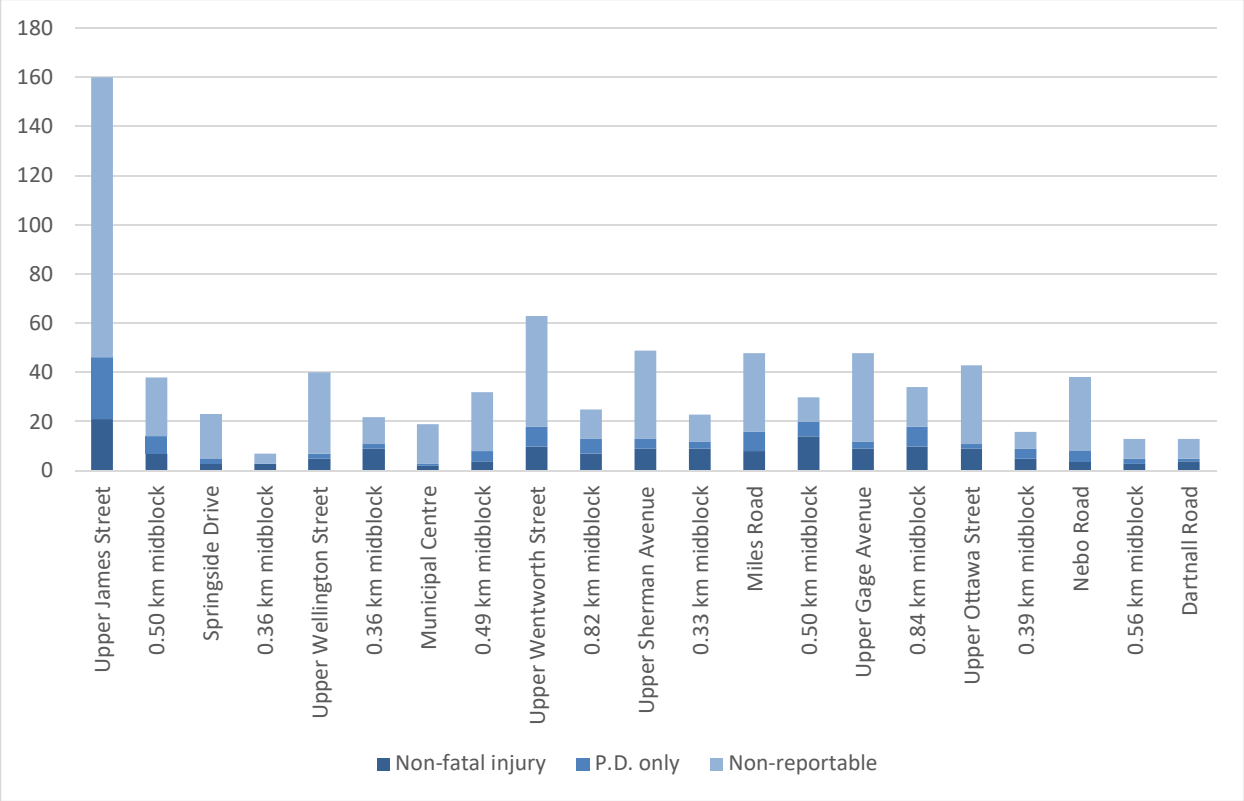
Figure 11 illustrates the number of injury collisions at each location; **Figure 12** illustrates all collisions including PDO and non-reportable[1] collisions. Although the Upper James Street intersection experienced a much higher collision frequency than any other location along the corridor, a high proportion of these were PDO and non-reportable collisions. The midblock sections along the central part of the corridor experienced a higher proportion of injury collisions (particularly between Miles Road and Upper Gage Avenue).

Figure 11: Injury Collisions by Location



[1] Collisions are considered non-reportable when certain conditions do not exist (e.g., no injuries; damage is less than $2,000; no damage to public or private property; did not involve a pedestrian; did not involve a criminal act such as DUI; etc.).

Figure 12: Collision Severity by Location



3.8 Collision Frequency by Environmental Conditions

Table 14 presents the collision frequency based on the environmental conditions at the time of the collision. For the majority of collisions, adverse environmental conditions were not reported as being a contributing factor. Environmental conditions were not noted for 39% of collisions. Of those collisions where environmental conditions were reported, 84% occurred during clear weather, 9% occurred during rainy conditions, and 7% occurred during winter weather or other conditions.

Table 14: Collision Frequency by Environmental Conditions

Location	Clear	Rain	Snow	Freezing Rain	Drifting Snow	Strong Wind	Fog, Mist, Smoke, Dust	(Blank)	Total
Upper James Street	71	5	3	0	1	0	0	80	**160**
0.50 km midblock	24	0	2	0	0	0	0	12	**38**
Springside Drive	10	0	1	1	0	0	0	11	**23**
0.36 km midblock	5	0	0	0	0	0	0	2	**7**
Upper Wellington Street	18	3	2	0	0	0	0	17	**40**
0.36 km midblock	12	5	0	0	0	0	0	5	**22**
Municipal Centre	12	1	0	0	0	0	0	6	**19**
0.49 km midblock	12	2	1	0	0	0	0	17	**32**
Upper Wentworth Street	33	2	2	1	0	0	0	25	**63**
0.82 km midblock	16	1	2	1	0	1	0	4	**25**
Upper Sherman Avenue	26	3	0	0	0	0	1	19	**49**
0.33 km midblock	14	2	0	0	0	0	0	7	**23**
Miles Road	26	3	0	0	0	0	0	19	**48**
0.50 km midblock	19	2	3	0	0	0	0	6	**30**
Upper Gage Avenue	21	3	2	0	0	1	0	21	**48**
0.84 km midblock	18	3	2	0	0	0	0	11	**34**
Upper Ottawa Street	23	2	2	0	0	0	1	15	**43**
0.39 km midblock	9	2	0	0	0	1	0	4	**16**
Nebo Road	13	3	0	0	0	0	1	21	**38**
0.56 km midblock	6	1	1	0	0	0	0	5	**13**
Dartnall Road	9	0	0	1	0	0	0	3	**13**
Total	**397**	**43**	**23**	**4**	**1**	**3**	**3**	**310**	**784**
% of Total	**51%**	**5%**	**3%**	**1%**	**0%**	**0%**	**0%**	**39%**	**100%**
% of Known (n=474)	**84%**	**9%**	**5%**	**1%**	**0%**	**1%**	**1%**	**—**	**100%**

3.9 Collision Frequency by Lighting Conditions

Table 15 presents the collision frequency based on the lighting conditions at the time of the collision. For the majority of collisions, poor lighting conditions were not reported as being a contributing factor. Lighting conditions were not noted for 67% of collisions. Of those collisions where lighting conditions were reported, 75% occurred in daylight, 18% occurred at night, and 6% occurred during dawn or dusk.

Table 15: Collision Frequency by Lighting Conditions

Location	Daylight	Dawn	Dusk	Dark	(Blank)	Total
Upper James Street	32	1	4	9	114	**160**
0.50 km midblock	12	0	0	2	24	**38**
Springside Drive	4	0	0	1	18	**23**
0.36 km midblock	3	0	0	0	4	**7**
Upper Wellington Street	5	0	0	2	33	**40**
0.36 km midblock	9	0	1	1	11	**22**
Municipal Centre	2	0	0	1	16	**19**
0.49 km midblock	7	0	0	1	24	**32**
Upper Wentworth Street	12	1	1	4	45	**63**
0.82 km midblock	9	0	0	4	12	**25**
Upper Sherman Avenue	8	0	0	5	36	**49**
0.33 km midblock	11	0	1	0	11	**23**
Miles Road	14	1	1	0	32	**48**
0.50 km midblock	16	0	0	4	10	**30**
Upper Gage Avenue	7	0	0	5	36	**48**
0.84 km midblock	15	0	1	2	16	**34**
Upper Ottawa Street	9	1	0	1	32	**43**
0.39 km midblock	6	0	1	2	7	**16**
Nebo Road	5	1	0	2	30	**38**
0.56 km midblock	4	0	1	0	8	**13**
Dartnall Road	4	0	0	1	8	**13**
Total	**194**	**5**	**11**	**47**	**527**	**784**
% of Total	**25%**	**1%**	**1%**	**6%**	**67%**	**100%**
% of Known (n=257)	**75%**	**2%**	**4%**	**18%**	**—**	**100%**

Note: Percentages may not add to 100% due to rounding.

3.10 Collision Frequency by Road Surface Conditions

Table 16 presents the collision frequency based on the road surface conditions at the time of the collision. For the majority of collisions, adverse road surface conditions were not reported as being a contributing factor. Road surface conditions were not noted for 67% of collisions. Of those collisions where road surface conditions were reported, 75% occurred on dry pavement, 18% occurred on wet pavement, and 8% occurred on snowy, slushy or icy pavement.

Table 16: Collision Frequency by Road Surface Conditions

Location	Dry	Wet	Slush	Loose Snow	Packed Snow	Ice	(Blank)	Total
Upper James Street	37	6	1	0	1	1	114	**160**
0.50 km midblock	14	0	0	0	0	0	24	**38**
Springside Drive	4	0	0	0	0	1	18	**23**
0.36 km midblock	2	1	0	0	0	0	4	**7**
Upper Wellington Street	4	3	0	0	0	0	33	**40**
0.36 km midblock	7	4	0	0	0	0	11	**22**
Municipal Centre	3	0	0	0	0	0	16	**19**
0.49 km midblock	6	2	0	0	0	0	24	**32**
Upper Wentworth Street	15	2	0	0	0	1	45	**63**
0.82 km midblock	8	1	2	1	1	0	12	**25**
Upper Sherman Avenue	10	3	0	0	0	0	36	**49**
0.33 km midblock	10	1	1	0	0	0	11	**23**
Miles Road	13	3	0	0	0	0	32	**48**
0.50 km midblock	14	4	1	0	1	0	10	**30**
Upper Gage Avenue	9	2	0	1	0	0	36	**48**
0.84 km midblock	14	2	0	1	0	1	16	**34**
Upper Ottawa Street	7	2	0	0	1	1	32	**43**
0.39 km midblock	6	3	0	0	0	0	7	**16**
Nebo Road	5	3	0	0	0	0	30	**38**
0.56 km midblock	3	2	0	0	0	0	8	**13**
Dartnall Road	3	1	0	1	0	0	8	**13**
Total	**194**	**45**	**5**	**4**	**4**	**5**	**527**	**784**
% of Total	**25%**	**6%**	**1%**	**1%**	**1%**	**1%**	**67%**	**100%**
% of Known (n=257)	**75%**	**18%**	**2%**	**2%**	**2%**	**2%**	**—**	**100%**

3.11 Collision Frequency by Initial Impact Type

Table 17 presents the collisions broken down by initial impact type. The following was noted:

- More than half of all collisions (56%) were rear-end collisions;
- 15% of collisions were angle collisions;
- 11% of collisions were sideswipe collisions, but this is skewed by the results at Upper James Street; elsewhere in the corridor, sideswipe collisions comprised only 8% of collisions;
- 8% of collisions involved turning vehicles;
- 12% of collisions were in other categories (primarily single motor vehicle collisions).

Table 17: Collision Frequency by Inial Impact Type

Location	Approaching	Angle	Rear End	Sideswipe	Turning Movement	SMV Unattended Vehicle	SMV Other	Other	Total
Upper James Street	4	23	71	35	22	0	4	1	**160**
0.50 km midblock	1	14	10	6	4	0	1	2	**38**
Springside Drive	0	3	15	0	2	0	1	2	**23**
0.36 km midblock	0	1	6	0	0	0	0	0	**7**
Upper Wellington Street	1	4	23	5	4	0	1	2	**40**
0.36 km midblock	0	0	21	0	1	0	0	0	**22**
Municipal Centre	0	2	10	3	3	0	0	1	**19**
0.49 km midblock	0	3	23	3	2	1	0	0	**32**
Upper Wentworth Street	2	6	39	6	3	0	6	1	**63**
0.82 km midblock	2	4	11	3	0	0	4	2	**25**
Upper Sherman Avenue	0	1	42	0	2	0	4	0	**49**
0.33 km midblock	1	1	20	1	0	0	0	0	**23**
Miles Road	0	5	36	0	3	0	1	3	**48**
0.50 km midblock	0	6	18	2	1	0	0	3	**30**
Upper Gage Avenue	1	10	21	6	7	1	1	1	**48**
0.84 km midblock	0	6	11	5	2	0	8	2	**34**
Upper Ottawa Street	2	6	28	1	2	0	2	2	**43**
0.39 km midblock	0	7	7	1	1	0	0	0	**16**
Nebo Road	0	10	18	6	3	0	0	1	**38**
0.56 km midblock	0	5	4	2	1	0	1	0	**13**
Dartnall Road	0	1	5	2	0	1	2	2	**13**
Total	**14**	**118**	**439**	**87**	**63**	**3**	**36**	**24**	**784**
% of Total	**2%**	**15%**	**56%**	**11%**	**8%**	**0%**	**5%**	**3%**	**100%**

Rear-end collisions comprised more than half of the collisions along the corridor, and 357 (81%) of them involved eastbound or westbound vehicles on Rymal Road. Adverse road surface conditions can generally contribute to rear-end collision risk, but in this case they were only identified as being a factor in 30 (8%) of these collisions. The frequency of these rear-end collisions was observed to be highest between the midday period and the end of the PM peak period. Potential contributing factors may include the eastbound lane drop east of Upper James Street; the extent of direct property access, combined with traffic characteristics (the relatively high volumes in a single lane; longer queues at intersections) may also be a factor.

3.12 Summary of Collision Activity

Between 2015 and 2019 (inclusive), 784 collisions were reported within the study area, for an average of 156 collisions per year. By far the highest frequency of collisions was observed at the Upper James Street intersection (20% of all collisions).

Collisions were roughly 40% more frequent in 2019 than in the four preceding years. Collisions were relatively evenly distributed throughout the year; occurred more frequently on Fridays and Saturdays compared to other days of the week; and occurred less frequently during the morning, and more frequently during the late afternoon and PM peak period, than the hourly traffic volume profile might suggest.

The majority of collisions were non-reportable or resulted in property damage only; 20% resulted in injury, and no collisions resulted in a fatality. Midblock collisions were more likely to result in injury than intersection collisions.

Most collisions occurred under ideal environmental, lighting, and road surface conditions.

More than half (56%) of all collisions were rear-end collisions. Most of these involved eastbound or westbound vehicles (i.e., few occurred on intersecting streets), and most occurred on dry pavement (i.e., wet or slippery roadways were less of a factor than might normally be expected). Potential contributing factors may include the eastbound lane drop east of Upper James Street; the extent of direct property access, combined with traffic characteristics (the relatively high volumes in a single lane; longer queues at intersections) may also be a factor.

The widening of the road to two lanes per direction may help to address the pattern of rear-end collisions (reduced queue lengths; reduced friction at unsignalized right turns), although this may be offset by other factors (potential for increased sideswipe collisions; potential for higher midblock speeds and higher turning speeds at intersections; longer pedestrian crossing distances).

Eleven collisions involved pedestrians, roughly half of which occurred at Upper Wentworth Street. Ten collisions involved cyclists, most of which occurred between Upper Sherman Avenue and Upper Ottawa Street. Most of these collisions resulted in non-fatal injuries.

The number of cycling collisions was low, although this should be considered in the context of the low existing level of cycling activity in the corridor. There are currently no dedicated bicycle facilities in the corridor. A bicycle facility would provide an improved sense of security for cyclists, although a two-way cycling facility would likely not have addressed the reported collisions; all were angle collisions and most involved right-turning motorists and "contraflow" cyclists approaching from the right, which would be reinforced with a two-way cycling facility.

4.0 Future Policy Context

The following City of Hamilton plans and policies were reviewed for applicability to the Rymal Road review.

4.1 Official Plan

From the perspective of the urban structure, the City of Hamilton Official Plan designates Rymal Road throughout the study area as one of a number of "secondary corridors", which generally correspond with the lower-priority rapid transit corridors (see **Section 4.3.1**). They are intended to be mixed-use corridors with retail and service clusters at key intersections and medium-density housing between these clusters, and with a focus on moderate-scale intensification, introduction of multiple-storey mixed use buildings, and measures to create "vibrant pedestrian and transit oriented places through investment in infrastructure, residential intensification, infill and redevelopment, and careful attention to urban design."

Schedule "C" of the Urban Hamilton Official Plan ("Functional Road Classification") identifies a southerly extension of Upper Sherman Road from Rymal Road to the urban boundary. However, the corresponding schedule of the Rural Hamilton Official Plan ("Rural Functional Road Classification") does not indicate a further southerly extension into the rural area.

4.2 Transportaon` Master Plan

The City of Hamilton completed an update to their Transportation Master Plan (TMP) in 2018. From an infrastructure perspective, it included recommendations related to active transportation, transit, roads, complete-livable better streets, and connectivity. As part of the TMP update, separate background reports were prepared discussing elements such as goods movement, the cycling network, and road safety.

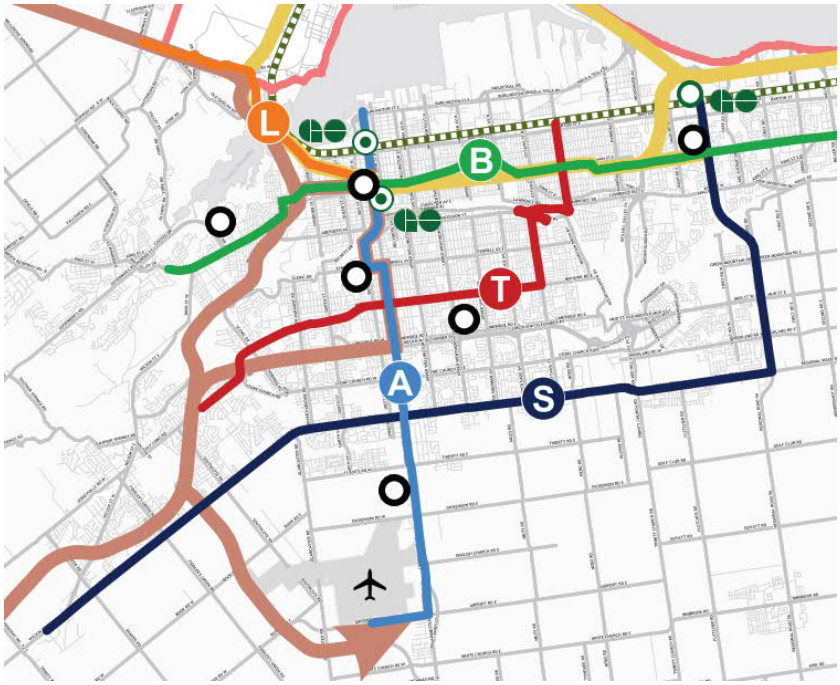
The TMP does not identify Rymal Road for widening within the study area. It does recommend the widening of Rymal Road / Garner Road west of West 5th Street (which has subsequently been completed as far west as Upper Paradise Road), as well as the widening of Upper Wellington Street between Rymal Road and the Lincoln Alexander Parkway. It also identified the potential extension of the Upper Red Hill Valley Parkway southerly and westerly to Highway 6 south of Mount Hope as an alternate truck route between the Red Hill Valley Parkway and the airport, although this link was identified at a conceptual level only.

4.3 Transit Policy and Planning Studies

4.3.1 BLAST Network

The Rymal Road corridor is part of the City's proposed "BLAST" rapid transit network, developed in 2008 in conjunction with the Metrolinx Regional Transportation Plan (RTP), known as "The Big Move". The BLAST network, shown in **Figure 13**, consists of five rapid transit corridors that were identified in the Metrolinx RTP. The S-line was envisioned to extend east-west along the southern limits of the City along Garner Road and Rymal Road, before turning to the north and continuing along Centennial Parkway to Eastgate Square. This network was subsequently carried forward as part of the City's Transportation Master Plan update in 2018.

Figure 13: Proposed BLAST Rapid Transit Network (2018)



Source: Map 2, 2018 Transportation Master Plan

To date the primary focus has been on the B-line (King/Main Street corridor) and A-line (Upper James Street corridor). The B-line is an existing high-ridership corridor with a long history of express service, and the A-line is an emerging corridor serving a strategic market between downtown and the upper city. The Big Move identified these corridors in the 15-year priority network. The T-line, along Mohawk Road and Kenilworth Avenue, was identified as a secondary corridor in Metrolinx's 25-year network. By comparison, the S-line was identified more conceptually as a potential longer-term corridor; at the time of their RTP, Metrolinx anticipated it to occur beyond the 25-year horizon.

The type of infrastructure and service associated with the S-line has not been determined to this point, but is anticipated to be a bus-based service. This could include buses operating in reserved lanes; limited-stop express service in mixed traffic overlaying the existing local service (similar to the existing A-line); or some intermediate combination (e.g., implementing high-frequency service on the existing route; construction of enhanced passenger amenities and/or strategic priority measures).

4.3.2 Rapid Ready

In preparation for the implementation of the BLAST network, the City of Hamilton prepared a report ("Rapid Ready") in 2013, documenting policies and initiatives to support the planned development of a rapid transit network in Hamilton (focusing primarily on the A-line and B-line light rail corridors). It identified the following seven "key actions" as interim measures to support those corridors:

1. **Building a rapid-ready transit network:** Enhance and increase bus services, restructure the route network around rapid transit corridors.
2. **Creating an accessible transportation system:** Transit and the transportation system will be fully accessible.
3. **Making transit faster and more reliable:** Transit must offer journey times competitive to driving to be an attractive choice.
4. **Creating a refined transit customer experience:** Provide customer service and amenities to make it easier and more attractive to use transit.
5. **Providing safe and convenient walking and cycling environments:** Encourage walking and cycling for short- and medium-distance trips while creating strong linkages to transit.
6. **Integrating corridor and community planning:** Planning for and building the city around transit.
7. **Developing seamless multi-modal connections:** Integrating different modes of transportation to maximize connections to transit.

From a service and route structure perspective, the report recommending enhancing the base transit network to build ridership in the B-Line and A-Line rapid transit corridors and to feed those corridors. It recommended increased service levels (frequency; duration; service area coverage) to increase the attractiveness of the HSR network as a whole and to grow ridership and establish travel patterns associated with planned rapid transit corridors. While the primary focus was the B-Line and A-Line corridors, the study also suggested the designation of a frequent transit network that conceptually included the eastern half of the S-Line (east of Upper James Street).

4.3.3 10-Year Local Transit Strategy

Leading out of the Rapid Ready study, the 10-Year Local Transit Strategy was prepared by City staff in February 2015 in response to Council direction requesting recommendations and a financial strategy to increase service with a goal of reaching 80-100 riders per capita by 2025.

Part of the strategy was developing the BLAST network to promote ridership growth:

- Increasing service levels on the A, B & T-Line corridors towards rapid transit;
- Introducing express service on the S and L lines;
- Strengthening the connectivity between the terminals/nodes (Downtown, McMaster University, Lime Ridge Mall, Eastgate Square, Mohawk College, Meadowlands, Valley Park, MTC/Airport); and
- Feeding the future rapid transit corridors.

On the BLAST corridors, the strategy identified shifting modal split incrementally, first through improved service on the existing lines, then by overlaying express bus service before implementing higher-order transit measures.

Associated measures included implementing transit priority measures (including signal priority, queue jump lanes and dedicated lanes) at strategic locations in the network, and improving headways to 10 minutes or better on major BLAST corridors to differentiate the quality of service on those lines.

4.3.4 S-Line Ridership Study

Although the Metrolinx RTP initially identified the S-Line as a longer-term priority (beyond that study's 25-year horizon of 2033), any changes to Rymal Road resulting from the current study offer an opportunity to advance any transit measures associated with the S-Line. To that end, a separate ridership study was completed by Dillon in September 2022 as part of this project. The study estimated future transit ridership along the Rymal Road corridor within the study area, and made recommendations as to appropriate service levels and supporting infrastructure to meet that projected ridership.

The study prepared ridership forecasts along the entire S-Line corridor. These forecasts refer to point ridership (the number of riders passing a given point in each direction) during the AM peak hour, and were prepared for 2031, 2041 and 2051 horizons. The following ridership levels were forecast for the central section of the S-Line (Upper James Street to Dartnall Road):

- 60 to 70 passengers per direction per hour under existing conditions;
- 100 to 125 passengers per direcon per` hour by 2051 after accounting for population growth within 1 kilometre of the S-Line corridor;
- 235 to 285 passengers per direcon per hour by` 2051 aer applying higher` transit trip rates (increased transit modal split); and
- 400 to 485 passengers per direcon per hour by` 2051 if service improvements along Rymal Road induce riders to shi` to the S-Line instead of using other routes for the same trip.

The study assessed the need for transit priority measures based on ridership and service frequency. The potential range of measures included the following:

- No transit measures required.
- Priority bus corridor:
  - Transit signal priority and/or physical intersecon meaȁsures (such as queue jump lanes); and/or
  - Managed lane for transit and high occupancy vehicles.
- Exclusive transit lane:
  - Not separated from general traffic; or
  - Physically separated from traffic.

The following two criteria were established to evaluate the need and/or level of transit priority:

- Number of transit passengers at peak points on each segment.
  - Continuous Transit Priority (TP), or exclusive facilities, should be considered when there are more than 700 passengers per hour per direcon (baseąd on the approximate equivalent person capacity of a standard vehicle lane).
  - Isolated Transit Priority measures should be considered when there are between 300 and 700 passengers per hour per direction.
- Number of bus routes and combined headway within corridor.
  - Transit Priority should be considered where there are frequent buses (frequent defined as a bus arriving almost every signal cycle — estimated as 30 buses per hour assuming a 120 second cycle).

This evaluation found the following:

- On the basis of ridership, the 2051 forecasts would warrant isolated transit priority measures within the majority of the S-Line corridor, but not a dedicated exclusive facility.
- On the basis of bus headways, the number of buses per hour would not warrant transit priority through the majority of the S-Line corridor. The section between Upper James Street and Dartnall Road was idenfied as an` exception, with transit priority measures being nearly jusfied. This` section is different because it includes two segments (between Upper Wellington Street and Upper Wentworth Street; between Upper Sherman Avenue and Upper Gage Avenue) where north-south routes travel along Rymal Road as part of an end-of-line loop.

4.3.5 HSR Operational Plans

Through partnership with McMaster University, the City's Transit Division initiated a project known as "(Re)envision the HSR" in April 2018 to redesign the entirety of the HSR's transit system. The project undertook a full redesign of the HSR network to make Hamilton "rail ready" by structuring the transit network around the Hamilton LRT, and more generally to make the network more attractive in terms of residents' travel mode choices. A concept network was developed illustrating proposed transit operations on the opening day of Hamilton LRT operation; the proposed service plan was completed in

September 2022 and issued to City Council in April 2023, followed by a period of public and stakeholder feedback.

The April 2023 report to City Council documented policies and initiatives to support the redesigned HSR network. It identified the following seven objectives utilized when designing the network:

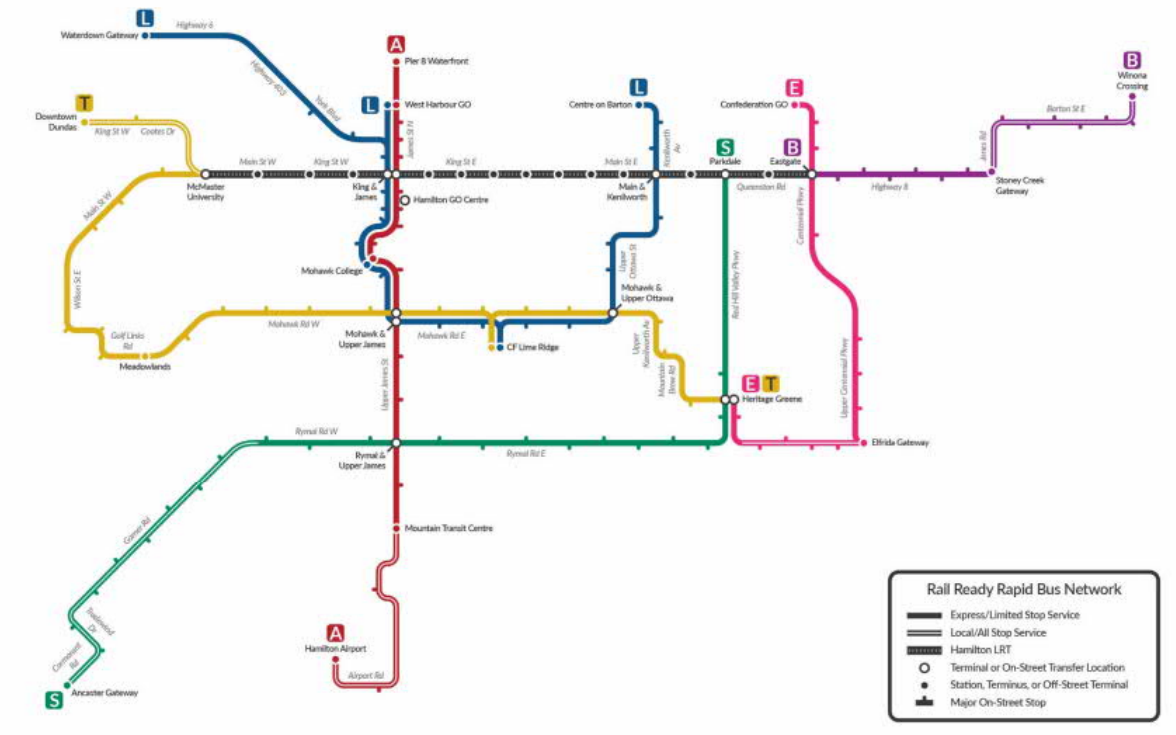
1. Maximizing service reliability;
2. Minimizing the number of transfers required;
3. Expanding service coverage area;
4. Improving infrastructure;
5. Improving regional transit service connectivity;
6. Expanding hours of service; and
7. Enhancing robustness of network to improve travel alternatives during service disruptions.

The new network concept divides routes according to the following hierarchy:

1. **Rapid:** Corresponds to the rapid transit network. High frequency (10-minute headways or better during peak periods). Limited stops (spacing of 500 metres or greater). May have dedicated transit lanes and/or transit signal priority.
2. **Core:** Major trunk routes operating along arterial roadways. Medium frequency (15-minute headways or better during peak periods). Moderate stop spacing of 250 to 400 metres.
3. **Feeder:** Routes running perpendicular to the LRT and designed to provide LRT access to riders originating outside walking distance from an LRT stop. Medium frequency (15-minute headways or better during peak periods).
4. **Local:** Lower-frequency (20-minute headways or better during peak periods) routes operating primarily on collector roadways, designed primarily for local access with shorter stop spacing (200 to 300 metres).
5. **On-demand:** Request-based transit service in areas where ridership levels are unable to support conventional fixed-route service.

The new rapid bus network (illustrated in **Figure 14**) includes a modified S-Line (also now known as Route 30). East of Upper James Street (connection to the A-Line) it would be a limited-stop route running to Heritage Greene, with stops at major north-south arterial roads, then travel express along the Red Hill Valley Parkway to the Parkside LRT stop. West of Upper James Street, it would be a limited-stop route as far as Redeemer University, then would be a local service running along Garner Road into the Ancaster Gateway hub.

Figure 14: Proposed "Rail Ready" LRT and Rapid Bus Network



The modified core, feeder and local routes within the study area are illustrated in **Figure 16** and can be compared against the existing network illustrated in **Figure 15**. The proposed "rail ready" routes within the study area the following:

- A parallel local route (36 Rymal) along Rymal Road, serving riders originating beyond walking distance of an S-Line stop;
- A restructuring of the 25 Upper Wentworth / 26 Upper Wellington loop and the 23 Upper Gage / 24 Upper Sherman loop, such that 26 Upper Wellington travels west along Rymal Road to Upper James and then southerly to the Mountain Transit Centre terminal, and the other three routes converge at a loop on Upper Sherman Avenue; and
- Restructuring of the service within the Red Hill Business Park.

Figure 15: Pre-Covid Baseline Condition (2019) HSR Map (Excerpt)

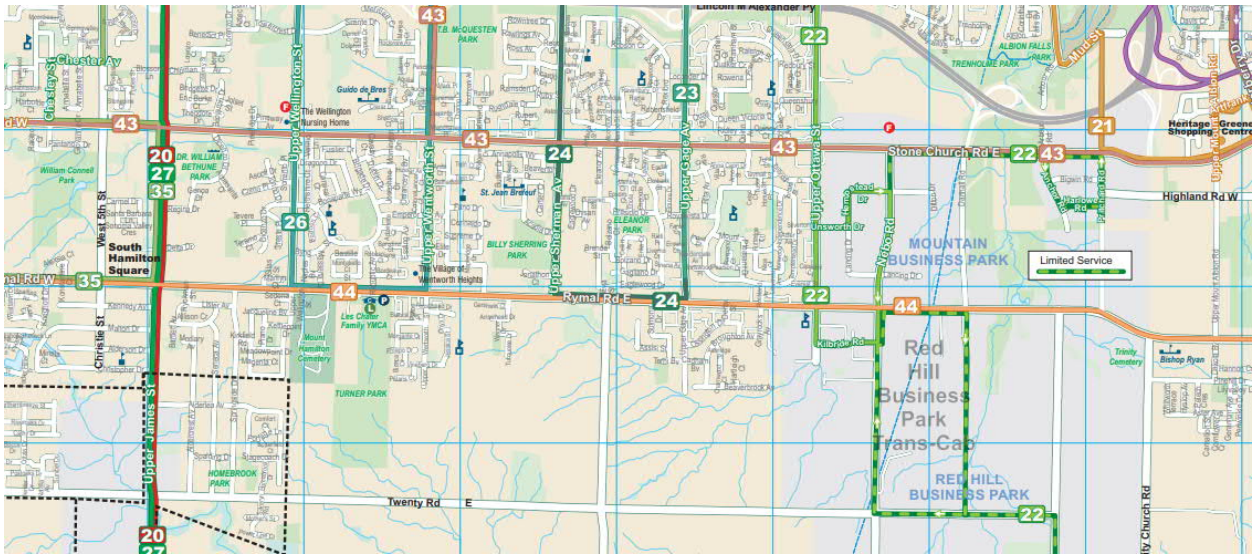
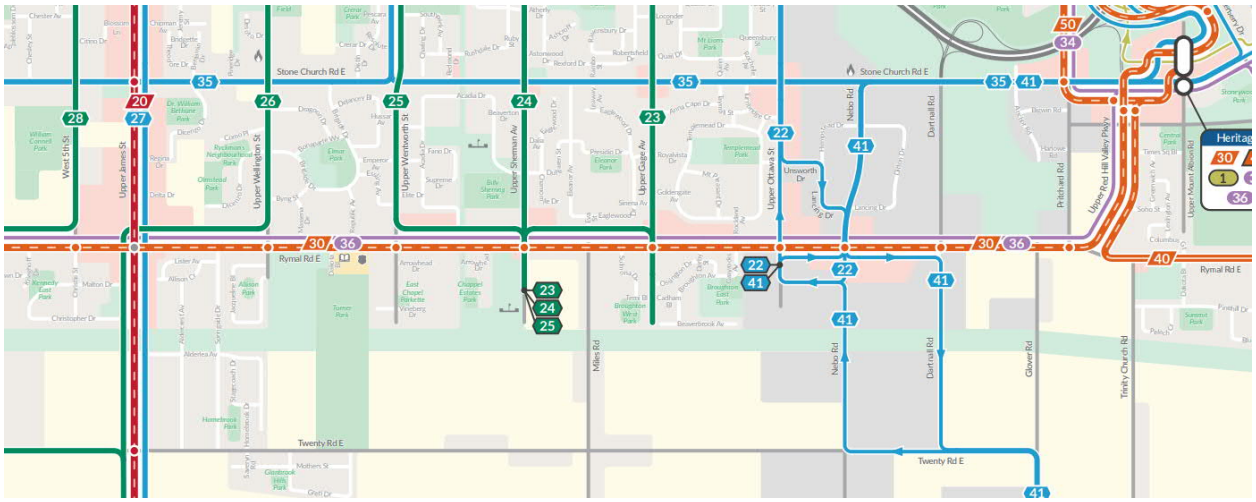


Figure 16: Proposed "Rail Ready" Transit Network Modifications (Excerpt)



4.4 Truck Route Network

The City undertook an update to the Truck Route Master Plan (TRMP) in September 2020. The updated TRMP was published in April 2022.

The 2022 TRMP recommended that all truck routes existing within the study area at that time be maintained:

- The full Rymal Road corridor (including Garner Road) throughout the city;
- Upper James Street;
- Upper Wentworth Street (north of Rymal Road);
- Upper Gage Avenue (north of Rymal Road);

- Upper Ottawa Street;
- Nebo Road (as far south as Twenty Road); and
- Dartnall Road.

It also recommended the addition of the following links in the long term:

- Nebo Road (extension of existing truck route southerly from Twenty Road to Dickinson Road East); and
- Dartnall Road (extension of existing truck route southerly from Twenty Road to Dickinson Road East).

4.5 Cycling Master Plan

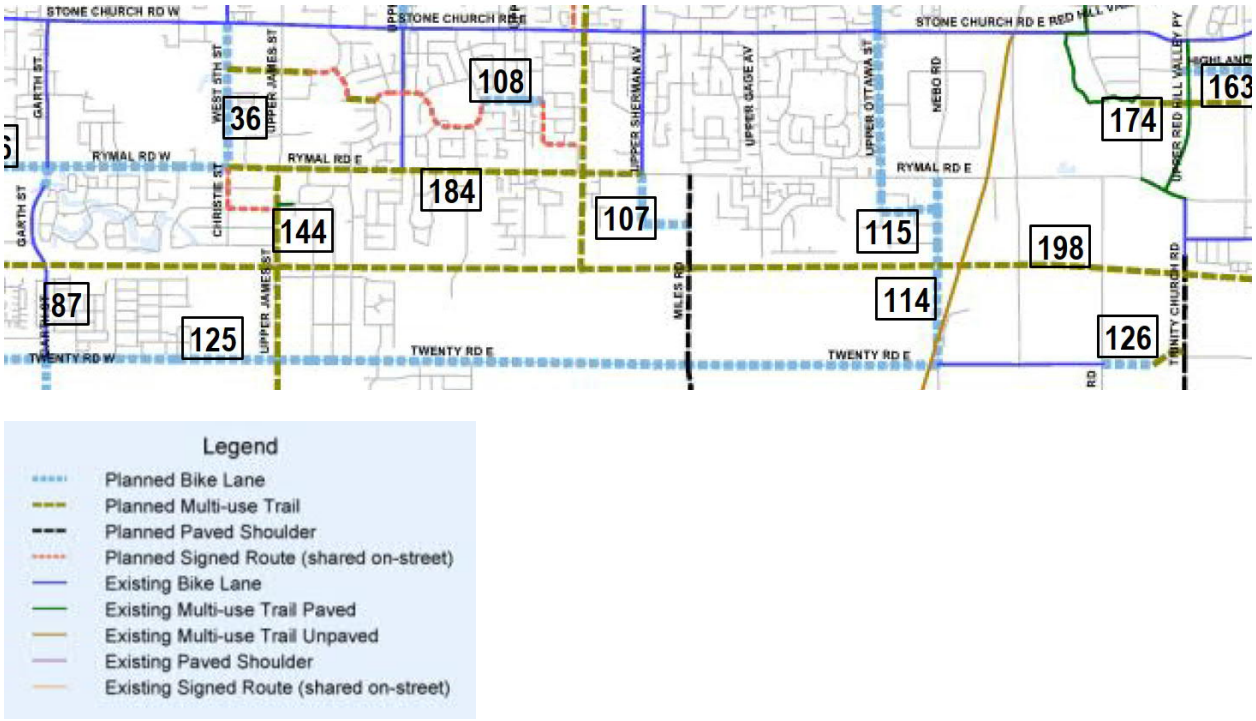
The City of Hamilton's Cycling Master Plan was updated in 2018 as a component of its overall Transportation Master Plan (TMP). The plan recommended an off-street multi-use trail along Rymal Road from Upper Sherman Avenue westerly to West 5th Street, and on-street bicycle lanes from that point westerly to Upper Paradise Road. (As part of recent reconstruction of Rymal Road west of the study area, a bicycle path beside a sidewalk was constructed for approximately 900 metres along the north side of Rymal Road crossing Garth Street, but was not extended easterly beyond Hazelton Avenue at that time due to property constraints.)

Additional cycling infrastructure was also identified on the following north-south routes intersecting with Rymal Road:

- An off-street multi-use trail along the north-south hydro corridor between Upper Wentworth Street and Upper Sherman Avenue, extending from south of Rymal Road to Mohawk Road;
- A southerly extension of the Upper Sherman Avenue bicycle lanes, south and east to Miles Road (recently completed as part of the Upper Sherman Avenue extension);
- Construction of bicycle lanes on Upper Ottawa Street and Nebo Road, from Twenty Road northerly to Mountain Brow Boulevard.

Figure 17 is an excerpt from the 2018 Cycling Master Plan illustrating the recommended cycling infrastructure in the study area.

Figure 17: Recommended Cycling Infrastructure from 2018 Cycling Master Plan



Source: Appendix A, Map 2, Cycling Master Plan Review and Update

4.6 Pedestrian Mobility Plan

The Hamilton Pedestrian Mobility Plan ("Step Forward") was completed in December 2012 by G. O'Connor Consultants Inc. and was prepared as a tool to be used to improve pedestrian environments in the city and to help achieve the pedestrian goals and objectives of the City of Hamilton's Transportation Master Plan and Official Plan.

The plan classifies the City of Hamilton into different context areas ranging from rural to urban for the purpose of identifying typical levels of pedestrian activity and appropriate types of pedestrian infrastructure. The full extent of the study area is classified as a "suburban" context area. The plan identified challenges generally associated with this context, including curvilinear local street patterns that can result in indirect travel paths; poor street and pedestrian connectivity; greater street widths than in older areas of the city; and longer distances between controlled crossings on arterial roads.

A toolbox was developed to facilitate the evaluation of existing pedestrian infrastructure and to be a guide for the design of new streets or reconfigurations of existing streets.

The 2018 TMP update recommended the development of new design criteria for Complete-Liveable-Better streets, which would build upon and/or supersede the 2012 report.

5.0 Future Traffic Volumes

Future traffic volumes were estimated by considering two potential components of traffic growth:

- Traffic generated by site specific developments within the study area; and
- Additional general background traffic growth as a result of changes in conditions or growth elsewhere in the region.

The general background growth rate was then calibrated against traffic forecasts for the Rymal Road corridor generated in the City's regional transportation model (which uses the EMME modeling platform).

The City's EMME model projects traffic volumes at a 2031 horizon. However, for the purposes of this study, a 20-year (2041) horizon has been considered.

5.1 Development Traffic

City staff provided a list of active development applications that could directly affect traffic volumes within the study area. **Table 18** presents the location and description of the development applications that were considered in the analyses. In total, they would result in the following development yield along the corridor:

- 587 residential units;
- A 33,300 sq. . place` of worship;
- 185,000 sq. ft. of retail and commercial space; and
- Two service staons and` two other auto service facilities.

Table 18: Study Area Development Applications

Address	Location	Proposed Development
11 Springside Drive	SE corner Rymal / Springside / Atessa	15 stacked townhouse units
323 Rymal Road East	N side Rymal, NE corner of entrance to municipal centre	21 apartment units
544-550 Rymal Road East	S side Rymal opposite Acadia (access also via Upper Wentworth, Arrowhead)	8 single detached units 10 townhouses 69 stacked townhouse units 203 apartment units
620 Rymal Road East	S side Rymal between Arrowhead and Upper Sherman	33.3 ksf church
675 Rymal Road East	NE corner Rymal / Upper Sherman (No Frills plaza)	5.21 ksf commercial building (outparcel pad)
708 Rymal Road East	S side Rymal between Upper Sherman and Eva (Miles)	32 single detached units 18 townhouses

Address	Location	Proposed Development
705 Rymal Road East	N side Rymal between Upper Sherman and Eva (Miles)	70 apartment units 95 townhouses
741 Rymal Road East	NW corner Rymal / Eva / Miles	4.57 ksf office 32 apartment units
820 Rymal Road East	SW corner Rymal / Sulmona (e/o Miles)	14 townhouses
385 Nebo Road	SE corner Rymal / Nebo	Commercial plaza including: • A gas bar with drive-through restaurant • Ancillary auto service uses (car wash, quick lube etc.) • 5.4 ksf stand-alone restaurant space • 29.4 ksf retail / service commercial space • 24.1 ksf office space • 15.5 ksf medical clinic • 84.8 ksf building supply store
1324 Rymal Road East	SW corner Rymal / Dartnall	Gas bar with convenience store and car wash A&W restaurant with drive-through (in convenience store)

Note: ksf = 1,000 sq. ft.

Three of the development applications (323 Rymal Road East, 544-550 Rymal Road East; 385 Nebo Road) have submitted traffic studies documenting anticipated traffic volumes generated by the proposed development. The other sites are in more preliminary stages or have not otherwise submitted traffic studies.[2] For the purpose of this assessment, the trip generation forecasts have been carried forward where available, and have been estimated where forecasts have not yet been prepared.

Given the high level of the analyses, pass-by trips were discounted from the overall trip generation forecasts but were not specifically assigned to the road network. (Pass-by trips are made by motorists that are already passing the site and are making a stop along the way at the subject site; these trips are observed on the site driveways but do not represent an increase in traffic on the road network. By comparison, primary trips are new trips made by motorists that would not otherwise be traveling in the area.) This is a reasonable representation of traffic forecasts at a link level but may understate turning movement volumes at some intersections where proposed commercial development is directly adjacent.

Table 19 presents the trip generation and pass-by rates applied to the planned developments in the study area. These rates were obtained from the ITE *Trip Generation Manual* (10th edition) and *Trip Generation Handbook* (3rd edition).

[2] The inclusion of data for these sites does not necessarily indicate the endorsement of City of Hamilton staff or negate any comments that may be provided through the development application process. Similarly, the inclusion of preliminary traffic forecasts for other sites does not obviate the requirement to prepare site-specific transportation studies as part of the development application process.

Table 19: Trip Generation Rates

Type of Development; ITE Land Use Code	AM Peak Hour					PM Peak Hour				
	Trip Gen Rate	% Pass-by	Primary trip gen rates:			Trip Gen Rate	% Pass-by	Primary Trip Gen Rates:		
			Total	% In	% Out			Total	% In	% Out
Single / semi-detached (ITE 210)	0.74	0%	0.74	25%	75%	0.99	0%	0.99	63%	37%
Townhouse (ITE 220)	0.46	0%	0.46	23%	77%	0.56	0%	0.56	63%	37%
Apartment (ITE 221)	0.36	0%	0.36	26%	74%	0.44	0%	0.44	61%	39%
Church (ITE 560)	0.33	0%	0.33	60%	40%	0.49	0%	0.49	45%	55%
General Office Building (ITE 710)	1.16	0%	1.16	86%	14%	1.15	86%	0.16	13%	87%
Medical-Dental Office Building (ITE 720)	2.78	0%	2.78	78%	22%	3.46	37%	2.28	28%	72%
General Commercial (ITE 820)	0.94	34%	0.62	62%	38%	3.81	34%	2.51	48%	52%
Home Improvement Superstore (ITE 862)	1.57	0%	1.57	57%	43%	2.33	17%	1.93	49%	51%
Drive-in Bank (ITE 912)	9.5	35%	6.18	58%	42%	20.45	35%	13.29	50%	50%
Fast Food Restaurant with Drive-through (ITE 934)	40.19	49%	20.50	51%	49%	32.67	80%	6.53	52%	48%
Coffee/Donut Shop with Drive-through (ITE 936)	101.14	89%	11.13	51%	49%	43.38	89%	4.77	50%	50%
Quick Lubrication Vehicle Shop (ITE 941)	3	0%	3	67%	33%	4.85	0%	4.85	55%	45%
Gas Bar with Convenience Store (ITE 945)	12.47	66%	4.61	51%	49%	88.35	66%	32.69	51%	49%
Self-serve Car Wash (ITE 947)	-	-	-	-	-	5.54	0%	5.54	50%	50%
Car Wash with Detailing (ITE 949)	-	-	-	-	-	13.6	0%	13.6	50%	50%

Table 20 presents the number of trips generated throughout the study area based on the trip generation rates listed in **Table 19**.

The directional distribution of development trips was estimated separately for residential, commercial (retail) and employment-based land uses based on data from the 2016 Transportation Tomorrow Survey (TTS). The TTS zones extending from Upper James Street to Dartnall Road, and from the Lincoln Alexander Parkway to south of Rymal Road, were assumed to be a reasonable proxy for future development traffic. **Table 21** presents the directional distribution applied to development traffic.

Table 20: Net Trip Generation

Land Use and Magnitude	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Single / semi-detached (40 units)	8	22	30	25	15	**40**
Townhomes (312 units)	32	111	143	110	64	**174**
Apartments (235 units)	22	63	85	63	40	**103**
Church (33.3 ksf)	7	4	11	7	9	**16**
General Office Building (24.089 ksf)	24	4	28	1	3	**4**
Medical-Dental Office Building (15.5 ksf)	34	9	43	9	25	**34**
General Commercial (20.3 ksf)	11	7	18	29	32	**61**
Home Improvement Superstore (94.294 ksf)	85	64	149	90	93	**183**
Drive-in Bank (5.36 ksf)	19	14	33	36	35	**71**
Fast Food Restaurant with Drive-through (5.36 ksf)	56	54	110	18	17	**35**
Coffee/Donut Shop with Drive-through (2.797 ksf)	16	15	31	7	6	**13**
Quick Lubrication Vehicle Shop (6 bays)	12	6	18	16	13	**29**
Gas Bar with Convenience Store (12 bays)	26	25	51	184	176	**360**
Self-serve Car Wash (5 bays)	-	-	-	14	14	**28**
Car Wash with Detailing (4 bays)	-	-	-	27	27	**54**
Total Auto Trips	**411**	**452**	**863**	**845**	**772**	**1617**

Table 21: Directional Distribution for Development Traffic

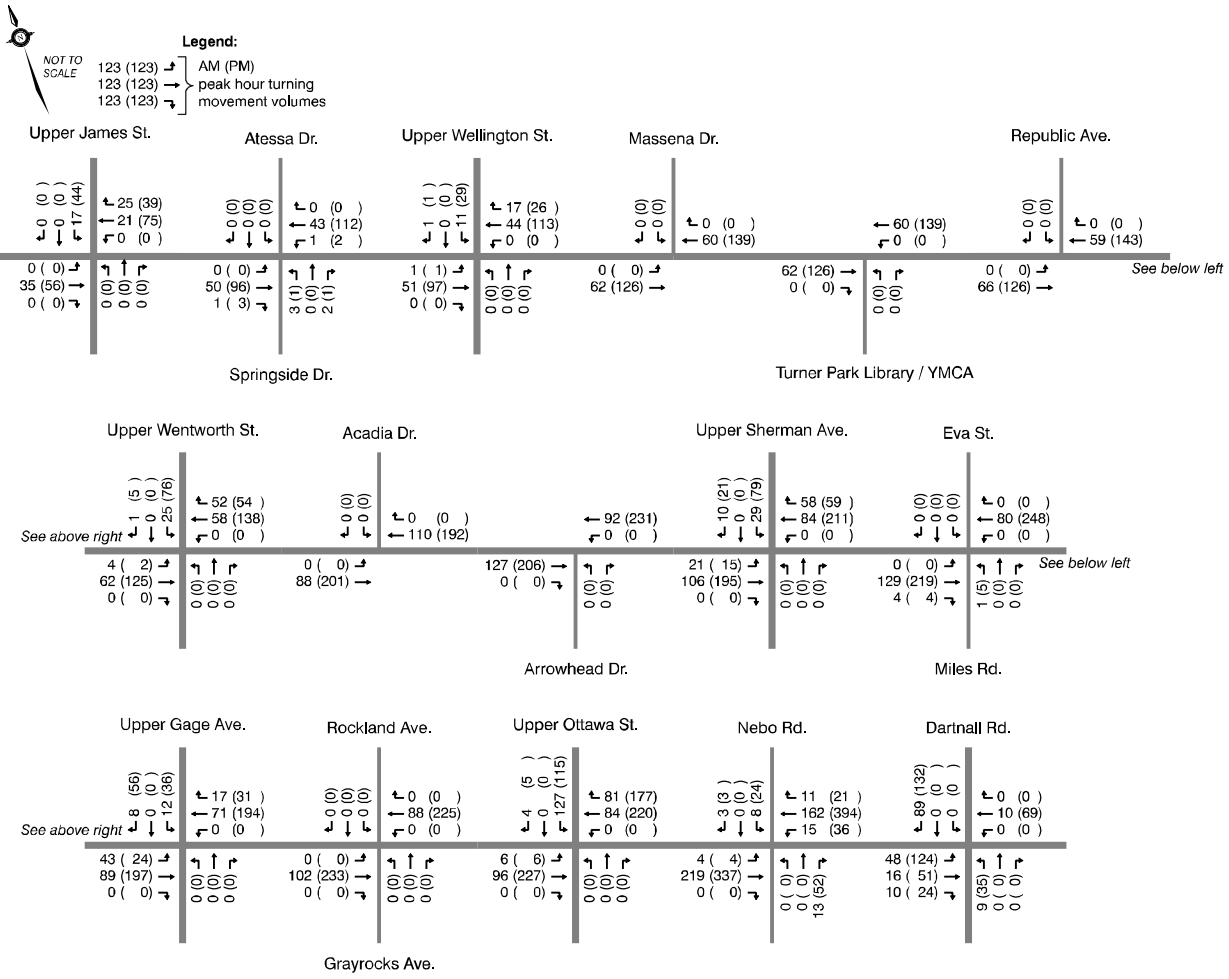
To/From:	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
Residential trips				
West	12%	11%	6%	8%
North (to/from LINC)	4%	26%	35%	17%
North (to/from upper/lower city)	45%	40%	41%	37%
South	0%	2%	2%	2%
East	1%	4%	3%	4%
Local (within general study area)	38%	18%	13%	31%
Retail trips				
West	8%	0%	7%	10%
North (to/from LINC)	12%	7%	15%	10%
North (to/from upper/lower city)	47%	34%	16%	31%
South	6%	10%	14%	9%
East	2%	3%	10%	7%
Local (within general study area)	25%	46%	38%	33%
Employment trips				
West	6%	7%	1%	6%
North (to/from LINC)	30%	63%	9%	32%
North (to/from upper/lower city)	30%	25%	90%	34%
South	8%	0%	0%	6%
East	10%	5%	0%	8%
Local (within general study area)	16%	0%	0%	15%

(Note: Percentages may not add to 100% due to rounding.)

The trips were then assigned logically to the road network. Longer-distance trips using the Lincoln Alexander Parkway / Red Hill Valley Parkway were assigned to the most logical north-south roadway(s) with interchange access, depending on the location of the development and the relative ease of making right and left turn movements. A similar process was followed for trips destined to the north (both in the lower city and the northern area of the upper city) where appropriate.

Figure 18 presents the volume of traffic estimated to be generated by currently planned developments based on the methodology outlined above.

Figure 18: Projected Development Traffic



5.2 General Background Growth

General background growth is an increase in traffic volumes through the study area that is not directly attributable to any specific new developments. The background growth rate was estimated through a comparison with link traffic volumes forecast by the City's EMME long-range regional transportation model. The model was developed as part of the TMP update and includes the following scenarios (all of which reflect AM peak hour travel demand):

- 2011 existing conditions;
- 2031 "do nothing" conditions (i.e., 2031 travel demand on the 2011 network);
- 2031 "base case" including currently programmed and approved infrastructure modifications;
- 2031 Scenario "A": same as the "base case" but with widening of Highway 403;

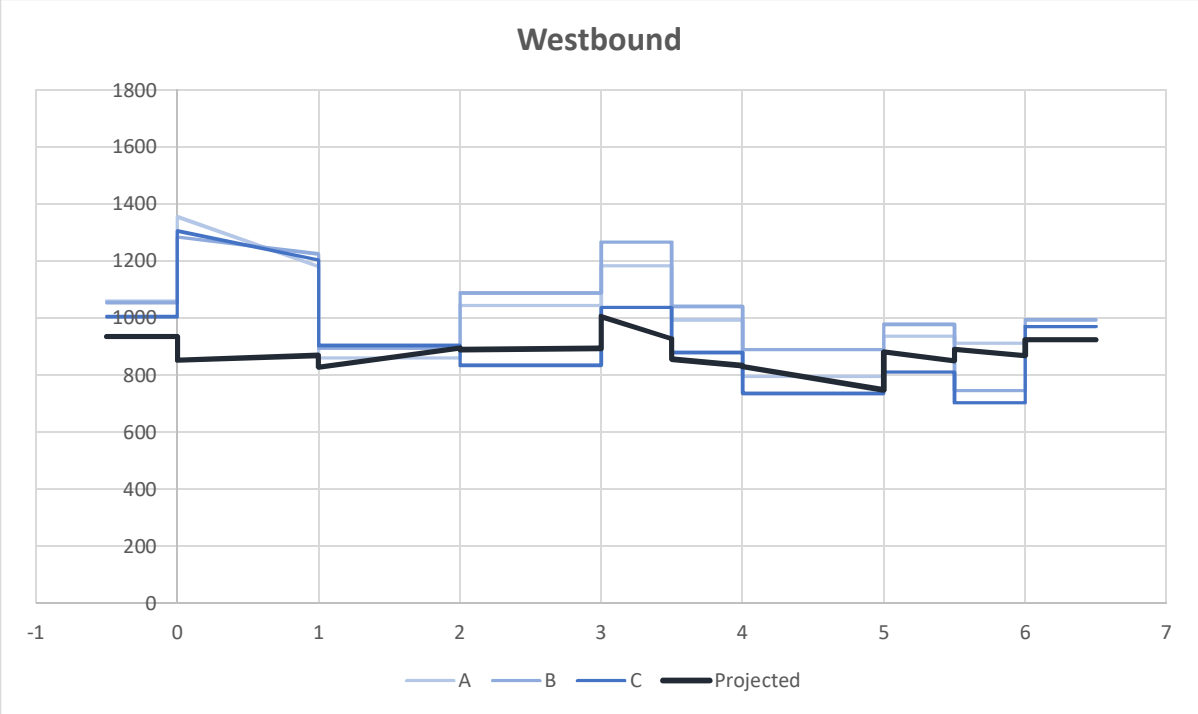
- 2031 Scenario "B": same as the "base case" but with a significant increase in non-auto ridership relying in part on the implementaon of` the BLAST network; also includes a potential roadway linking the Red Hill Valley Parkway and the airport;
- 2031 Scenario "C": same as Scenario "B" but with the widening of the Lincoln Alexander Parkway /Red Hill Valley Parkway to six lanes; and
- 2031 Scenario "D": includes measures in Scenarios "A", "B" and "C" as well as additional modifications at Lincoln Alexander Parkway / Highway 403 and at Red Hill Valley Parkway / QEW.

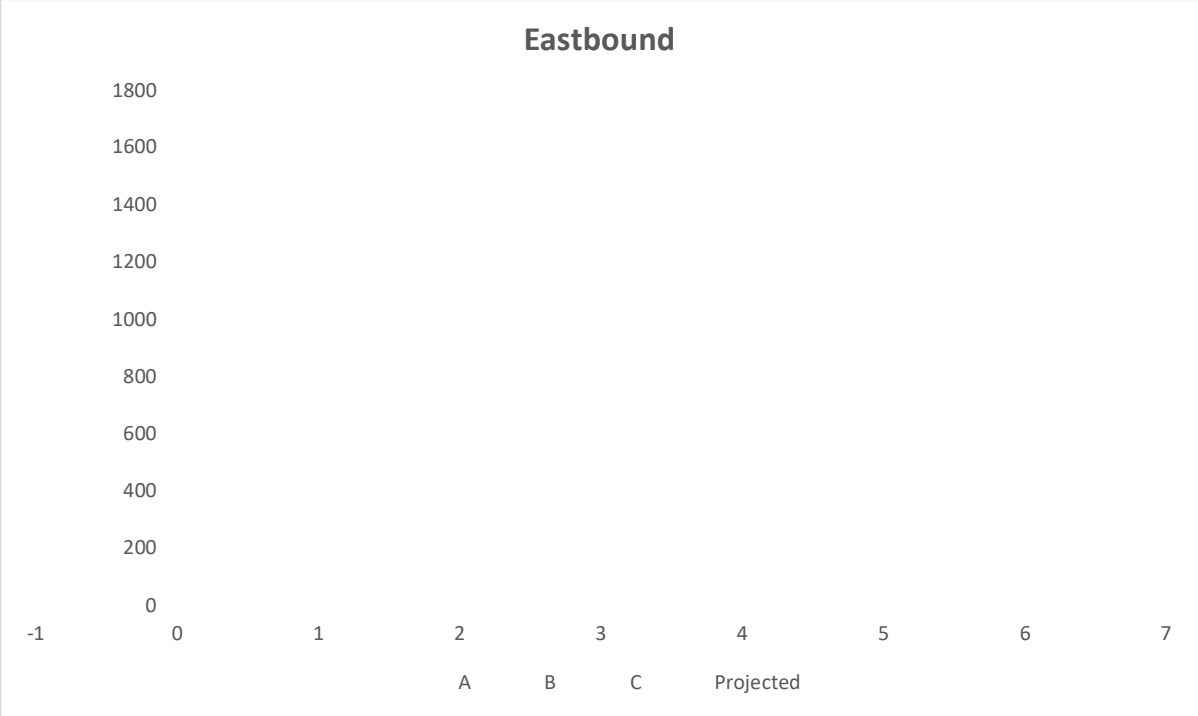
Given the differences in the network from one scenario to another, the model yields a range of traffic forecasts along the Rymal Road corridor rather than a specific defined demand. In addition, the model is generally calibrated at a coarser screenline level rather than at the link level, and as such the forecasts on individual links may vary from actual conditions (e.g., when comparing the 2011 model scenario against the traffic volumes presented in **Figure 6**, the model understates traffic volumes in the central part of the corridor).

The growth rate for this assessment was estimated by applying a preliminary growth rate to the existing volumes shown in **Figure 6**, adding the development traffic volumes shown in **Figure 18**, and comparing the resulting link volumes against the Scenario "A", "B" and "C" forecasts. The preliminary growth rate was then adjusted to yield link volumes that are broadly consistent with the EMME results, recognizing the range in forecasted volumes and the relatively coarse nature of the model output. **Figure 19** presents the estimated 2031 link volumes on Rymal Road assuming an annual growth rate of 1% eastbound / 2% westbound, and compares them against the forecasts from Scenarios "A" through "C".

For PM peak hour forecasts, the growth rates were reversed (1% westbound and northbound; 2% eastbound and southbound).

Figure 19: Comparison of Estimated Traffic Volumes` and Model Projections (Rymal Road)



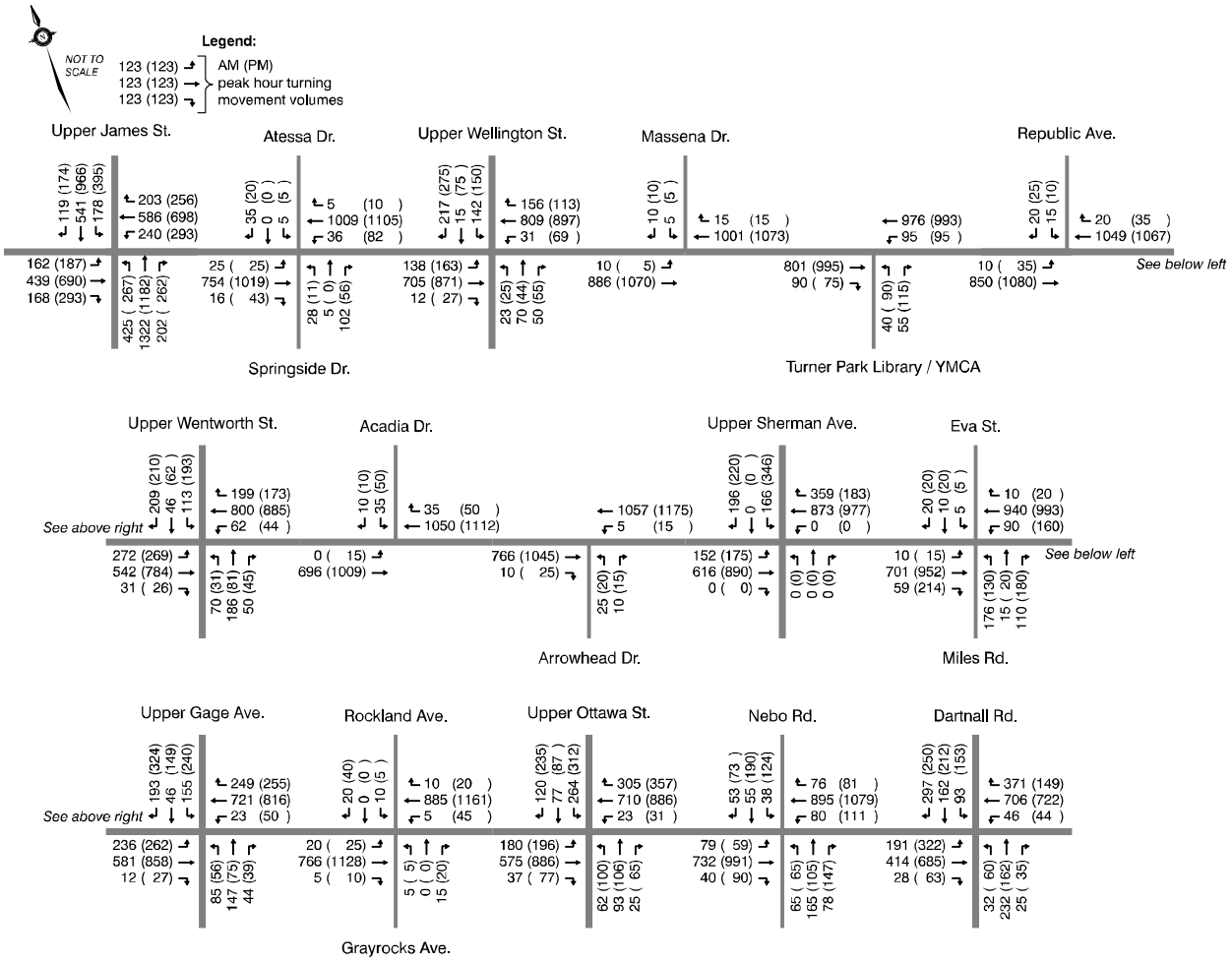


0 = Upper James
1 = Upper Wellington
2 = Upper Wentworth
3 = Upper Sherman
3.5 = Miles
4 = Upper Gage
5 = Upper Ottawa
5.5 = Nebo
6 = Dartnall

5.3 2041 Traffic Projections

Figure 20 presents the estimated 2041 traffic volumes applied in the traffic analyses. These volumes account for the development traffic documented in **Section 5.1** and the traffic growth rates documented in **Section 5.2** (extrapolated an additional 10 years to 2041).

Figure 20: Estimated 2041 Traffic Volumes



6.0 Assessment of Future Conditions

6.1 Future "Do Nothing" Intersection Operations

Intersection operational analyses were completed under the projected future volumes using Trafficware's Synchro software (version 10). At signalized intersections, the volume-to-capacity (v/c) ratio, average vehicular delay, level of service and 95th percentile queue were noted for each individual movement, and the average delay and level of service were noted for the intersection as a whole. At unsignalized (stop-controlled) intersections, the v/c ratio, delay, level of service and 95th percentile queue were noted for any stop-controlled movements. Synchro reports are provided in **Appendix C**.

The 2019 lane configuration and intersection geometry was applied, with the following exceptions:

- Eastbound and westbound right turn lanes have subsequently been constructed at Upper Sherman Avenue and have been included in the analyses; and
- Planned road construction on Nebo Road south of` Rymal Road will result in the addition of a northbound right turn lane at the intersection with Rymal Road, which has been included in the analyses.

Table 22: 2041 Signalized Intersection Operations, Baseline Configuration

Movement	AM Peak Hour				PM Peak Hour			
	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Rymal Road at Upper James Street								
EB left	0.67	C	33.4	38	0.97	F	80.1	70
EB through	0.54	C	28.6	72	0.93	D	46.9	160
WB left	0.81	D	44.1	67	1.64	F	330.8	136
WB through	0.71	C	33.6	101	0.82	D	38.5	126
NB left	1.03	E	76.5	141	0.91	E	60.7	85
NB through	1.39	F	212.2	295	1.02	E	67.1	186
SB left	0.84	D	53.5	61	1.69	F	349.1	177
SB through	0.53	C	34.1	72	0.99	E	63.6	177
SB right	0.22	A	6.2	14	0.33	B	15.5	32
Overall	—	**F**	**97.0**	—	—	**F**	**90.0**	—
Rymal Road at Atessa Drive / Springside Drive								
EB left	0.10	A	4.8	5	0.10	A	3.1	3
EB through	0.54	A	6.7	129	0.70	A	7.3	153
EB right	0.01	A	1.2	2	0.03	A	0.7	2
WB left	0.09	A	5.1	4	0.29	A	4.6	5
WB through	0.79	B	10.8	110	0.76	A	8.2	126
NB approach	0.56	C	22.7	26	0.40	C	23.7	18
SB approach	0.23	B	18.9	11	0.18	C	23.6	10
Overall	—	**B**	**10.0**	—	—	**A**	**8.1**	—

Movement	AM Peak Hour				PM Peak Hour			
	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Rymal Road at Upper Wellington Street								
EB left	0.72	D	44.6	46	0.85	E	61.7	58
EB through	0.56	A	9.1	88	0.75	B	12.3	104
WB left	0.09	B	15.0	6	0.30	B	18.2	14
WB through	0.97	D	35.4	362	0.98	D	38.7	365
NB left	0.20	D	43.0	13	0.44	E	64.3	16
NB through	0.39	D	35.5	39	0.28	C	23.2	26
SB left	0.74	E	66.3	57	0.60	D	53.1	56
SB through	0.51	B	10.2	25	0.85	D	46.6	92
Overall	—	**C**	**27.2**	—	—	**C**	**32.2**	—
Rymal Road at Turner Park Library								
EB through	0.63	B	12.2	168	0.84	B	19.7	335
EB right	0.08	A	3.0	8	0.07	A	3.7	4
WB left	0.25	A	4.7	10	0.40	A	8.7	10
WB through	0.76	C	20.8	274	0.73	C	22.9	261
NB left	0.21	D	45.0	19	0.31	D	44.8	34
NB right	0.26	B	12.6	11	0.34	A	9.8	16
Overall	—	**B**	**16.2**	—	—	**C**	**20.6**	—
Rymal Road at Upper Wentworth Street								
EB left	1.04	F	95.0	113	1.13	F	127.2	99
EB through	0.47	A	3.5	13	0.74	A	5.1	26
EB right	0.04	A	0.2	0	0.03	A	0.1	0
WB left	0.17	A	8.3	4	0.19	A	7.8	3
WB through	1.04	D	40.4	117	1.03	D	41.8	251
WB right	0.25	A	0.5	0	0.22	A	0.4	0
NB left	0.27	D	39.5	29	0.13	D	35.8	15
NB through	0.65	D	47.9	80	0.34	C	33.3	39
SB left	0.90	F	100.8	61	0.83	E	70.5	82
SB through	0.14	D	36.1	20	0.17	D	36.5	24
SB right	0.46	A	7.7	20	0.45	A	7.6	20
Overall	—	**C**	**34.6**	—	—	**C**	**34.8**	—
Rymal Road at Arrowhead Drive								
EB approach	0.50	A	7.6	175	0.72	B	11.6	334
WB left	0.01	A	1.0	0	0.06	A	2.3	1
WB through	0.74	A	5.1	20	0.77	B	12.5	90
WB right	0.15	D	49.5	15	0.12	D	48.7	12
NB approach	0.07	C	22.8	6	0.09	C	20.6	7
Overall	-	**A**	**6.8**	-	-	**B**	**12.4**	-

Movement	AM Peak Hour				PM Peak Hour			
	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Rymal Road at Upper Sherman Avenue								
EB left	1.18	F	157.4	83	1.03	F	95.7	73
EB through	0.49	A	9.7	130	0.82	C	23.5	312
EB right	0.00	A	0.0	0	0.00	A	0.0	0
WB left	0.00	A	0.0	0	0.00	A	0.0	0
WB through	1.26	F	143.5	554	1.08	E	73.6	390
NB left	0.00	A	0.0	0	0.00	A	0.0	0
NB through	0.00	A	0.0	0	0.00	A	0.0	0
SB left	0.63	D	52.4	54	0.79	D	51.5	155
SB through	0.45	A	5.3	11	0.41	A	7.1	21
Overall	**—**	**F**	**91.6**	**—**	**—**	**D**	**46.9**	**—**
Rymal Road at Miles Road / Eva Street								
EB left	0.06	A	7.0	1	0.18	B	11.1	2
EB through	0.77	C	23.1	110	1.28	F	155.7	489
WB left	0.29	A	3.5	2	0.98	F	84.7	55
WB through	0.87	B	18.5	306	0.87	B	19.7	284
WB right	0.01	A	0.0	0	0.02	A	0.3	0
NB approach	0.98	F	88.6	135	1.06	F	103.8	150
SB left	0.02	D	37.4	5	0.03	D	37.8	5
SB through	0.09	C	20.4	11	0.11	C	23.4	15
Overall	**—**	**C**	**29.2**	**—**	**—**	**F**	**91.7**	**—**
Rymal Road at Upper Gage Avenue								
EB left	0.64	B	10.2	19	0.93	C	32.9	21
EB through	0.52	A	8.4	103	0.77	A	9.4	73
WB left	0.06	B	13.7	8	0.27	C	20.1	17
WB through	0.79	C	28.3	245	0.84	C	33.5	244
WB right	0.29	A	7.9	34	0.31	A	9.3	35
NB left	0.37	D	45.0	35	0.23	D	40.4	24
NB through	0.43	D	45.3	53	0.18	D	38.5	29
NB right	0.14	A	7.6	8	0.10	A	4.9	5
SB left	0.86	F	84.1	71	0.95	F	87.6	117
SB through	0.14	D	39.0	21	0.37	D	42.0	53
SB right	0.50	A	9.7	21	0.61	B	13.3	42
Overall	**—**	**C**	**23.1**	**—**	**—**	**C**	**26.9**	**—**

Movement	AM Peak Hour				PM Peak Hour			
	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Rymal Road at Upper Ottawa Street								
EB left	0.59	B	13.8	23	1.22	F	164.5	99
EB through	0.75	B	19.4	150	1.12	F	94.8	397
WB left	0.06	B	16.8	5	0.79	F	102.3	12
WB through	0.85	D	35.3	241	1.15	F	112.4	361
WB right	0.38	B	16.9	69	0.51	C	24.7	92
NB left	0.34	D	44.9	28	0.43	D	46.2	42
NB through	0.31	D	36.4	32	0.42	C	33.5	42
SB left	1.13	F	138.9	136	1.10	F	115.2	159
SB through	0.22	D	39.9	31	0.20	C	32.1	31
SB right	0.49	D	47.8	49	0.57	D	41.0	81
Overall	—	**D**	**39.5**	—	—	**F**	**88.1**	—
Rymal Road at Nebo Road								
EB left	0.42	B	10.5	10	0.52	B	13.1	6
EB through	0.67	A	9.9	130	0.89	B	13.1	219
WB left	0.26	A	3.3	6	1.08	F	131.6	58
WB through	0.81	B	13.2	256	0.87	C	22.6	380
NB left	0.53	E	58.2	31	0.71	F	81.7	34
NB through	0.65	E	57.0	64	0.30	D	41.3	37
NB right	0.36	B	17.9	18	0.38	B	11.8	22
SB left	0.39	D	53.3	20	0.58	D	53.1	47
SB through	0.47	D	35.0	35	0.79	E	58.3	85
Overall	—	**B**	**17.8**	—	—	**C**	**28.2**	—
Rymal Road at Dartnall Road								
EB left	0.77	C	26.0	41	0.97	D	47.1	53
EB through	0.22	A	6.5	27	0.41	A	5.9	45
WB left	0.12	B	12.3	13	0.14	B	15.7	14
WB through	0.58	B	17.3	126	0.57	B	19.8	135
WB right	0.41	A	5.5	36	0.18	A	6.2	19
NB left	0.32	D	53.0	18	0.61	E	72.3	29
NB through	0.68	E	55.2	47	0.48	D	45.2	33
SB left	0.53	D	47.0	35	0.69	D	53.6	55
SB through	0.71	C	33.2	57	0.59	C	21.6	40
Overall	—	**C**	**22.4**	—	—	**C**	**23.3**	—

Under the projected 2041 volumes, the majority of signalized intersections with major arterials are expected to operate at LOS C to D overall. The intersections with Upper James Street and with Upper Sherman Avenue are expected to operate at LOS F during both peak hours, and the intersections with Miles Road / Eva Street and with Upper Ottawa Street are expected to operate at LOS F during the PM peak hour.

The capacity of the roadway to accommodate the projected volumes was assessed by comparing the anticipated v/c ratios against critical thresholds typically applied by the City in evaluating intersection operations. A v/c ratio of 0.85 or higher on through lanes, or 1.00 or higher on dedicated left turn lanes, is typically an indication that mitigation is recommended. The majority of intersections are expected to experience capacity constraints on one or more movement during the AM and/or PM peak hours:

- Upper James Street
  - Eastbound through (PM)
  - Westbound left (PM)
  - Northbound left (AM)
  - Northbound through (AM/PM)
  - Southbound left (PM)
  - Southbound through (PM)
- Upper Wellington Street
  - Westbound through (AM/PM)
  - Southbound through (PM)
- Upper Wentworth Street
  - Eastbound left (AM/PM)
  - Westbound through (AM/PM)
- Upper Sherman Avenue
  - Eastbound left (AM/PM)
  - Westbound through (AM/PM)
- Miles Road / Eva Street:
  - Eastbound through (PM)
  - Westbound through (AM/PM)
  - Northbound approach (AM/PM)
- Upper Ottawa Street:
  - Eastbound through (PM)
  - Westbound through (PM)
  - Southbound left (AM/PM)
- Nebo Road:
  - Eastbound through (PM)
  - Westbound through (PM)
  - Westbound left (PM)

In some cases, the capacity constraint can be mitigated by minor timing adjustments (e.g., the westbound through movement at Dartnall Road, which is projected to only marginally exceed the critical threshold during the PM peak hour). However, in most cases the anticipated capacity constraints are too great to address through minor adjustments alone, or adjustments to mitigate the constraints would result in critical conditions on other movements.

Table 23: 2041 Unsignalized Intersection Operations, Baseline Configuration

Rymal Road at:	Movement	AM Peak Hour				PM Peak Hour			
		V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Massena Drive	SB approach	0.04	D	25.4	1	0.05	D	26.3	1
Republic Avenue	SB left SB right	0.17 0.11	F C	50.5 24.8	5 3	0.08 0.12	D C	34.7 23.4	2 3
Arcadia Drive	SB left SB right	0.73 0.05	F C	174 21.7	24 1	5.00 0.04	F C	>200 21.2	>39 1

Growth on Rymal Road is anticipated to result in LOS F conditions on most stop-controlled intersections included in the assessment. The Republic Avenue stop-controlled approach is expected to have sufficient capacity, and the poor level of service is based on increased side street delays. The Acadia Drive and Arrowhead Drive intersections are expected to exceed capacity during one or both peak hours. While not all unsignalized intersections and driveways were included in the analyses, conditions at the intersections shown in **Table 23** suggest that most stop-controlled accesses and driveways are likely to experience poor levels of service and/or capacity constraints due to increased east-west travel in a two-lane cross-section.

6.2 Potenal Future` Road Configuration

The capacity and operational deficiencies identified in **Section 6.1** indicate that additional roadway capacity will be required along Rymal Road to accommodate anticipated growth in east-west traffic. The magnitude and extent of the constraints indicate that traffic signal timing modifications and/or isolated intersection modifications would not be sufficient to address the problem, and as a result the widening of Rymal Road to a five-lane cross-section (two lanes per direction plus a centre two-way left turn lane) is recommended. Widening of Rymal Road to five lanes would also result in a consistent cross-section along the corridor, matching the existing cross-section west of Springside Drive and east of Dartnall Road.

The projected 2041 traffic volumes were re-assessed assuming a five-lane cross-section along Rymal Road. Intersection operations were first tested assuming dedicated eastbound and westbound left turn lanes, no dedicated eastbound or westbound right turn lanes, and the existing lane configuration on north/south roadways. The opportunity to reduce the corridor cycle length from 120 seconds was reviewed, recognizing that the additional east-west capacity may reduce the need for long cycle lengths to maximize intersection capacity; shorter cycle lengths would allow for shorter delays and queues for vehicular traffic, as well as shorter delays for pedestrians waiting to cross Rymal Road.

Potential changes to north-south pedestrian clearance intervals were estimated, given that intersection designs had not been prepared at the time of the analyses.

Table 24 presents the results of the signalized intersection analyses. Synchro reports are provided in **Appendix D**.

Table 24: 2041 Signalized Intersection Operations, Five-Lane Cross-Section

Movement	AM Peak Hour				PM Peak Hour			
	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Rymal Road at Upper James Street								
EB left	0.67	C	33.4	38	0.97	F	80.1	70
EB through	0.54	C	28.6	72	0.93	D	46.9	160
WB left	0.81	D	44.1	67	1.64	F	330.8	136
WB through	0.71	C	33.6	101	0.82	D	38.5	126
NB left	1.03	E	76.5	141	0.91	E	60.7	85
NB through	1.39	F	212.2	295	1.02	E	67.1	186
SB left	0.84	D	53.5	61	1.69	F	349.1	177
SB through	0.53	C	34.1	72	0.99	E	63.6	177
SB right	0.22	A	6.2	14	0.33	B	15.5	32
Overall	—	**F**	**97.0**	—	—	**F**	**90.0**	—
Rymal Road at Atessa Drive / Springside Drive								
EB left	0.08	A	5.1	5	0.08	A	3.1	3
EB through	0.31	A	4.7	48	0.40	A	3.4	41
WB left	0.09	A	1.4	1	0.26	A	3.5	5
WB through	0.44	A	1.8	11	0.41	A	2.1	24
NB approach	0.50	B	17.9	22	0.36	B	19.8	16
SB approach	0.20	B	15.1	10	0.15	B	16.6	8
Overall	—	**A**	**4.3**	—	—	**A**	**3.4**	—
Rymal Road at Upper Wellington Street								
EB left	0.43	B	15.6	37	0.50	B	15.9	34
EB through	0.32	B	11.3	88	0.41	A	9.1	75
WB left	0.09	A	6.7	3	0.23	A	7.1	6
WB through	0.55	A	6.7	26	0.54	A	6.2	40
NB left	0.14	C	30.3	10	0.37	D	45.0	12
NB through	0.34	C	23.3	27	0.26	B	15.6	19
SB left	0.60	D	44.2	42	0.56	D	41.5	42
SB through	0.48	A	7.9	19	0.74	C	24.4	55
Overall	—	**B**	**12.0**	—	—	**B**	**12.6**	—
Rymal Road at Turner Park Library								
EB through	0.37	A	3.5	31	0.51	A	9.7	77
WB left	0.22	A	1.9	2	0.27	A	2.7	2
WB through	0.40	A	2.0	28	0.41	A	2.1	10
NB left	0.21	D	38.9	16	0.26	C	33.5	28
NB right	0.26	B	11.9	10	0.29	A	7.7	13
Overall	—	**A**	**3.6**	—	—	**A**	**7.1**	—

Movement	AM Peak Hour				PM Peak Hour			
	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Rymal Road at Upper Wentworth Street								
EB left	0.96	E	63.6	61	0.95	E	57.5	66
EB through	0.29	A	3.8	5	0.44	A	4.1	11
WB left	0.19	B	10.6	7	0.17	B	13.0	5
WB through	0.72	B	13.4	77	0.70	B	12.2	53
NB left	0.24	C	29.3	23	0.11	C	26.3	12
NB through	0.57	C	34.9	62	0.30	C	23.0	30
SB left	0.68	D	51.4	40	0.71	D	45.9	61
SB through	0.13	C	26.7	16	0.15	C	26.9	20
SB right	0.42	A	6.1	17	0.41	A	6.0	17
Overall	—	**C**	**20.2**	—	—	**B**	**16.9**	—

With Rymal Road widened to a five-lane cross-section, the majority of signalized intersections east of Upper James Street and west of Dartnall Road are anticipated to operate at LOS A to B, and with all movements operating at reasonable v/c levels. The main exception is the intersection with Upper Ottawa Street, which is anticipated to operate at LOS C to D, and with continued capacity constraints on the westbound approach and the southbound left turn. This can be addressed by adding a westbound right turn lane to the basic five-lane cross-section at this intersection.

At Upper James Street, Rymal Road already has a five-lane cross-section (including left turn lanes) and therefore the modifications in the section to the east would not affect intersection operations; a number of movements would continue to operate at or above capacity. Other modifications at Upper James Street are discussed in **Section 6.3**.

As further mitigation, consideration was also given to the potential effects of extending Upper Sherman Avenue southerly to Miles Road, to eliminate the need for north-south traffic traveling along the Upper Sherman Avenue / Miles Road corridor to travel along Rymal Road. The results of this diversion scenario for these two intersections are presented in **Table 25**.

Table 25: 2041 Signalized Intersection Operations with Upper Sherman Avenue Southerly Extension

Movement	AM Peak Hour				PM Peak Hour			
	V/C	LOS	Delay (s/veh)	95th %ile Queue (m)	V/C	LOS	Delay (s/veh)	95th %ile Queue (m)
Rymal Road at Upper Sherman Avenue								
EB left	0.62	C	25.4	39	0.80	D	48.8	61
EB through	0.35	B	12.3	67	0.58	B	15.9	114
WB left	0.08	A	7.6	6	0.20	B	13.3	11
WB through	0.69	B	15.6	140	0.75	C	24.6	84
NB left	0.28	C	25.4	18	0.28	C	21.2	15
NB through	0.74	D	51.5	61	0.34	C	25.5	35
SB left	0.49	C	30.8	29	0.48	C	25.7	45
SB through	0.62	C	20.4	41	0.90	D	53.3	120
Overall	—	**B**	**19.9**	—	—	**C**	**27.1**	—
Rymal Road at Miles Road / Eva Street								
EB left	0.03	A	8.8	3	0.07	A	7.3	2
EB through	0.35	A	6.6	46	0.54	A	7.1	48
WB left	0.14	A	1.6	3	0.35	A	3.6	10
WB through	0.42	A	2.4	40	0.44	A	3.3	66
NB approach	0.42	B	16.8	19	0.57	B	16.9	24
SB left	0.04	C	33.6	4	0.06	C	34.6	4
SB through	0.14	B	19.7	9	0.18	C	22.3	12
Overall	—	**A**	**5.3**	—	—	**A**	**6.3**	—

The diversion of traffic would result in moderately increased delays at Upper Sherman Avenue due to the increase in traffic on minor movements, but would improve operations at Miles Road and Eva Street due to diversion of traffic to Upper Sherman Avenue. It would also reduce travel times for north-south travel through these intersections by eliminating the need to travel along Rymal Road. As such, the Upper Sherman Avenue southerly extension is not necessary in addition to the widening of Rymal Road to five lanes, but would have other operational benefits that suggest it be considered as a separate initiative.

Table 26 presents the results of the unsignalized intersection analyses.

Table 26: 2041 Unsignalized Intersection Operations, Five-Lane Cross-Section

Rymal Road At:	Movement	AM Peak Hour				PM Peak Hour			
		V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Massena Drive	SB approach	0.03	C	15.1	1	0.02	B	14.4	1
Republic Avenue	SB left SB right	0.07 0.03	C A	21.7 9.2	2 1	0.03 0.03	C A	16.6 9.3	1 1
Arcadia Drive	SB left SB right	0.37 0.03	F B	59.2 13.6	12 1	0.60 0.02	F B	98.0 13.5	22 1

The additional east-west lanes on Rymal Road are anticipated to improve conditions on the unsignalized intersections included in the study area. Most are anticipated to operate at better than LOS F, and all are anticipated to operate within capacity.

6.3 Intersection Alternatives at Upper James Street

The analysis results at Upper James Street and Rymal Road as outlined in the foregoing sections are based on a "do nothing" configuration at that intersection.

The City is considering alternatives to provide queue jump lanes on Upper James Street as part of the work for the A-Line. A design concept previously developed in 2017 included the addition of a northbound right turn lane on Upper James Street in addition to separate northbound and southbound bus queue jump lanes; channelized right turn movements were proposed to ensure that right-turning vehicles would not queue back into the bus lane.

As part of the functional design work on Rymal Road, an additional concept was developed to mitigate traffic conditions and/or improve conditions for transit service on Rymal Road. In addition to the northbound/southbound right turn lanes and separate queue jump lanes, eastbound and westbound right turn lanes were added on Rymal Road, to also serve as bus queue jump lanes leading to far-side stops. This configuration was tested under the projected 2041 volumes; the results are presented in **Table 27**.

Table 27: 2041 Intersection Operations at Upper James Street; Revised Configuration

Movement	AM Peak Hour				PM Peak Hour			
	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*	V/C	LOS	Delay *(s/veh)*	95th %ile Queue *(m)*
Rymal Road at Upper James Street								
EB left	0.67	D	39.7	44	0.67	C	34.7	47
EB through	0.54	D	39.2	63	0.80	D	48.0	116
EB right	0.34	A	7.2	17	0.56	B	14.6	48
WB left	0.83	D	53.3	80	1.03	F	84.6	104
WB through	0.72	D	43.7	86	0.65	D	37.3	95
WB right	0.43	B	11.7	28	0.40	A	5.5	13
NB left	0.81	C	27.4	83	1.02	F	94.3	102
NB through	0.88	D	35.5	176	0.94	E	61.6	156
NB right	0.28	A	4.4	15	0.44	A	8.7	27
SB left	1.03	F	103.0	74	1.01	F	81.9	149
SB through	0.44	C	27.9	66	0.86	D	44.3	159
SB right	0.19	A	5.0	12	0.29	B	12.0	28
Overall	—	**C**	**34.7**	—	—	**D**	**47.2**	—

The revised intersection configuration would improve the level of service to LOS C to D. The southbound, northbound and westbound left turn movements would be at or slightly above capacity during the AM and/or PM peak hours, and the northbound through movement would be approaching capacity. Additional capacity could be provided by adding dual left turn lanes on one or more approaches; however, this would result in increased pedestrian crossing distance at an already large intersection where transfer activity can be expected between the A-Line and S-Line corridors. Dual left turn lanes also reduce flexibility in signal operations during off-peak times, since they require fully protected left turn phases to be provided at all times. As such, dual left turn lanes are not recommended.

6.4 Multi-Modal Infrastructure Requirements

In addition to the traffic capacity and operational constraints identified in **Section 6.1**, the following existing missing links and future opportunities were identified to accommodate multi-modal travel along Rymal Road.

6.4.1 Pedestrian Movement

Although there are sidewalks along both sides of most of the corridor, there are gaps in the sidewalk network:

- A 100-metre gap on the north side, west of Atessa Drive;
- A 300-metre gap between Upper Sherman Avenue and Miles Road (both sides);
- A 125-metre gap on the south side, east of Upper Oawa S treet; and
- The majority of the link between Nebo Road and Dartnall Road.

New sidewalk construction, and sidewalk reconstruction that may be required to accommodate roadway widening, should reference the design toolbox provided in the Hamilton Pedestrian Mobility Plan.

6.4.2 Cycling Connectivity

There is currently no dedicated cycling infrastructure along Rymal Road within the study area. The Cycling Master Plan identifies a future off-street multi-use trail from Upper Sherman Avenue westerly to beyond the western study area limits. Although the Cycling Master Plan does not identify cycling infrastructure east of Upper Sherman Avenue, consideration could be given to extending a multi-use trail farther to the east (e.g., to the Chippawa Rail Trail between Nebo Road and Dartnall Road, or to the existing multi-use path at Pritchard Road 850 metres east of the study area).

Ultimately, two north-south off-street multi-use trails are envisioned to cross Rymal Road in the study area. One is the existing Chippawa Rail Trail between Nebo Road and Dartnall Road; and the second is the proposed multi-use trail within the hydro corridor between Upper Wentworth Street and Upper Sherman Avenue. Opportunities should be resolved to accommodate cyclists and pedestrians wishing to cross Rymal Road at these locations.

6.4.3 Transit

The “S” line of the planned BLAST rapid transit network follows Rymal Road through the study area. Current HSR plans are to operate parallel local and limited-stop service along Rymal Road, with the express service stopping at all north-south arterials. Service on the limited-stop route is planned to operate at 10-minute headways (or less) during the weekday peak periods.

As outlined in **Section 4.3.4**, a set of ridership forecasts was prepared and documented under separate cover; these forecasts were used to determine the appropriate type of service and transit priority measures along the entire S-Line corridor. This evaluation found the following:

- On the basis of ridership, the 2051 forecasts would warrant isolated transit priority measures within the majority of the S-Line corridor, but not a dedicated exclusive facility.
- On the basis of bus headways, the number of buses per hour would not warrant transit priority through the majority of the S-Line corridor. The secon betw een Upper James Street and Dartnall Road was idenfied as an excepon, with transit priority measures being nearly jusfied. This

secon is diff erent because it includes two segments (between Upper Wellington Street and Upper Wentworth Street; between Upper Sherman Avenue and Upper Gage Avenue) where north-south routes travel along Rymal Road as part of an end-of-line loop. (The north-south routes have subsequently been proposed to be modified as part of the HSR's "rail ready" reconfiguraon but would sl l result in secons wher e north-south routes operate along part of Rymal Road, between Upper James Street and Upper Wellington Street, and between Upper Wentworth Street and Upper Gage Avenue.)

Conceptual design work being undertaken as part of this EA is considering the need and opportunity for queue jump lanes at intersections along Rymal Road and the relationship with major stop locations (near-side vs. far-side stops). When the roadway designs are developed in greater detail in the future, they should consider the provision of additional passenger amenities (e.g., shelters, real-time arrival information displays) at transfer points, major intersections and other higher-ridership stops.

6.4.4 Trucks

Rymal Road forms part of the truck route network. While no specific infrastructure is warranted, roadway geometry should accommodate the movement of larger trucks (particularly corner radii where other north-south truck routes intersect with Rymal Road).

Corner radii that are designed to accommodate truck movements can result in poorer conditions for pedestrians, in that they increase the crossing distance and exposure time for pedestrians crossing the intersection, and enable higher speeds for smaller vehicles completing right turns. At the detailed design stage, truck right turn paths should be tested at intersections between truck routes to identify the minimum radius that will reasonably accommodate truck movements.

7.0 Summary

Rymal Road is the southernmost east-west arterial road within the Hamilton urban limits, approximately 2 kilometres south of the Lincoln Alexander Parkway. It forms a continuous link across the city, from Ancaster to the boundary with Niagara Region.

In the past five years, sections of Rymal Road west of Upper James Street and east of Dartnall Road have been widened to a four- to five-lane cross-section with continuous active transportation features. A 4.7-kilometre section of Rymal Road, extending from Springside Avenue (east of Upper James Street) to Dartnall Road, still has a three-lane cross-section (one lane per direction plus a continuous two-way left turn lane) and has gaps in the sidewalk network. The closest east-west cycling infrastructure is bicycle lanes on Stone Church Road, 1 kilometre to the north.

Five years of collision reports were reviewed covering the years 2015 through 2019 inclusive. Rear-end collisions are the most prevalent type along the corridor; widening from a three-lane to a five-lane cross-section may help to mitigate this pattern (reduced queue lengths; reduced friction at unsignalized right turns), although this may be offset by other factors (potential for increased sideswipe collisions; potential for higher midblock speeds and higher turning speeds at intersections; longer pedestrian crossing distances).

The number of collisions involving pedestrians or cyclists was low on an absolute basis, although this is offset by the low level of existing cycling activity within the corridor. There are currently no dedicated bicycle facilities in the corridor. A bicycle facility would provide an improved sense of security for cyclists, although a two-way cycling facility would likely not have addressed the reported collisions; all were angle collisions and most involved right-turning motorists and cyclists approaching from the right (i.e., in the contraflow direction), which would be reinforced with a two-way cycling facility.

Traffic forecasts have been prepared for a 2041 horizon. The forecasts account for currently anticipated development along the corridor, plus a growth rate of 1% to 2% per year. Under the 2041 traffic forecasts, several intersections along the corridor are anticipated to experience congestion and poor levels of service on one or more movements. The magnitude and nature of the capacity constraints are such that low-impact mitigation (signal timing adjustments; isolated intersection modifications) are unlikely to address them. Further, since the constraints extend broadly across the corridor, a considerable proportion of the corridor would require modifications even under an “isolated modifications” scenario.

Widening Rymal Road to a five-lane cross-section would address the anticipated capacity requirements through the majority of the study area and would provide flexibility for further growth. In addition to the five-lane cross-section, a westbound right turn lane is recommended at Upper Ottawa Street. Dedicated right turn lanes are recommended in all directions at Upper James Street. On Rymal Road these would also serve as queue jump lanes; on Upper James Street they would be in addition to separate queue jump lanes, both of which are carried over from a previously proposed concept.

Consideration should be given to carrying the planned Upper Sherman Avenue extension southerly into the rural area and connecting it to Miles Road to eliminate the jog along Rymal Road; although this is not required to accommodate the 2041 volumes, it would improve operations at Rymal Road and Miles Road, and would reduce delays for vehicles traveling along the Miles Road / Upper Sherman Avenue corridor.

Any construction on Rymal Road should include sidewalk construction to fill in existing gaps in the sidewalk network (west of Atessa Drive; between Upper Sherman Avenue and Miles Road; east of Upper Ottawa Street; east of Nebo Road). Sidewalk design should reference the design toolbox provided in the Hamilton Pedestrian Mobility Plan.

The Cycling Master Plan recommended an off-street multi-use pathway along Rymal Road from Upper Sherman Avenue westerly to beyond the study area limits. Road modification plans should accommodate cycling infrastructure in this segment (e.g., a bicycle-only path or multi-use trail), and should consider the feasibility of extending it east of Upper Sherman Avenue for connectivity to other cycling infrastructure (e.g., to the Chippawa Rail Trail between Nebo Road and Dartnall Road or to the existing multi-use path at Pritchard Road 850 metres east of the study area).

Rymal Road forms part of the "S" line, a crosstown route extending along Rymal Road and Centennial Parkway in the City's "BLAST" rapid transit plan. The HSR proposes to operate parallel local and limited-stop services along Rymal Road as part of a network restructuring to be implemented when the LRT opens, as well as reconfiguring some routes that intersect with the corridor; service levels on the express service are proposed to be increased to at least 10-minute headways during peak periods. Long-term ridership forecasts along Rymal Road are below levels where full continuous, exclusive facilities are warranted, although high enough to consider isolated transit priority measures (e.g., transit signal priority and/or physical intersection measures such as queue jump lanes). In addition, passenger amenities at S-Line stops (shelters, "next bus" displays, etc.) should be considered as part of the detailed design.

Rymal Road is a designated truck route, as are other several other north-south roadways that intersect with Rymal Road. While no specific infrastructure is required along Rymal Road to accommodate trucks, corner radii at intersecting truck routes should be designed to accommodate truck turns. To balance truck requirements against pedestrian crossing considerations, truck turning paths should be tested at the detailed design stage to identify the minimum corner radii that will reasonably accommodate truck movements.



Mike Walters, P.Eng.

Appendix A

Level of Service Definitions

LEVEL OF SERVICE[1]

Level of Service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. This concept was introduced in the 1965 *Highway Capacity Manual* as a criteria for interrupted flow conditions. The 2000 *Highway Capacity Manual* changed the basis for measuring Level of Service at intersections to control delay[2].

Six Levels of Service are defined with LOS A representing the best operating conditions, and LOS F the worst (briefly described below). It should be noted that there is often significant variability in the amount of delay experienced by individual drivers.

LOS A: This Level of Service describes the highest quality of traffic flow and is referred to as free flow. The approach appears open, turning movements are easily made and drivers have freedom of operation. Control delay is less than 10 seconds/vehicle.

LOS B: This Level of Service is referred to as a stable flow. Drivers feel somewhat restricted and occasionally may have to wait to complete the minor movement. Control delay is 10-15 seconds/vehicle for unsignalized intersections and 10-20 seconds/vehicle for signalized intersections.

LOS C: At this level, the operation is stable. Drivers feel more restricted and may have to wait, with queues developing for short periods. Control delay is 15-25 seconds/vehicle at unsignalized intersections and 20-35 seconds/vehicle at signalized intersections.

LOS D: At this level, traffic is approaching unstable flow. The motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period, but there are enough gaps to lower demand to permit occasional clearance of developing queues and prevent excessive back-ups. Control delay is 25-35 seconds/vehicle at unsignalized intersections and 35-55 seconds/vehicle at signalized intersections.

LOS E: At this level capacity occurs. Long queues of vehicles exist and delays to vehicles may extend. Control delay is 35-50 seconds/vehicle at unsignalized intersections and 55-80 seconds/vehicle at signalized intersections.

LOS F: At this Level of Service, the intersection has failed. Capacity of the intersection has been exceeded. Control delay exceeds 50 seconds/vehicle at unsignalized intersections and exceeds 80 seconds/vehicle at signalized intersections.

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[1] *Transportation Research Board: Highway Capacity Manual 1965, 2000*

[2] *Control delay is defined as the component of delay that results when a control signal causes a lane group to reduce speed or to stop; it is measured by comparison with the uncontrolled condition.*

Appendix B

Synchro Analysis Worksheets (Existing Conditions)

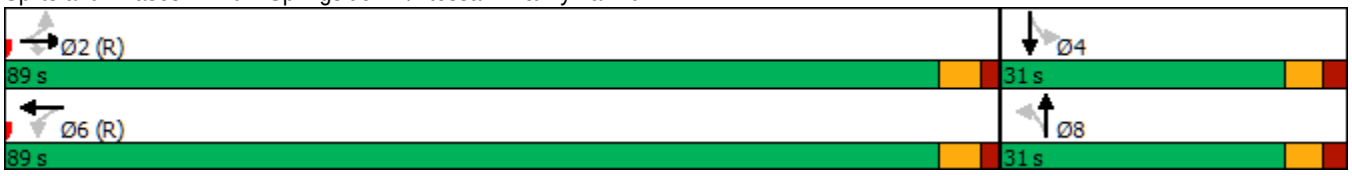
DILLON CONSULTING

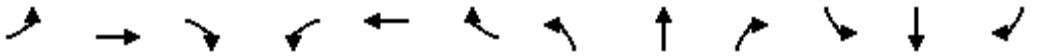
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	540	15	35	615	5	25	5	100	5	0	35
Future Volume (vph)	25	540	15	35	615	5	25	5	100	5	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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	1.00			0.98			1.00	
Frt			0.850		0.999			0.896			0.881	
Flt Protected	0.950			0.950				0.991			0.994	
Satd. Flow (prot)	1805	1900	1524	1703	1755	0	0	1608	0	0	1486	0
Flt Permitted	0.371			0.415				0.923			0.944	
Satd. Flow (perm)	704	1900	1484	742	1755	0	0	1498	0	0	1411	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			25		1			109			38	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		170.2			375.5			112.3			153.5	
Travel Time (s)		12.3			27.0			8.1			11.1	
Confl. Peds. (#/hr)	2		3	3		2			1	1		
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%	0%	6%	6%	8%	25%	0%	0%	4%	4%	8%	13%
Adj. Flow (vph)	27	587	16	38	668	5	27	5	109	5	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	587	16	38	673	0	0	141	0	0	43	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	30.0	30.0	30.0	30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	35.6	35.6	35.6	35.6	35.6		29.7	29.7		29.7	29.7	
Total Split (s)	89.0	89.0	89.0	89.0	89.0		31.0	31.0		31.0	31.0	
Total Split (%)	74.2%	74.2%	74.2%	74.2%	74.2%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	83.4	83.4	83.4	83.4	83.4		25.3	25.3		25.3	25.3	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6	5.6	5.6	5.6			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	21.0	21.0	21.0	21.0	21.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	9.0	9.0	9.0	9.0	9.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	3	3	3	2	2		1	1		0	0	
Act Effct Green (s)	95.7	95.7	95.7	95.7	95.7			13.0			13.0	
Actuated g/C Ratio	0.80	0.80	0.80	0.80	0.80			0.11			0.11	
v/c Ratio	0.05	0.39	0.01	0.06	0.48			0.54			0.23	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	3.8	5.0	1.2	5.0	6.1			22.1			18.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	3.8	5.0	1.2	5.0	6.1			22.1			18.9	
LOS	A	A	A	A	A			C			B	
Approach Delay		4.9			6.1			22.1			18.9	
Approach LOS		A			A			C			B	
Queue Length 50th (m)	1.0	28.9	0.0	1.0	19.9			7.6			1.2	
Queue Length 95th (m)	4.8	76.5	1.5	m6.5	79.3			25.1			11.2	
Internal Link Dist (m)		146.2			351.5			88.3			129.5	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	561	1515	1189	591	1400			401			327	
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	0.39	0.01	0.06	0.48			0.35			0.13	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 114 (95%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay: 7.4		Intersection LOS: A	
Intersection Capacity Utilization 72.4%		ICU Level of Service C	
Analysis Period (min) 15			
m	Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 101: Springside Dr./Atessa Dr. & Rymal Rd.





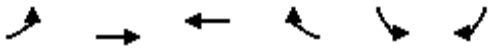
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	525	10	20	495	90	15	45	40	105	10	140
Future Volume (vph)	110	525	10	20	495	90	15	45	40	105	10	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		10.0	40.0		0.0	15.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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		0.99	1.00		1.00	0.98		0.98	0.98	
Frt		0.997			0.977			0.929			0.860	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1890	0	1641	1722	0	1805	1604	0	1703	1590	0
Flt Permitted	0.334			0.450			0.520			0.698		
Satd. Flow (perm)	581	1890	0	773	1722	0	985	1604	0	1222	1590	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			12			35			149	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		375.5			185.6			230.2			240.7	
Travel Time (s)		27.0			13.4			16.6			17.3	
Confl. Peds. (#/hr)	5		5	5		5	2		12	12		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	9%	0%	8%	10%	7%	9%	0%	2%	14%	6%	6%	0%
Adj. Flow (vph)	117	559	11	21	527	96	16	48	43	112	11	149
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	570	0	21	623	0	16	91	0	112	160	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	9.5	36.0		36.0	36.0		33.1	33.1		33.1	33.1	
Total Split (s)	14.0	86.0		72.0	72.0		34.0	34.0		34.0	34.0	
Total Split (%)	11.7%	71.7%		60.0%	60.0%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	11.0	80.0		66.0	66.0		27.9	27.9		27.9	27.9	
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.3		2.3	2.3		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		6.0	6.0		6.1	6.1		6.1	6.1	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	2.0	0.2		0.2	0.2		5.0	5.0		5.0	5.0	
Recall Mode	None	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)		10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)		5		5	5		2	2		12	12	
Act Effct Green (s)	92.5	89.5		79.7	79.7		18.4	18.4		18.4	18.4	
Actuated g/C Ratio	0.77	0.75		0.66	0.66		0.15	0.15		0.15	0.15	
v/c Ratio	0.23	0.40		0.04	0.54		0.11	0.33		0.60	0.43	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.9	6.5		6.7	7.4		41.9	30.1		59.3	11.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.9	6.5		6.7	7.4		41.9	30.1		59.3	11.6	
LOS	A	A		A	A		D	C		E	B	
Approach Delay		6.2			7.3			31.9			31.2	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	5.7	41.9		0.6	17.8		3.5	12.4		26.3	2.4	
Queue Length 95th (m)	13.4	62.9		m3.1	59.1		9.5	26.1		42.4	20.2	
Internal Link Dist (m)		351.5			161.6			206.2			216.7	
Turn Bay Length (m)	50.0			40.0			15.0			35.0		
Base Capacity (vph)	546	1409		513	1147		229	399		284	484	
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	0.21	0.40		0.04	0.54		0.07	0.23		0.39	0.33	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 12.2		Intersection LOS: B	
Intersection Capacity Utilization 84.1%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 110: Upper Wellington St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	665	595	15	5	10
Future Volume (Veh/h)	10	665	595	15	5	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	10	686	613	15	5	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (m)		186	187			
pX, platoon unblocked	0.89				0.91	0.89
vC, conflicting volume	628				1319	613
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	516				1018	499
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	99				98	98
cM capacity (veh/h)	939				228	510

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	10	686	613	15	15
Volume Left	10	0	0	0	5
Volume Right	0	0	0	15	10
cSH	939	1700	1700	1700	684
Volume to Capacity	0.01	0.40	0.36	0.01	0.02
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.5
Control Delay (s)	8.9	0.0	0.0	0.0	15.2
Lane LOS	A				C
Approach Delay (s)	0.1		0.0		15.2
Approach LOS					C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

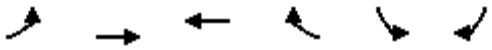
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	580	90	95	570	40	55
Future Volume (vph)	580	90	95	570	40	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		55.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			65.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.98	0.97
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1687	1696	1530	1335
Flt Permitted			0.351		0.950	
Satd. Flow (perm)	1900	1615	623	1696	1498	1299
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		86				59
Link Speed (k/h)	50			50	50	
Link Distance (m)	186.7			157.7	124.6	
Travel Time (s)	13.4			11.4	9.0	
Confl. Peds. (#/hr)					9	3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	7%	12%	18%	21%
Adj. Flow (vph)	617	96	101	606	43	59
Shared Lane Traffic (%)						
Lane Group Flow (vph)	617	96	101	606	43	59
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	30.0	30.0	5.0	30.0	10.0	10.0
Minimum Split (s)	35.6	35.6	8.0	35.6	31.8	31.8
Total Split (s)	74.6	74.6	13.2	74.6	32.2	32.2
Total Split (%)	62.2%	62.2%	11.0%	62.2%	26.8%	26.8%
Maximum Green (s)	69.0	69.0	10.2	69.0	26.4	26.4
Yellow Time (s)	3.7	3.7	3.0	3.7	3.3	3.3
All-Red Time (s)	1.9	1.9	0.0	1.9	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6	3.0	5.6	5.8	5.8
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)	17.0	17.0			12.0	12.0
Flash Dont Walk (s)	13.0	13.0			14.0	14.0
Pedestrian Calls (#/hr)	0	0			12	12
Act Effct Green (s)	85.1	85.1	98.0	96.5	16.4	16.4
Actuated g/C Ratio	0.71	0.71	0.82	0.80	0.14	0.14
v/c Ratio	0.46	0.08	0.18	0.44	0.21	0.26

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	9.7	1.9	5.2	10.8	45.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	1.9	5.2	10.8	45.0	12.6
LOS	A	A	A	B	D	B
Approach Delay	8.7			10.0	26.2	
Approach LOS	A			A	C	
Queue Length 50th (m)	46.3	1.6	3.9	77.3	10.2	0.0
Queue Length 95th (m)	119.0	4.1	16.6	159.3	19.2	11.4
Internal Link Dist (m)	162.7			133.7	100.6	
Turn Bay Length (m)		55.0	35.0			
Base Capacity (vph)	1347	1170	598	1363	336	331
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.08	0.17	0.44	0.13	0.18

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 11 (9%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 10.5		Intersection LOS: B	
Intersection Capacity Utilization 58.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 112: Turner Park Library & Rymal Rd.

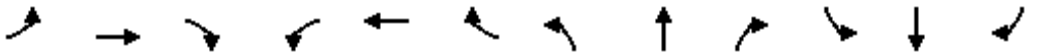




Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	625	645	20	15	20
Future Volume (Veh/h)	10	625	645	20	15	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	11	672	694	22	16	22
Pedestrians		3	5		2	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		158	345			
pX, platoon unblocked	0.82				0.90	0.82
vC, conflicting volume	718				1395	699
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	543				990	520
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	99				93	95
cM capacity (veh/h)	845				229	456

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	11	672	694	22	16	22
Volume Left	11	0	0	0	16	0
Volume Right	0	0	0	22	0	22
cSH	845	1700	1700	1700	229	456
Volume to Capacity	0.01	0.40	0.41	0.01	0.07	0.05
Queue Length 95th (m)	0.3	0.0	0.0	0.0	1.8	1.2
Control Delay (s)	9.3	0.0	0.0	0.0	21.9	13.3
Lane LOS	A				C	B
Approach Delay (s)	0.2		0.0		16.9	
Approach LOS					C	

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	44.9%	ICU Level of Service		A
Analysis Period (min)	15			



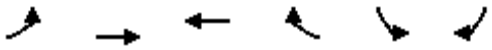
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	385	25	40	480	95	45	120	40	70	30	135
Future Volume (vph)	215	385	25	40	480	95	45	120	40	70	30	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		15.0	50.0		120.0	30.0		0.0	55.0		0.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	7.5			20.0			35.0			7.5		
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		0.96	0.99		0.97	0.97	0.99		0.98		0.95
Frt			0.850			0.850		0.963				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	1845	1404	1597	1557	1455	1752	1785	0	1597	1624	1553
Flt Permitted	0.359			0.518			0.736			0.537		
Satd. Flow (perm)	605	1845	1353	863	1557	1406	1315	1785	0	883	1624	1472
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			103		13				147
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.6			378.8			243.5			277.8	
Travel Time (s)		24.8			27.3			17.5			20.0	
Confl. Peds. (#/hr)	19		7	7		19	17		15	15		17
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 (%)	12%	3%	15%	13%	22%	11%	3%	0%	5%	13%	17%	4%
Adj. Flow (vph)	234	418	27	43	522	103	49	130	43	76	33	147
Shared Lane Traffic (%)												
Lane Group Flow (vph)	234	418	27	43	522	103	49	173	0	76	33	147
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6		6	2		2	4			4		4
Detector Phase	1	6	6	2	2	2	4	4		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	1.0	1.0	30.0	30.0	30.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	31.3	31.3	37.3	37.3	37.3	37.3	37.3		37.3	37.3	37.3
Total Split (s)	17.0	82.0	82.0	65.0	65.0	65.0	38.0	38.0		38.0	38.0	38.0
Total Split (%)	14.2%	68.3%	68.3%	54.2%	54.2%	54.2%	31.7%	31.7%		31.7%	31.7%	31.7%
Maximum Green (s)	14.0	75.7	75.7	58.7	58.7	58.7	31.7	31.7		31.7	31.7	31.7
Yellow Time (s)	3.0	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.6	2.6	2.6	2.6	2.6	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3		6.3	6.3	6.3
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
Flash Dont Walk (s)		13.0	13.0	19.0	19.0	19.0	19.0	19.0		19.0	19.0	19.0
Pedestrian Calls (#/hr)		7	7	19	19	19	32	32		32	32	32
Act Effct Green (s)	87.4	84.1	84.1	69.8	69.8	69.8	23.3	23.3		23.3	23.3	23.3
Actuated g/C Ratio	0.73	0.70	0.70	0.58	0.58	0.58	0.19	0.19		0.19	0.19	0.19
v/c Ratio	0.44	0.32	0.03	0.09	0.58	0.12	0.19	0.48		0.44	0.10	0.36

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.7	3.0	0.3	7.8	11.0	1.0	38.3	42.3		48.0	36.1	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	4.7	3.0	0.3	7.8	11.0	1.0	38.3	42.3		48.0	36.1	8.2
LOS	A	A	A	A	B	A	D	D		D	D	A
Approach Delay		3.5			9.2			41.4			23.6	
Approach LOS		A			A			D			C	
Queue Length 50th (m)	16.1	40.4	0.6	3.9	69.1	2.4	9.4	32.5		15.3	6.2	0.0
Queue Length 95th (m)	5.7	10.7	m0.3	m3.3	40.2	m0.0	20.2	53.9		30.7	14.9	16.2
Internal Link Dist (m)		320.6			354.8			219.5			253.8	
Turn Bay Length (m)	80.0		15.0	50.0		120.0	30.0			55.0		
Base Capacity (vph)	559	1292	957	501	905	860	347	481		233	429	497
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.42	0.32	0.03	0.09	0.58	0.12	0.14	0.36		0.33	0.08	0.30

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 56 (47%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 91.1%		ICU Level of Service F	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 120: Upper Wentworth St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	485	600	35	35	10
Future Volume (Veh/h)	0	485	600	35	35	10
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)	0	527	652	38	38	11
Pedestrians			4		26	
Lane Width (m)			3.6		3.6	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		379				
pX, platoon unblocked					0.94	
vC, conflicting volume	716				1228	697
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	716				1210	697
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				80	97
cM capacity (veh/h)	861				186	435

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	0	527	690	38	11
Volume Left	0	0	0	38	0
Volume Right	0	0	38	0	11
cSH	1700	1700	1700	186	435
Volume to Capacity	0.00	0.31	0.41	0.20	0.03
Queue Length 95th (m)	0.0	0.0	0.0	5.9	0.6
Control Delay (s)	0.0	0.0	0.0	29.2	13.5
Lane LOS				D	B
Approach Delay (s)	0.0		0.0	25.7	
Approach LOS				D	

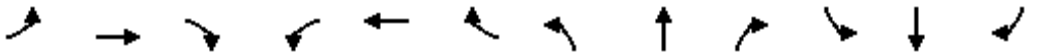
Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	515	10	5	625	25	10
Future Volume (Veh/h)	515	10	5	625	25	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	554	11	5	672	27	11
Pedestrians				2	1	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	0	
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (m)				292		
pX, platoon unblocked					0.77	
vC, conflicting volume			566		1242	562
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			566		1166	562
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		84	98
cM capacity (veh/h)			1015		166	529

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	565	5	672	38
Volume Left	0	5	0	27
Volume Right	11	0	0	11
cSH	1700	1015	1700	233
Volume to Capacity	0.33	0.00	0.40	0.16
Queue Length 95th (m)	0.0	0.1	0.0	4.6
Control Delay (s)	0.0	8.6	0.0	25.4
Lane LOS		A		D
Approach Delay (s)	0.0	0.1		25.4
Approach LOS				D

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		



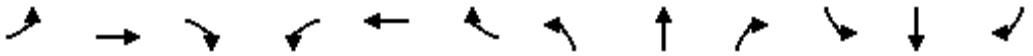
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	410	0	0	510	195	0	0	0	110	0	120
Future Volume (vph)	105	410	0	0	510	195	0	0	0	110	0	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	40.0		0.0	40.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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)	1612	1900	0	1900	1637	0	1900	1900	0	1703	1573	0
Flt Permitted	0.234									0.493		
Satd. Flow (perm)	397	1900	0	1900	1637	0	1900	1900	0	880	1573	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)		291.6			340.9			113.6			275.5	
Travel Time (s)		21.0			24.5			8.2			19.8	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	4%	0%	12%	5%	0%	0%	0%	6%	9%	0%
Adj. Flow (vph)	115	451	0	0	560	214	0	0	0	121	0	132
Shared Lane Traffic (%)												
Lane Group Flow (vph)	115	451	0	0	774	0	0	0	0	121	132	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		7 4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	30.1		8.0	30.1		8.0	34.3		8.0	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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.1		3.0	6.1		3.0	6.3		3.0	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	0.2		1.0	0.2		1.0	0.2		1.0	0.2	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
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)		3			8			3			2	
Act Effct Green (s)	93.5	90.4			81.7					20.5	17.2	
Actuated g/C Ratio	0.78	0.75			0.68					0.17	0.14	
v/c Ratio	0.31	0.32			0.69					0.50	0.24	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.0	7.8			13.0					49.5	1.0	
Queue Delay	0.0	0.0			0.0					0.0	0.0	
Total Delay	7.0	7.8			13.0					49.5	1.0	
LOS	A	A			B					D	A	
Approach Delay		7.6			13.0						24.2	
Approach LOS		A			B						C	
Queue Length 50th (m)	4.7	24.8			41.7					28.3	0.0	
Queue Length 95th (m)	14.7	79.4			m#247.2					36.7	0.0	
Internal Link Dist (m)		267.6			316.9			89.6			251.5	
Turn Bay Length (m)	20.0									40.0		
Base Capacity (vph)	373	1431			1121					346	692	
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	0.31	0.32			0.69					0.35	0.19	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 12.9		Intersection LOS: B	
Intersection Capacity Utilization 72.2%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 130: Rymal Rd. & Upper Sherman Ave.





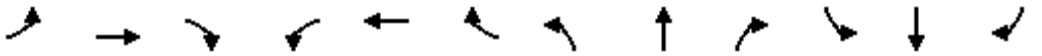
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	440	55	90	505	10	175	15	110	5	10	20
Future Volume (vph)	10	440	55	90	505	10	175	15	110	5	10	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		10.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		1	0		0	1		0
Taper Length (m)	7.5			7.5			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		0.97		0.99		1.00	0.98	
Frt		0.983				0.850		0.950			0.902	
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1805	1739	0	1752	1667	1292	0	1718	0	1656	1551	0
Flt Permitted	0.464			0.360				0.802		0.578		
Satd. Flow (perm)	877	1739	0	664	1667	1252	0	1413	0	1007	1551	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				25		22			21	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		340.9			498.9			153.4			80.6	
Travel Time (s)		24.5			35.9			11.0			5.8	
Confl. Peds. (#/hr)	4		1	1		4	2		1	1		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	8%	0%	3%	14%	25%	1%	0%	2%	9%	12%	7%
Adj. Flow (vph)	11	468	59	96	537	11	186	16	117	5	11	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	527	0	96	537	11	0	319	0	5	32	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		1	6	6	4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	27.7	27.7		8.0	27.7	27.7	31.7	31.7		31.7	31.7	
Total Split (s)	70.0	70.0		18.0	88.0	88.0	32.0	32.0		32.0	32.0	
Total Split (%)	58.3%	58.3%		15.0%	73.3%	73.3%	26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	64.3	64.3		15.0	82.3	82.3	26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0	2.0	2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	5.7	5.7		3.0	5.7	5.7		5.7		5.7	5.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)	10.0	10.0			10.0	10.0	10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0	12.0	16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	1	1			4	4	1	1		2	2	
Act Effct Green (s)	71.8	71.8		85.0	82.3	82.3		26.3		26.3	26.3	
Actuated g/C Ratio	0.60	0.60		0.71	0.69	0.69		0.22		0.22	0.22	
v/c Ratio	0.02	0.51		0.18	0.47	0.01		0.98		0.02	0.09	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.7	15.9		3.8	8.5	0.3		88.7		37.4	20.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	7.7	15.9		3.8	8.5	0.3		88.7		37.4	20.4	
LOS	A	B		A	A	A		F		D	C	
Approach Delay		15.8			7.6			88.7			22.7	
Approach LOS		B			A			F			C	
Queue Length 50th (m)	1.2	108.4		8.7	73.6	0.2		74.4		1.0	2.2	
Queue Length 95th (m)	m2.0	39.5		2.1	47.0	m0.0		#134.9		4.6	10.9	
Internal Link Dist (m)		316.9			474.9			129.4			56.6	
Turn Bay Length (m)	30.0			30.0		10.0				20.0		
Base Capacity (vph)	524	1043		606	1143	866		326		220	356	
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	0.02	0.51		0.16	0.47	0.01		0.98		0.02	0.09	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 11 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 27.6	Intersection LOS: C
Intersection Capacity Utilization 81.4%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 131: Miles Rd./Eva St. & Rymal Rd.





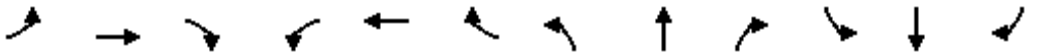
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	395	10	15	420	150	55	95	35	115	30	120
Future Volume (vph)	155	395	10	15	420	150	55	95	35	115	30	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	90.0		40.0	45.0		45.0	50.0		30.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			35.0			7.5		
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		0.99		0.97	0.99		0.95	0.97		0.97
Frt		0.996				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1720	0	1597	1667	1509	1687	1881	1615	1687	1776	1292
Flt Permitted	0.433			0.512			0.736			0.692		
Satd. Flow (perm)	778	1720	0	853	1667	1468	1295	1881	1531	1192	1776	1254
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				137			59			128
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		498.9			509.5			366.2			122.9	
Travel Time (s)		35.9			36.7			26.4			8.8	
Confl. Peds. (#/hr)	14		9	9		14	4		15	15		4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	10%	7%	13%	14%	7%	7%	1%	0%	7%	7%	25%
Adj. Flow (vph)	165	420	11	16	447	160	59	101	37	122	32	128
Shared Lane Traffic (%)												
Lane Group Flow (vph)	165	431	0	16	447	160	59	101	37	122	32	128
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6			2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Detector Phase	1	6		2	2	2	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0	35.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	8.0	41.5		41.5	41.5	41.5	32.2	32.2	32.2	32.2	32.2	32.2
Total Split (s)	16.0	86.0		70.0	70.0	70.0	34.0	34.0	34.0	34.0	34.0	34.0
Total Split (%)	13.3%	71.7%		58.3%	58.3%	58.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%
Maximum Green (s)	13.0	79.5		63.5	63.5	63.5	27.8	27.8	27.8	27.8	27.8	27.8
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	0.0	2.8		2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5		6.5	6.5	6.5	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		12.0		12.0	12.0	12.0				12.0	12.0	12.0
Flash Dont Walk (s)		20.0		20.0	20.0	20.0				14.0	14.0	14.0
Pedestrian Calls (#/hr)		9		14	14	14				19	19	19
Act Effct Green (s)	90.9	87.4		75.6	75.6	75.6	19.9	19.9	19.9	19.9	19.9	19.9
Actuated g/C Ratio	0.76	0.73		0.63	0.63	0.63	0.17	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.25	0.34		0.03	0.43	0.16	0.28	0.32	0.12	0.62	0.11	0.41

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	3.6	7.0		11.1	14.1	3.2	45.2	45.5	4.9	59.3	40.9	10.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	7.0		11.1	14.1	3.2	45.2	45.5	4.9	59.3	40.9	10.7
LOS	A	A		B	B	A	D	D	A	E	D	B
Approach Delay		6.1			11.2			37.8			35.2	
Approach LOS		A			B			D			D	
Queue Length 50th (m)	5.0	37.3		1.3	48.3	1.9	13.3	22.9	0.0	29.1	7.0	0.0
Queue Length 95th (m)	m16.2	m80.6		5.2	91.9	12.5	24.7	37.3	4.8	47.0	15.3	16.5
Internal Link Dist (m)		474.9			485.5			342.2			98.9	
Turn Bay Length (m)	30.0			90.0		40.0	45.0		45.0	50.0		30.0
Base Capacity (vph)	691	1252		537	1049	975	300	435	400	276	411	388
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.34		0.03	0.43	0.16	0.20	0.23	0.09	0.44	0.08	0.33

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 75 (63%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 16.5		Intersection LOS: B	
Intersection Capacity Utilization 88.4%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 140: Upper Gage Ave. & Rymal Rd.



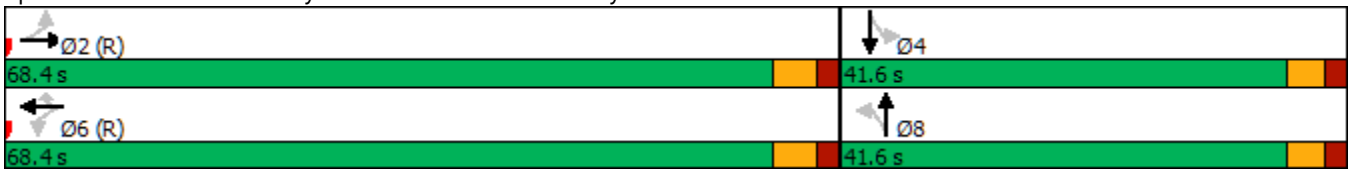


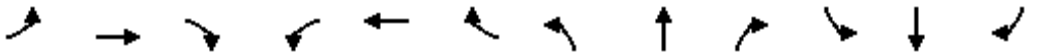
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	530	5	5	495	10	0	0	0	0	0	0
Future Volume (vph)	20	530	5	5	495	10	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		5.0	35.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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						
Frt		0.999				0.850						
Flt Protected	0.950			0.950								
Satd. Flow (prot)	1805	1898	0	1805	1776	1615	0	1900	0	0	1712	0
Flt Permitted	0.444			0.421								
Satd. Flow (perm)	840	1898	0	800	1776	1567	0	1900	0	0	1712	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				20						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		509.5			351.2			177.4			122.5	
Travel Time (s)		36.7			25.3			12.8			8.8	
Confl. Peds. (#/hr)	11					11	4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	0%	0%	0%	7%	0%	0%	0%	7%	5%	11%	0%
Adj. Flow (vph)	22	596	6	6	556	11	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	602	0	6	556	11	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm						
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	
Minimum Split (s)	41.0	41.0		41.0	41.0	41.0	25.6	25.6		41.6	41.6	
Total Split (s)	68.4	68.4		68.4	68.4	68.4	41.6	41.6		41.6	41.6	
Total Split (%)	62.2%	62.2%		62.2%	62.2%	62.2%	37.8%	37.8%		37.8%	37.8%	
Maximum Green (s)	62.8	62.8		62.8	62.8	62.8	36.6	36.6		36.6	36.6	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.9	1.9		1.9	1.9	1.9	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6	5.6		5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)										15.0	15.0	
Flash Dont Walk (s)										21.0	21.0	
Pedestrian Calls (#/hr)										1	1	
Act Effct Green (s)	100.7	100.7		100.7	100.7	100.7						
Actuated g/C Ratio	0.92	0.92		0.92	0.92	0.92						
v/c Ratio	0.03	0.35		0.01	0.34	0.01						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.9	4.9		5.6	5.0	2.2						
Queue Delay	0.0	0.0		0.0	0.0	0.0						
Total Delay	4.9	4.9		5.6	5.0	2.2						
LOS	A	A		A	A	A						
Approach Delay		4.9			4.9							
Approach LOS		A			A							
Queue Length 50th (m)	0.0	0.0		0.0	0.0	0.0						
Queue Length 95th (m)	5.7	109.7		2.4	102.4	1.6						
Internal Link Dist (m)		485.5			327.2			153.4			98.5	
Turn Bay Length (m)	30.0			35.0		20.0						
Base Capacity (vph)	769	1737		732	1625	1436						
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	0.03	0.35		0.01	0.34	0.01						

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 58 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.35			
Intersection Signal Delay: 4.9		Intersection LOS: A	
Intersection Capacity Utilization 55.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 141: Grayrocks Ave./Rockland Ave. & Rymal Rd.





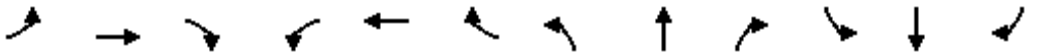
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	385	30	15	405	145	40	60	20	110	50	75
Future Volume (vph)	140	385	30	15	405	145	40	60	20	110	50	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	30.0		10.0	35.0		50.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	*0.65	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00			0.99		0.99		
Frt		0.989						0.963				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1556	1294	0	1570	1616	0	1165	1739	0	1671	1652	1170
Flt Permitted	0.354			0.507			0.722			0.673		
Satd. Flow (perm)	579	1294	0	837	1616	0	885	1739	0	1171	1652	1170
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		7			*55			18				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		351.2			400.2			147.9			323.0	
Travel Time (s)		25.3			28.8			10.6			23.3	
Confl. Peds. (#/hr)	3		1	1		3			5	5		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	16%	47%	19%	15%	20%	9%	55%	31%	50%	8%	15%	38%
Adj. Flow (vph)	149	410	32	16	431	154	43	64	21	117	53	80
Shared Lane Traffic (%)												
Lane Group Flow (vph)	149	442	0	16	585	0	43	85	0	117	53	80
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		6	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	48.2		48.2	48.2		31.0	31.0		31.0	31.0	31.0
Total Split (s)	15.0	87.0		72.0	72.0		33.0	33.0		33.0	33.0	33.0
Total Split (%)	12.5%	72.5%		60.0%	60.0%		27.5%	27.5%		27.5%	27.5%	27.5%
Maximum Green (s)	12.0	80.8		65.8	65.8		27.0	27.0		27.0	27.0	27.0
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.5		2.5	2.5		2.7	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.2		6.2	6.2		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	None
Walk Time (s)		20.0		20.0	20.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		22.0		22.0	22.0		18.0	18.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)		1		3	3		5	5		0	0	0
Act Effct Green (s)	93.6	90.4		78.9	78.9		17.4	17.4		17.4	17.4	17.4
Actuated g/C Ratio	0.78	0.75		0.66	0.66		0.14	0.14		0.14	0.14	0.14
v/c Ratio	0.29	0.45		0.03	0.54		0.34	0.32		0.69	0.22	0.47

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	5.3	8.0		16.4	18.6		51.1	37.4		68.6	45.2	54.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	5.3	8.0		16.4	18.6		51.1	37.4		68.6	45.2	54.9
LOS	A	A		B	B		D	D		E	D	D
Approach Delay		7.3			18.6			42.0			59.2	
Approach LOS		A			B			D			E	
Queue Length 50th (m)	7.4	34.4		1.5	65.8		9.7	11.5		27.9	11.8	18.5
Queue Length 95th (m)	17.1	69.3		m6.2	152.2		20.3	21.9		45.7	22.6	32.8
Internal Link Dist (m)		327.2			376.2			123.9			299.0	
Turn Bay Length (m)	45.0			30.0			35.0			50.0		
Base Capacity (vph)	549	976		550	1081		199	405		263	371	263
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.27	0.45		0.03	0.54		0.22	0.21		0.44	0.14	0.30

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 116 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 22.7		Intersection LOS: C	
Intersection Capacity Utilization 92.3%		ICU Level of Service F	
Analysis Period (min) 15			
* User Entered Value			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 150: Upper Ottawa St. & Rymal Rd.





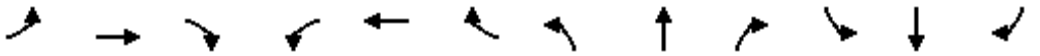
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	395	40	65	415	65	65	165	65	30	55	50
Future Volume (vph)	75	395	40	65	415	65	65	165	65	30	55	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	45.0		0.0	20.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			30.0			7.5		
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		0.98	0.99		0.99	0.98	
Frt		0.986			0.980			0.958			0.928	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1626	0	1556	1683	0	1530	1554	0	1719	1402	0
Flt Permitted	0.416			0.444			0.587			0.284		
Satd. Flow (perm)	633	1626	0	724	1683	0	922	1554	0	511	1402	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			15			16			37	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		400.2			349.0			199.0			219.6	
Travel Time (s)		28.8			25.1			14.3			15.8	
Confl. Peds. (#/hr)	9		4	4		9	13		4	4		13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	24%	16%	4%	16%	10%	10%	18%	8%	37%	5%	7%	40%
Adj. Flow (vph)	83	439	44	72	461	72	72	183	72	33	61	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	483	0	72	533	0	72	255	0	33	117	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Detector Phase	2	2		2	2		4	4		4	4	
Switch Phase												
Minimum Initial (s)	25.0	25.0		25.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	29.5	29.5		29.5	29.5		29.4	29.4		29.4	29.4	
Total Split (s)	85.0	85.0		85.0	85.0		35.0	35.0		35.0	35.0	
Total Split (%)	70.8%	70.8%		70.8%	70.8%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	82.0	82.0		82.0	82.0		31.6	31.6		31.6	31.6	
Yellow Time (s)	2.0	2.0		2.0	2.0		2.4	2.4		2.4	2.4	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	13	13		13	13		17	17		17	17	
Act Effct Green (s)	89.9	89.9		89.9	89.9		23.7	23.7		23.7	23.7	
Actuated g/C Ratio	0.75	0.75		0.75	0.75		0.20	0.20		0.20	0.20	
v/c Ratio	0.18	0.40		0.13	0.42		0.40	0.80		0.33	0.38	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.0	8.4		4.4	7.9		46.6	60.5		48.0	30.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.0	8.4		4.4	7.9		46.6	60.5		48.0	30.2	
LOS	A	A		A	A		D	E		D	C	
Approach Delay		8.2			7.5			57.4			34.2	
Approach LOS		A			A			E			C	
Queue Length 50th (m)	7.1	47.0		5.4	67.0		15.6	57.0		7.1	17.0	
Queue Length 95th (m)	18.1	86.4		12.2	104.2		28.5	81.4		16.6	32.6	
Internal Link Dist (m)		376.2			325.0			175.0			195.6	
Turn Bay Length (m)	50.0			45.0			20.0					
Base Capacity (vph)	474	1219		542	1264		242	421		134	396	
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	0.18	0.40		0.13	0.42		0.30	0.61		0.25	0.30	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 30 (25%), Referenced to phase 2:EBWB and 6:, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 20.1		Intersection LOS: C	
Intersection Capacity Utilization 81.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 160: Nebo Rd. & Rymal Rd.



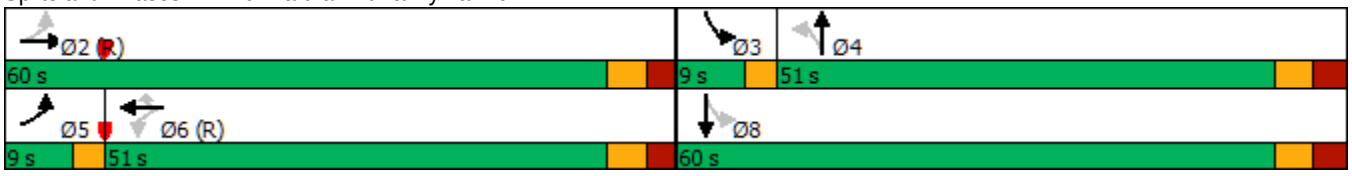


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	320	15	30	450	240	15	150	20	75	105	135
Future Volume (vph)	115	320	15	30	450	240	15	150	20	75	105	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		150.0	60.0		60.0	85.0		0.0	30.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			55.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.65	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor							0.99				0.99	
Frt		0.993				0.850		0.983			0.916	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3321	0	1421	2266	1509	1805	2974	0	1480	2768	0
Flt Permitted	0.328			0.528			0.585			0.512		
Satd. Flow (perm)	561	3321	0	790	2266	1509	1104	2974	0	797	2768	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				270		13			152	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		106.4			328.2			269.5			224.1	
Travel Time (s)		7.7			23.6			19.4			16.1	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	11%	8%	7%	27%	9%	7%	0%	17%	37%	22%	9%	25%
Adj. Flow (vph)	129	360	17	34	506	270	17	169	22	84	118	152
Shared Lane Traffic (%)												
Lane Group Flow (vph)	129	377	0	34	506	270	17	191	0	84	270	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		
Detector Phase	5	2		6	6	6	4	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	20.0		20.0	20.0	20.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	36.3		36.3	36.3	36.3	37.6	37.6		8.0	27.6	
Total Split (s)	9.0	60.0		51.0	51.0	51.0	51.0	51.0		9.0	60.0	
Total Split (%)	7.5%	50.0%		42.5%	42.5%	42.5%	42.5%	42.5%		7.5%	50.0%	
Maximum Green (s)	6.0	53.7		44.7	44.7	44.7	44.4	44.4		6.0	53.4	
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	3.3	3.3		0.0	3.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3		6.3	6.3	6.3	6.6	6.6		3.0	6.6	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)		12.0		12.0	12.0	12.0	10.0	10.0			10.0	
Flash Dont Walk (s)		18.0		18.0	18.0	18.0	21.0	21.0			1.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			3	
Act Effct Green (s)	90.3	87.0		75.8	75.8	75.8	12.9	12.9		23.7	20.1	
Actuated g/C Ratio	0.75	0.72		0.63	0.63	0.63	0.11	0.11		0.20	0.17	
v/c Ratio	0.26	0.16		0.07	0.35	0.26	0.14	0.58		0.44	0.46	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.0	6.0		11.0	12.4	2.0	50.0	54.3		46.9	20.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	6.0	6.0		11.0	12.4	2.0	50.0	54.3		46.9	20.7	
LOS	A	A		B	B	A	D	D		D	C	
Approach Delay		6.0			8.9			53.9			26.9	
Approach LOS		A			A			D			C	
Queue Length 50th (m)	12.6	21.7		3.1	44.1	0.0	3.9	22.4		17.6	13.3	
Queue Length 95th (m)	15.3	22.7		8.8	69.0	11.2	10.9	33.6		31.2	25.0	
Internal Link Dist (m)		82.4			304.2			245.5			200.1	
Turn Bay Length (m)	50.0			60.0		60.0	85.0			30.0		
Base Capacity (vph)	495	2409		499	1430	1052	408	1108		191	1316	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.26	0.16		0.07	0.35	0.26	0.04	0.17		0.44	0.21	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 16.5		Intersection LOS: B	
Intersection Capacity Utilization 71.6%		ICU Level of Service C	
Analysis Period (min) 15			
* User Entered Value			

Splits and Phases: 170: Dartnall Rd. & Rymal Rd.

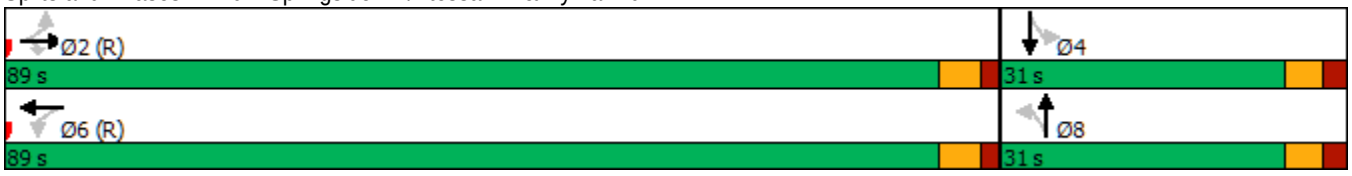


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	740	40	80	775	10	10	0	55	5	0	20
Future Volume (vph)	25	740	40	80	775	10	10	0	55	5	0	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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	1.00								
Frt			0.850		0.998			0.886			0.890	
Flt Protected	0.950			0.950				0.992			0.991	
Satd. Flow (prot)	1805	1900	1615	1770	1839	0	0	1552	0	0	1636	0
Flt Permitted	0.308			0.329				0.939			0.935	
Satd. Flow (perm)	585	1900	1570	612	1839	0	0	1469	0	0	1543	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			43		1			59			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		170.2			375.5			112.3			153.5	
Travel Time (s)		12.3			27.0			8.1			11.1	
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	2%	3%	11%	0%	0%	9%	0%	4%	3%
Adj. Flow (vph)	27	796	43	86	833	11	11	0	59	5	0	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	796	43	86	844	0	0	70	0	0	27	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	30.0	30.0	30.0	30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	35.6	35.6	35.6	35.6	35.6		29.7	29.7		29.7	29.7	
Total Split (s)	89.0	89.0	89.0	89.0	89.0		31.0	31.0		31.0	31.0	
Total Split (%)	74.2%	74.2%	74.2%	74.2%	74.2%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	83.4	83.4	83.4	83.4	83.4		25.3	25.3		25.3	25.3	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6	5.6	5.6	5.6			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	21.0	21.0	21.0	21.0	21.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	9.0	9.0	9.0	9.0	9.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	3	3	3	0	0		0	0		0	0	
Act Effct Green (s)	102.7	102.7	102.7	102.7	102.7			10.2			10.2	
Actuated g/C Ratio	0.86	0.86	0.86	0.86	0.86			0.08			0.08	
v/c Ratio	0.05	0.49	0.03	0.16	0.54			0.39			0.18	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	2.4	4.1	0.7	3.6	5.5			23.5			23.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	2.4	4.1	0.7	3.6	5.5			23.5			23.7	
LOS	A	A	A	A	A			C			C	
Approach Delay		3.9			5.3			23.5			23.7	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	1.0	46.6	0.0	4.9	84.9			2.6			0.7	
Queue Length 95th (m)	2.8	68.6	1.8	m7.2	95.0			17.3			10.1	
Internal Link Dist (m)		146.2			351.5			88.3			129.5	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	501	1626	1350	524	1574			356			344	
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	0.49	0.03	0.16	0.54			0.20			0.08	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 114 (95%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay: 5.6		Intersection LOS: A	
Intersection Capacity Utilization 84.2%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 101: Springside Dr./Atessa Dr. & Rymal Rd.

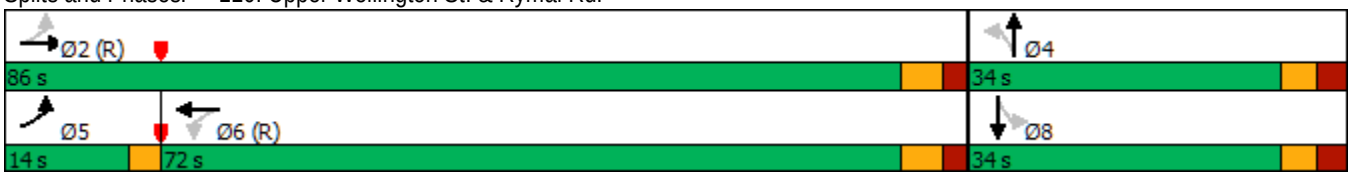


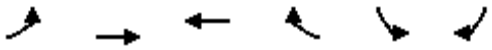
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	645	25	55	630	70	20	35	45	95	60	220
Future Volume (vph)	135	645	25	55	630	70	20	35	45	95	60	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		10.0	40.0		0.0	15.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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	1.00		0.99	0.98		0.99	0.98	
Frt		0.994			0.985			0.915			0.882	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1851	0	1805	1807	0	1703	1704	0	1805	1582	0
Flt Permitted	0.266			0.381			0.205			0.703		
Satd. Flow (perm)	491	1851	0	723	1807	0	365	1704	0	1317	1582	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			7			47			142	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		375.5			185.6			230.2			240.7	
Travel Time (s)		27.0			13.4			16.6			17.3	
Confl. Peds. (#/hr)	3		2	2		3	5		7	7		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	2%	0%	0%	3%	6%	6%	0%	0%	0%	1%	4%
Adj. Flow (vph)	141	672	26	57	656	73	21	36	47	99	63	229
Shared Lane Traffic (%)												
Lane Group Flow (vph)	141	698	0	57	729	0	21	83	0	99	292	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	9.5	36.0		36.0	36.0		33.1	33.1		33.1	33.1	
Total Split (s)	14.0	86.0		72.0	72.0		34.0	34.0		34.0	34.0	
Total Split (%)	11.7%	71.7%		60.0%	60.0%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	11.0	80.0		66.0	66.0		27.9	27.9		27.9	27.9	
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.3		2.3	2.3		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		6.0	6.0		6.1	6.1		6.1	6.1	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	2.0	0.2		0.2	0.2		5.0	5.0		5.0	5.0	
Recall Mode	None	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)		10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)		2		3	3		5	5		7	7	
Act Effct Green (s)	91.4	88.4		78.2	78.2		19.5	19.5		19.5	19.5	
Actuated g/C Ratio	0.76	0.74		0.65	0.65		0.16	0.16		0.16	0.16	
v/c Ratio	0.31	0.51		0.12	0.62		0.36	0.26		0.46	0.78	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.1	7.9		6.7	8.0		58.7	21.8		50.8	38.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.1	7.9		6.7	8.0		58.7	21.8		50.8	38.0	
LOS	A	A		A	A		E	C		D	D	
Approach Delay		7.6			7.9			29.3			41.2	
Approach LOS		A			A			C			D	
Queue Length 50th (m)	7.6	59.0		1.3	17.1		4.7	7.7		22.5	36.3	
Queue Length 95th (m)	16.8	78.2		9.1	80.0		12.7	20.8		37.4	63.9	
Internal Link Dist (m)		351.5			161.6			206.2			216.7	
Turn Bay Length (m)	50.0			40.0			15.0			35.0		
Base Capacity (vph)	489	1365		471	1180		84	432		306	476	
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	0.29	0.51		0.12	0.62		0.25	0.19		0.32	0.61	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 15.0		Intersection LOS: B	
Intersection Capacity Utilization 93.5%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 110: Upper Wellington St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	785	745	15	5	10
Future Volume (Veh/h)	5	785	745	15	5	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	826	784	16	5	11
Pedestrians					6	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (m)		186	187			
pX, platoon unblocked	0.84				0.88	0.84
vC, conflicting volume	806				1626	790
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	672				1229	653
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	97
cM capacity (veh/h)	774				172	393

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	5	826	784	16	16
Volume Left	5	0	0	0	5
Volume Right	0	0	0	16	11
cSH	774	1700	1700	1700	551
Volume to Capacity	0.01	0.49	0.46	0.01	0.03
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.7
Control Delay (s)	9.7	0.0	0.0	0.0	18.2
Lane LOS	A				C
Approach Delay (s)	0.1		0.0		18.2
Approach LOS					C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

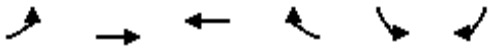
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	710	75	95	665	90	115
Future Volume (vph)	710	75	95	665	90	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		55.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			65.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98			0.98	0.93
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1805	1845	1787	1615
Flt Permitted			0.274		0.950	
Satd. Flow (perm)	1900	1576	521	1845	1750	1499
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		59				116
Link Speed (k/h)	50			50	50	
Link Distance (m)	186.7			157.7	124.6	
Travel Time (s)	13.4			11.4	9.0	
Confl. Peds. (#/hr)		2	2		9	23
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%
Adj. Flow (vph)	717	76	96	672	91	116
Shared Lane Traffic (%)						
Lane Group Flow (vph)	717	76	96	672	91	116
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	30.0	30.0	5.0	30.0	10.0	10.0
Minimum Split (s)	35.6	35.6	8.0	35.6	31.8	31.8
Total Split (s)	74.6	74.6	13.2	74.6	32.2	32.2
Total Split (%)	62.2%	62.2%	11.0%	62.2%	26.8%	26.8%
Maximum Green (s)	69.0	69.0	10.2	69.0	26.4	26.4
Yellow Time (s)	3.7	3.7	3.0	3.7	3.3	3.3
All-Red Time (s)	1.9	1.9	0.0	1.9	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6	3.0	5.6	5.8	5.8
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)	17.0	17.0			12.0	12.0
Flash Dont Walk (s)	13.0	13.0			14.0	14.0
Pedestrian Calls (#/hr)	2	2			32	32
Act Effct Green (s)	78.7	78.7	91.6	89.0	19.6	19.6
Actuated g/C Ratio	0.66	0.66	0.76	0.74	0.16	0.16
v/c Ratio	0.58	0.07	0.20	0.49	0.31	0.34

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	11.9	2.1	6.8	14.6	44.8	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	2.1	6.8	14.6	44.8	9.8
LOS	B	A	A	B	D	A
Approach Delay	10.9			13.6	25.2	
Approach LOS	B			B	C	
Queue Length 50th (m)	100.6	0.8	11.0	154.4	18.8	0.0
Queue Length 95th (m)	125.8	3.6	m14.2	182.5	34.1	15.7
Internal Link Dist (m)	162.7			133.7	100.6	
Turn Bay Length (m)		55.0	35.0			
Base Capacity (vph)	1246	1054	507	1367	393	420
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.07	0.19	0.49	0.23	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 11 (9%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 13.8		Intersection LOS: B	
Intersection Capacity Utilization 70.9%		ICU Level of Service C	
Analysis Period (min) 15			
m	Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 112: Turner Park Library & Rymal Rd.

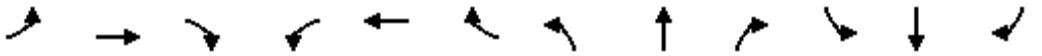




Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	795	735	35	10	25
Future Volume (Veh/h)	35	795	735	35	10	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	36	811	750	36	10	26
Pedestrians		4	7		3	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	1		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		158	345			
pX, platoon unblocked	0.77				0.89	0.77
vC, conflicting volume	789				1643	757
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	581				1093	540
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				95	94
cM capacity (veh/h)	774				200	420

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	36	811	750	36	10	26
Volume Left	36	0	0	0	10	0
Volume Right	0	0	0	36	0	26
cSH	774	1700	1700	1700	200	420
Volume to Capacity	0.05	0.48	0.44	0.02	0.05	0.06
Queue Length 95th (m)	1.2	0.0	0.0	0.0	1.3	1.6
Control Delay (s)	9.9	0.0	0.0	0.0	23.9	14.1
Lane LOS	A				C	B
Approach Delay (s)	0.4		0.0		16.9	
Approach LOS					C	

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		



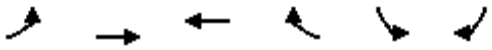
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	565	20	35	600	95	25	65	35	100	50	165
Future Volume (vph)	215	565	20	35	600	95	25	65	35	100	50	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		15.0	50.0		120.0	30.0		0.0	55.0		0.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	7.5			20.0			35.0			7.5		
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		0.96	0.99		0.94	0.96	0.99		0.98		0.93
Frt			0.850			0.850		0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1759	1495	1626	1712	1495	1597	1657	0	1687	1712	1538
Flt Permitted	0.288			0.440			0.722			0.689		
Satd. Flow (perm)	493	1759	1441	748	1712	1413	1159	1657	0	1203	1712	1434
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			100		22				174
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.6			378.8			243.5			277.8	
Travel Time (s)		24.8			27.3			17.5			20.0	
Confl. Peds. (#/hr)	38		7	7		38	25		10	10		25
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	10%	8%	8%	11%	11%	8%	13%	5%	11%	7%	11%	5%
Adj. Flow (vph)	226	595	21	37	632	100	26	68	37	105	53	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	226	595	21	37	632	100	26	105	0	105	53	174
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6		6	2		2	4			4		4
Detector Phase	1	6	6	2	2	2	4	4		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	1.0	1.0	30.0	30.0	30.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	31.3	31.3	37.3	37.3	37.3	37.3	37.3		37.3	37.3	37.3
Total Split (s)	17.0	82.0	82.0	65.0	65.0	65.0	38.0	38.0		38.0	38.0	38.0
Total Split (%)	14.2%	68.3%	68.3%	54.2%	54.2%	54.2%	31.7%	31.7%		31.7%	31.7%	31.7%
Maximum Green (s)	14.0	75.7	75.7	58.7	58.7	58.7	31.7	31.7		31.7	31.7	31.7
Yellow Time (s)	3.0	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.6	2.6	2.6	2.6	2.6	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3		6.3	6.3	6.3
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
Flash Dont Walk (s)		13.0	13.0	19.0	19.0	19.0	19.0	19.0		19.0	19.0	19.0
Pedestrian Calls (#/hr)		7	7	38	38	38	35	35		35	35	35
Act Effct Green (s)	87.5	84.2	84.2	70.2	70.2	70.2	23.2	23.2		23.2	23.2	23.2
Actuated g/C Ratio	0.73	0.70	0.70	0.58	0.58	0.58	0.19	0.19		0.19	0.19	0.19
v/c Ratio	0.49	0.48	0.02	0.08	0.63	0.12	0.12	0.31		0.45	0.16	0.42

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.3	3.3	0.1	6.6	9.9	0.5	36.6	32.4		46.7	37.5	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	6.3	3.3	0.1	6.6	9.9	0.5	36.6	32.4		46.7	37.5	8.3
LOS	A	A	A	A	A	A	D	C		D	D	A
Approach Delay		4.0			8.5			33.2			25.1	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	3.3	11.2	0.0	1.6	76.0	0.3	4.9	16.1		21.2	10.1	0.0
Queue Length 95th (m)	8.9	21.2	m0.2	m3.0	59.3	m0.0	12.7	31.7		38.3	21.1	17.7
Internal Link Dist (m)		320.6			354.8			219.5			253.8	
Turn Bay Length (m)	80.0		15.0	50.0		120.0	30.0			55.0		
Base Capacity (vph)	494	1234	1020	437	1001	867	306	453		317	452	506
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.46	0.48	0.02	0.08	0.63	0.12	0.08	0.23		0.33	0.12	0.34

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 56 (47%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 10.9		Intersection LOS: B	
Intersection Capacity Utilization 90.4%		ICU Level of Service E	
Analysis Period (min) 15			
m	Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 120: Upper Wentworth St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	685	735	50	50	10
Future Volume (Veh/h)	15	685	735	50	50	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	15	692	742	51	51	10
Pedestrians					22	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		379				
pX, platoon unblocked					0.86	
vC, conflicting volume	815				1512	790
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	815				1513	790
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				54	97
cM capacity (veh/h)	806				111	386

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	15	692	793	51	10
Volume Left	15	0	0	51	0
Volume Right	0	0	51	0	10
cSH	806	1700	1700	111	386
Volume to Capacity	0.02	0.41	0.47	0.46	0.03
Queue Length 95th (m)	0.5	0.0	0.0	16.1	0.6
Control Delay (s)	9.6	0.0	0.0	62.7	14.6
Lane LOS	A			F	B
Approach Delay (s)	0.2		0.0	54.8	
Approach LOS				F	

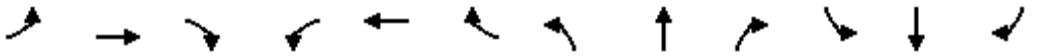
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	715	25	15	760	20	15
Future Volume (Veh/h)	715	25	15	760	20	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	761	27	16	809	21	16
Pedestrians				2		
Lane Width (m)				3.6		
Walking Speed (m/s)				1.2		
Percent Blockage				0		
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (m)				292		
pX, platoon unblocked					0.68	
vC, conflicting volume			788		1616	776
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			788		1670	776
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		71	96
cM capacity (veh/h)			840		71	400

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	788	16	809	37
Volume Left	0	16	0	21
Volume Right	27	0	0	16
cSH	1700	840	1700	126
Volume to Capacity	0.46	0.02	0.48	0.29
Queue Length 95th (m)	0.0	0.5	0.0	9.1
Control Delay (s)	0.0	9.4	0.0	48.9
Lane LOS		A		E
Approach Delay (s)	0.0	0.2		48.9
Approach LOS				E

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		



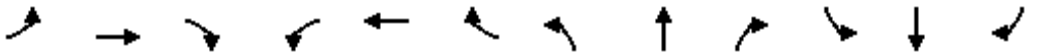
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	595	0	0	615	100	0	0	0	240	0	160
Future Volume (vph)	135	595	0	0	615	100	0	0	0	240	0	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	40.0		0.0	40.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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					0.99	0.97	
Frt					0.979						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1770	1900	0	1900	1799	0	1900	1900	0	1787	1562	0
Flt Permitted	0.176									0.493		
Satd. Flow (perm)	328	1900	0	1900	1799	0	1900	1900	0	921	1562	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					10						317	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		291.6			340.9			113.6			275.5	
Travel Time (s)		21.0			24.5			8.2			19.8	
Confl. Peds. (#/hr)	24		6	6		24	6		3	3		6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	1%	0%	2%	4%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	148	654	0	0	676	110	0	0	0	264	0	176
Shared Lane Traffic (%)												
Lane Group Flow (vph)	148	654	0	0	786	0	0	0	0	264	176	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		7 4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	30.1		8.0	30.1		8.0	34.3		8.0	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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.1		3.0	6.1		3.0	6.3		3.0	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	0.2		1.0	0.2		1.0	0.2		1.0	0.2	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
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)		6			24			6			3	
Act Effct Green (s)	86.0	82.9			73.1					28.0	24.7	
Actuated g/C Ratio	0.72	0.69			0.61					0.23	0.21	
v/c Ratio	0.47	0.50			0.71					0.72	0.31	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	10.2	11.5			15.2					53.2	1.4	
Queue Delay	0.0	0.0			0.0					0.0	0.0	
Total Delay	10.2	11.5			15.2					53.2	1.4	
LOS	B	B			B					D	A	
Approach Delay		11.3			15.2						32.5	
Approach LOS		B			B						C	
Queue Length 50th (m)	6.3	44.8			59.7					59.8	0.0	
Queue Length 95th (m)	19.0	142.4			m#228.6					#81.3	0.0	
Internal Link Dist (m)		267.6			316.9			89.6			251.5	
Turn Bay Length (m)	20.0									40.0		
Base Capacity (vph)	318	1312			1100					416	640	
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	0.47	0.50			0.71					0.63	0.28	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 80.5%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 130: Rymal Rd. & Upper Sherman Ave.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	600	210	160	565	20	125	20	180	5	20	20
Future Volume (vph)	15	600	210	160	565	20	125	20	180	5	20	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		10.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		1	0		0	1		0
Taper Length (m)	7.5			7.5			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					0.97		0.98		1.00	0.98	
Frt		0.961				0.850		0.925			0.925	
Flt Protected	0.950			0.950				0.981		0.950		
Satd. Flow (prot)	1504	1700	0	1787	1863	1615	0	1659	0	1805	1672	0
Flt Permitted	0.423			0.092				0.855		0.427		
Satd. Flow (perm)	666	1700	0	173	1863	1561	0	1435	0	810	1672	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				25		48			22	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		340.9			498.9			153.4			80.6	
Travel Time (s)		24.5			35.9			11.0			5.8	
Confl. Peds. (#/hr)	5					5	9		2	2		9
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	20%	10%	0%	1%	2%	0%	2%	10%	2%	0%	4%	2%
Adj. Flow (vph)	17	674	236	180	635	22	140	22	202	6	22	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	910	0	180	635	22	0	364	0	6	44	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		1	6	6	4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	27.7	27.7		8.0	27.7	27.7	31.7	31.7		31.7	31.7	
Total Split (s)	70.0	70.0		18.0	88.0	88.0	32.0	32.0		32.0	32.0	
Total Split (%)	58.3%	58.3%		15.0%	73.3%	73.3%	26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	64.3	64.3		15.0	82.3	82.3	26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0	2.0	2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	5.7	5.7		3.0	5.7	5.7		5.7		5.7	5.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)	10.0	10.0			10.0	10.0	10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0	12.0	16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0			5	5	2	2		9	9	
Act Effct Green (s)	67.6	67.6		85.0	82.3	82.3		26.3		26.3	26.3	
Actuated g/C Ratio	0.56	0.56		0.71	0.69	0.69		0.22		0.22	0.22	
v/c Ratio	0.05	0.94		0.64	0.50	0.02		1.04		0.03	0.11	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	9.7	42.8		22.8	8.0	0.1		98.0		37.8	23.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	9.7	42.8		22.8	8.0	0.1		98.0		37.8	23.5	
LOS	A	D		C	A	A		F		D	C	
Approach Delay		42.2			11.0			98.0			25.2	
Approach LOS		D			B			F			C	
Queue Length 50th (m)	1.6	209.3		6.3	90.7	0.1		~87.1		1.2	4.4	
Queue Length 95th (m)	m2.4	#308.3		28.4	24.8	m0.0		#146.4		5.0	14.5	
Internal Link Dist (m)		316.9			474.9			129.4			56.6	
Turn Bay Length (m)	30.0			30.0		10.0				20.0		
Base Capacity (vph)	374	966		324	1277	1078		351		177	383	
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	0.05	0.94		0.56	0.50	0.02		1.04		0.03	0.11	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 11 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.04			
Intersection Signal Delay: 39.1		Intersection LOS: D	
Intersection Capacity Utilization 91.9%		ICU Level of Service F	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 131: Miles Rd./Eva St. & Rymal Rd.



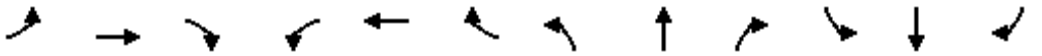
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	565	25	40	500	180	45	60	30	175	120	215
Future Volume (vph)	200	565	25	40	500	180	45	60	30	175	120	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	90.0		40.0	45.0		45.0	50.0		30.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			35.0			7.5		
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		0.99		0.96	0.98		0.93	0.95		0.96
Frt		0.994				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1883	0	1805	1881	1583	1805	1900	1615	1770	1845	1553
Flt Permitted	0.369			0.432			0.645			0.716		
Satd. Flow (perm)	675	1883	0	812	1881	1526	1202	1900	1494	1260	1845	1487
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				138			59			224
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		498.9			509.5			366.2			122.9	
Travel Time (s)		35.9			36.7			26.4			8.8	
Confl. Peds. (#/hr)	22		13	13		22	10		26	26		10
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	0%	3%	0%	1%	2%	0%	0%	0%	2%	3%	4%
Adj. Flow (vph)	208	589	26	42	521	188	47	63	31	182	125	224
Shared Lane Traffic (%)												
Lane Group Flow (vph)	208	615	0	42	521	188	47	63	31	182	125	224
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6			2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Detector Phase	1	6		2	2	2	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0	35.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	8.0	41.5		41.5	41.5	41.5	32.2	32.2	32.2	32.2	32.2	32.2
Total Split (s)	16.0	86.0		70.0	70.0	70.0	34.0	34.0	34.0	34.0	34.0	34.0
Total Split (%)	13.3%	71.7%		58.3%	58.3%	58.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%
Maximum Green (s)	13.0	79.5		63.5	63.5	63.5	27.8	27.8	27.8	27.8	27.8	27.8
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	0.0	2.8		2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5		6.5	6.5	6.5	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		12.0		12.0	12.0	12.0				12.0	12.0	12.0
Flash Dont Walk (s)		20.0		20.0	20.0	20.0				14.0	14.0	14.0
Pedestrian Calls (#/hr)		13		22	22	22				36	36	36
Act Effct Green (s)	88.1	84.6		71.6	71.6	71.6	22.7	22.7	22.7	22.7	22.7	22.7
Actuated g/C Ratio	0.73	0.70		0.60	0.60	0.60	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.36	0.46		0.09	0.46	0.19	0.21	0.17	0.09	0.76	0.36	0.48

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	2.0	3.7		13.2	16.6	4.7	41.2	40.0	3.0	65.9	44.0	8.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	3.7		13.2	16.6	4.7	41.2	40.0	3.0	65.9	44.0	8.7
LOS	A	A		B	B	A	D	D	A	E	D	A
Approach Delay		3.3			13.4			32.3			36.6	
Approach LOS		A			B			C			D	
Queue Length 50th (m)	7.1	41.5		4.5	73.5	5.3	9.6	12.8	0.0	41.6	26.2	0.0
Queue Length 95th (m)	m6.7	m40.7		11.4	112.6	17.7	20.4	25.0	2.7	67.1	43.7	20.5
Internal Link Dist (m)		474.9			485.5			342.2			98.9	
Turn Bay Length (m)	30.0			90.0		40.0	45.0		45.0	50.0		30.0
Base Capacity (vph)	611	1328		484	1122	965	278	440	391	291	427	516
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.46		0.09	0.46	0.19	0.17	0.14	0.08	0.63	0.29	0.43

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 75 (63%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 16.4		Intersection LOS: B	
Intersection Capacity Utilization 94.3%		ICU Level of Service F	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 140: Upper Gage Ave. & Rymal Rd.



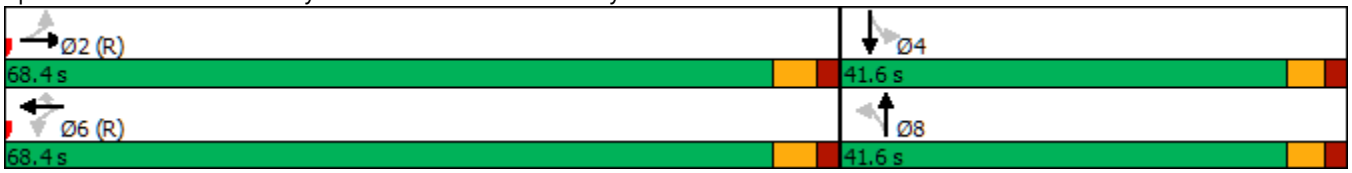


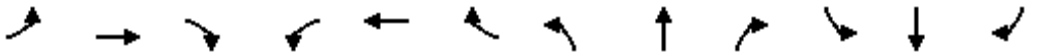
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	760	10	45	750	20	0	0	0	0	0	0
Future Volume (vph)	25	760	10	45	750	20	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		5.0	35.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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		1.00		0.97						
Frt		0.998				0.850						
Flt Protected	0.950			0.950								
Satd. Flow (prot)	1787	1895	0	1805	1652	1599	0	1900	0	0	1462	0
Flt Permitted	0.348			0.339								
Satd. Flow (perm)	653	1895	0	644	1652	1549	0	1900	0	0	1462	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				20						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		509.5			351.2			177.4			122.5	
Travel Time (s)		36.7			25.3			12.8			8.8	
Confl. Peds. (#/hr)	13		3	3		13	5					
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	0%	1%	0%	15%	1%	0%	0%	0%	1%	30%	0%
Adj. Flow (vph)	25	768	10	45	758	20	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	778	0	45	758	20	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm						
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	
Minimum Split (s)	41.0	41.0		41.0	41.0	41.0	25.6	25.6		41.6	41.6	
Total Split (s)	68.4	68.4		68.4	68.4	68.4	41.6	41.6		41.6	41.6	
Total Split (%)	62.2%	62.2%		62.2%	62.2%	62.2%	37.8%	37.8%		37.8%	37.8%	
Maximum Green (s)	62.8	62.8		62.8	62.8	62.8	36.6	36.6		36.6	36.6	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.9	1.9		1.9	1.9	1.9	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6	5.6		5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)										15.0	15.0	
Flash Dont Walk (s)										21.0	21.0	
Pedestrian Calls (#/hr)										5	5	
Act Effct Green (s)	100.7	100.7		100.7	100.7	100.7						
Actuated g/C Ratio	0.92	0.92		0.92	0.92	0.92						
v/c Ratio	0.04	0.45		0.08	0.50	0.01						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	5.0	6.0		5.0	7.2	3.0						
Queue Delay	0.0	0.0		0.0	0.0	0.0						
Total Delay	5.0	6.0		5.0	7.2	3.0						
LOS	A	A		A	A	A						
Approach Delay		6.0			6.9							
Approach LOS		A			A							
Queue Length 50th (m)	0.0	0.0		0.0	0.0	0.0						
Queue Length 95th (m)	6.5	166.8		10.3	185.1	3.3						
Internal Link Dist (m)		485.5			327.2			153.4			98.5	
Turn Bay Length (m)	30.0			35.0		20.0						
Base Capacity (vph)	598	1734		589	1512	1419						
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	0.04	0.45		0.08	0.50	0.01						

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 58 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 6.5		Intersection LOS: A	
Intersection Capacity Utilization 45.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 141: Grayrocks Ave./Rockland Ave. & Rymal Rd.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	565	70	25	535	145	80	85	60	170	70	185
Future Volume (vph)	155	565	70	25	535	145	80	85	60	170	70	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	30.0		10.0	35.0		50.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	*0.65	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		0.99		0.98
Frt		0.984						0.937				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1632	0	1220	1673	0	1530	1902	0	1656	1508	1468
Flt Permitted	0.220			0.381			0.708			0.463		
Satd. Flow (perm)	394	1632	0	489	1673	0	1138	1902	0	803	1508	1435
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		9			*82			46				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		351.2			400.2			147.9			323.0	
Travel Time (s)		25.3			28.8			10.6			23.3	
Confl. Peds. (#/hr)	5		2	2		5	1		3	3		1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	6%	12%	33%	48%	14%	10%	18%	17%	25%	9%	26%	10%
Adj. Flow (vph)	167	608	75	27	575	156	86	91	65	183	75	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	167	683	0	27	731	0	86	156	0	183	75	199
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		6	6		4	4		3	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0		10.0	10.0		5.0	10.0	10.0
Minimum Split (s)	9.5	48.2		48.2	48.2		31.0	31.0		8.0	31.0	31.0
Total Split (s)	15.0	77.0		62.0	62.0		33.0	33.0		10.0	43.0	43.0
Total Split (%)	12.5%	64.2%		51.7%	51.7%		27.5%	27.5%		8.3%	35.8%	35.8%
Maximum Green (s)	12.0	70.8		55.8	55.8		27.0	27.0		7.0	37.0	37.0
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.0	3.3	3.3
All-Red Time (s)	0.0	2.5		2.5	2.5		2.7	2.7		0.0	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.2		6.2	6.2		6.0	6.0		3.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	None
Walk Time (s)		20.0		20.0	20.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)		22.0		22.0	22.0		18.0	18.0			18.0	18.0
Pedestrian Calls (#/hr)		2		5	5		3	3			1	1
Act Effct Green (s)	85.4	82.2		69.5	69.5		15.6	15.6		28.6	25.6	25.6
Actuated g/C Ratio	0.71	0.68		0.58	0.58		0.13	0.13		0.24	0.21	0.21
v/c Ratio	0.43	0.61		0.10	0.73		0.58	0.54		0.76	0.23	0.65

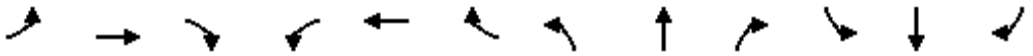
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	10.0	14.1		23.5	31.4		63.3	40.0		59.7	39.1	52.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	10.0	14.1		23.5	31.4		63.3	40.0		59.7	39.1	52.5
LOS	A	B		C	C		E	D		E	D	D
Approach Delay		13.3			31.2			48.3			53.2	
Approach LOS		B			C			D			D	
Queue Length 50th (m)	11.3	78.6		4.0	138.3		20.6	19.9		39.6	15.7	46.0
Queue Length 95th (m)	25.4	151.3		m10.6	#232.5		35.0	33.6		55.7	26.7	64.7
Internal Link Dist (m)		327.2			376.2			123.9			299.0	
Turn Bay Length (m)	45.0			30.0			35.0			50.0		
Base Capacity (vph)	415	1120		283	1003		256	463		241	464	442
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.40	0.61		0.10	0.73		0.34	0.34		0.76	0.16	0.45

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 30.8 Intersection LOS: C
Intersection Capacity Utilization 101.8% ICU Level of Service G
Analysis Period (min) 15
* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 150: Upper Ottawa St. & Rymal Rd.





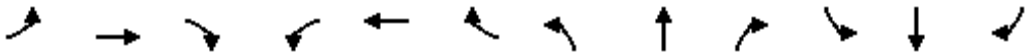
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	535	90	75	520	60	65	105	95	100	190	70
Future Volume (vph)	55	535	90	75	520	60	65	105	95	100	190	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	45.0		0.0	20.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			30.0			7.5		
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		1.00	1.00		0.99	0.99		1.00	0.99	
Frt		0.978			0.984			0.929			0.960	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1774	0	1456	1827	0	1752	1651	0	1719	1663	0
Flt Permitted	0.380			0.355			0.259			0.390		
Satd. Flow (perm)	660	1774	0	542	1827	0	472	1651	0	703	1663	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			11			37			15	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		400.2			349.0			199.0			219.6	
Travel Time (s)		28.8			25.1			14.3			15.8	
Confl. Peds. (#/hr)	4		5	5		4	10		3	3		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	5%	0%	24%	2%	2%	3%	6%	5%	5%	6%	15%
Adj. Flow (vph)	57	552	93	77	536	62	67	108	98	103	196	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	645	0	77	598	0	67	206	0	103	268	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Detector Phase	2	2		2	2		4	4		4	4	
Switch Phase												
Minimum Initial (s)	25.0	25.0		25.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	29.5	29.5		29.5	29.5		29.4	29.4		29.4	29.4	
Total Split (s)	85.0	85.0		85.0	85.0		35.0	35.0		35.0	35.0	
Total Split (%)	70.8%	70.8%		70.8%	70.8%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	82.0	82.0		82.0	82.0		31.6	31.6		31.6	31.6	
Yellow Time (s)	2.0	2.0		2.0	2.0		2.4	2.4		2.4	2.4	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	9	9		9	9		13	13		13	13	
Act Effct Green (s)	89.8	89.8		89.8	89.8		23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.75	0.75		0.75	0.75		0.20	0.20		0.20	0.20	
v/c Ratio	0.12	0.48		0.19	0.44		0.72	0.58		0.74	0.79	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.0	9.8		5.8	8.1		82.7	41.0		74.3	58.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.0	9.8		5.8	8.1		82.7	41.0		74.3	58.8	
LOS	A	A		A	A		F	D		E	E	
Approach Delay		9.5			7.8			51.3			63.1	
Approach LOS		A			A			D			E	
Queue Length 50th (m)	4.9	77.0		7.6	79.4		15.7	38.2		24.2	60.3	
Queue Length 95th (m)	m7.1	120.7		19.9	123.6		#33.5	58.8		42.6	84.6	
Internal Link Dist (m)		376.2			325.0			175.0			195.6	
Turn Bay Length (m)	50.0			45.0			20.0					
Base Capacity (vph)	494	1332		405	1370		124	462		185	448	
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	0.12	0.48		0.19	0.44		0.54	0.45		0.56	0.60	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 30 (25%), Referenced to phase 2:EBWB and 6:, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 24.4		Intersection LOS: C	
Intersection Capacity Utilization 92.8%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 160: Nebo Rd. & Rymal Rd.



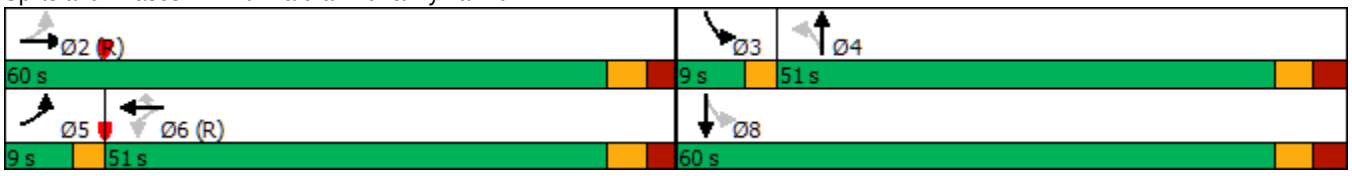


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	555	35	35	525	120	20	130	30	135	170	95
Future Volume (vph)	170	555	35	35	525	120	20	130	30	135	170	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		150.0	60.0		60.0	85.0		0.0	30.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			55.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.65	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.99	0.99				0.99	
Frt		0.991				0.850		0.972			0.946	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3011	0	1656	2375	1495	1656	3195	0	1736	3151	0
Flt Permitted	0.297			0.416			0.580			0.511		
Satd. Flow (perm)	532	3011	0	725	2375	1476	998	3195	0	934	3151	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				120		27			100	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		106.4			328.2			269.5			224.1	
Travel Time (s)		7.7			23.6			19.4			16.1	
Confl. Peds. (#/hr)	1		1	1		1	6					6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	19%	14%	9%	4%	8%	9%	10%	9%	4%	5%	11%
Adj. Flow (vph)	179	584	37	37	553	126	21	137	32	142	179	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	621	0	37	553	126	21	169	0	142	279	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		
Detector Phase	5	2		6	6	6	4	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	20.0		20.0	20.0	20.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	36.3		36.3	36.3	36.3	37.6	37.6		8.0	27.6	
Total Split (s)	9.0	60.0		51.0	51.0	51.0	51.0	51.0		9.0	60.0	
Total Split (%)	7.5%	50.0%		42.5%	42.5%	42.5%	42.5%	42.5%		7.5%	50.0%	
Maximum Green (s)	6.0	53.7		44.7	44.7	44.7	44.4	44.4		6.0	53.4	
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	3.3	3.3		0.0	3.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3		6.3	6.3	6.3	6.6	6.6		3.0	6.6	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)		12.0		12.0	12.0	12.0	10.0	10.0			10.0	
Flash Dont Walk (s)		18.0		18.0	18.0	18.0	21.0	21.0			1.0	
Pedestrian Calls (#/hr)		0		1	1	1	0	0			6	
Act Effct Green (s)	90.0	86.7		74.0	74.0	74.0	11.4	11.4		24.0	20.4	
Actuated g/C Ratio	0.75	0.72		0.62	0.62	0.62	0.10	0.10		0.20	0.17	
v/c Ratio	0.36	0.29		0.08	0.38	0.13	0.22	0.52		0.63	0.45	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.3	7.1		10.9	12.9	2.5	55.2	48.7		55.2	30.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	6.3	7.1		10.9	12.9	2.5	55.2	48.7		55.2	30.5	
LOS	A	A		B	B	A	E	D		E	C	
Approach Delay		6.9			10.9			49.5			38.8	
Approach LOS		A			B			D			D	
Queue Length 50th (m)	12.3	35.7		3.4	48.3	0.5	4.9	17.9		31.2	20.9	
Queue Length 95th (m)	18.0	38.7		9.3	74.3	8.9	13.2	29.0		49.9	33.8	
Internal Link Dist (m)		82.4			304.2			245.5			200.1	
Turn Bay Length (m)	50.0			60.0		60.0	85.0			30.0		
Base Capacity (vph)	493	2176		447	1464	956	369	1199		227	1457	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.36	0.29		0.08	0.38	0.13	0.06	0.14		0.63	0.19	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 18.4		Intersection LOS: B	
Intersection Capacity Utilization 80.0%		ICU Level of Service D	
Analysis Period (min) 15			
* User Entered Value			

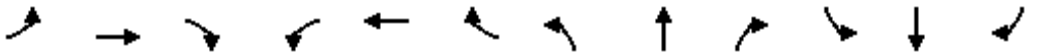
Splits and Phases: 170: Dartnall Rd. & Rymal Rd.



Appendix C

Synchro Analysis Worksheets (2041 "Do Nothing" Conditions)

DILLON CONSULTING



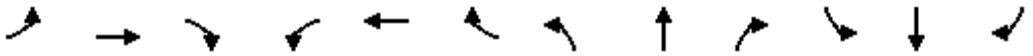
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	754	16	36	1009	5	28	5	102	5	0	35
Future Volume (vph)	25	754	16	36	1009	5	28	5	102	5	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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	1.00	1.00			0.98			1.00	
Frt			0.850		0.999			0.897			0.881	
Flt Protected	0.950			0.950				0.990			0.994	
Satd. Flow (prot)	1805	1900	1524	1703	1756	0	0	1610	0	0	1486	0
Flt Permitted	0.179			0.301				0.918			0.941	
Satd. Flow (perm)	340	1900	1484	539	1756	0	0	1492	0	0	1407	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			25					111			38	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		170.2			375.5			112.3			153.5	
Travel Time (s)		12.3			27.0			8.1			11.1	
Confl. Peds. (#/hr)	2		3	3		2			1	1		
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%	0%	6%	6%	8%	25%	0%	0%	4%	4%	8%	13%
Adj. Flow (vph)	27	820	17	39	1097	5	30	5	111	5	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	820	17	39	1102	0	0	146	0	0	43	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	30.0	30.0	30.0	30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	35.6	35.6	35.6	35.6	35.6		29.7	29.7		29.7	29.7	
Total Split (s)	89.0	89.0	89.0	89.0	89.0		31.0	31.0		31.0	31.0	
Total Split (%)	74.2%	74.2%	74.2%	74.2%	74.2%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	83.4	83.4	83.4	83.4	83.4		25.3	25.3		25.3	25.3	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6	5.6	5.6	5.6			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	21.0	21.0	21.0	21.0	21.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	9.0	9.0	9.0	9.0	9.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	3	3	3	2	2		1	1		0	0	
Act Effct Green (s)	95.6	95.6	95.6	95.6	95.6			13.1			13.1	
Actuated g/C Ratio	0.80	0.80	0.80	0.80	0.80			0.11			0.11	
v/c Ratio	0.10	0.54	0.01	0.09	0.79			0.56			0.23	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.8	6.7	1.2	5.1	11.0			22.7			18.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	4.8	6.7	1.2	5.1	11.0			22.7			18.9	
LOS	A	A	A	A	B			C			B	
Approach Delay		6.6			10.8			22.7			18.9	
Approach LOS		A			B			C			B	
Queue Length 50th (m)	1.0	49.1	0.0	2.0	74.7			8.3			1.2	
Queue Length 95th (m)	5.4	129.2	1.6	m4.1	m109.5			26.4			11.2	
Internal Link Dist (m)		146.2			351.5			88.3			129.5	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	270	1514	1188	429	1399			402			326	
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	0.10	0.54	0.01	0.09	0.79			0.36			0.13	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 114 (95%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 10.1		Intersection LOS: B	
Intersection Capacity Utilization 76.2%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 101: Springside Dr./Atessa Dr. & Rymal Rd.





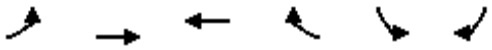
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	705	12	31	809	156	23	70	50	142	15	217
Future Volume (vph)	138	705	12	31	809	156	23	70	50	142	15	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		10.0	40.0		0.0	15.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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	1.00		1.00	0.98		0.98	0.98	
Frt		0.997			0.976			0.937			0.860	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1891	0	1641	1719	0	1805	1632	0	1703	1591	0
Flt Permitted	0.067			0.341			0.348			0.635		
Satd. Flow (perm)	117	1891	0	587	1719	0	659	1632	0	1113	1591	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			13			28			231	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		375.5			185.6			230.2			240.7	
Travel Time (s)		27.0			13.4			16.6			17.3	
Confl. Peds. (#/hr)	5		5	5		5	2		12	12		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	9%	0%	8%	10%	7%	9%	0%	2%	14%	6%	6%	0%
Adj. Flow (vph)	147	750	13	33	861	166	24	74	53	151	16	231
Shared Lane Traffic (%)												
Lane Group Flow (vph)	147	763	0	33	1027	0	24	127	0	151	247	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	9.5	36.0		36.0	36.0		33.1	33.1		33.1	33.1	
Total Split (s)	14.0	86.0		72.0	72.0		34.0	34.0		34.0	34.0	
Total Split (%)	11.7%	71.7%		60.0%	60.0%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	11.0	80.0		66.0	66.0		27.9	27.9		27.9	27.9	
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.3		2.3	2.3		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		6.0	6.0		6.1	6.1		6.1	6.1	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	2.0	0.2		0.2	0.2		5.0	5.0		5.0	5.0	
Recall Mode	None	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)		10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)		5		5	5		2	2		12	12	
Act Effct Green (s)	88.7	85.7		73.4	73.4		22.2	22.2		22.2	22.2	
Actuated g/C Ratio	0.74	0.71		0.61	0.61		0.18	0.18		0.18	0.18	
v/c Ratio	0.72	0.56		0.09	0.97		0.20	0.39		0.74	0.51	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	45.1	9.1		15.1	35.8		43.0	35.5		66.3	10.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	45.1	9.1		15.1	35.8		43.0	35.5		66.3	10.2	
LOS	D	A		B	D		D	D		E	B	
Approach Delay		14.9			35.2			36.7			31.5	
Approach LOS		B			D			D			C	
Queue Length 50th (m)	19.6	64.2		1.8	67.8		5.1	21.4		35.5	3.3	
Queue Length 95th (m)	#47.0	88.4		m6.2	#362.0		12.9	38.5		57.3	25.3	
Internal Link Dist (m)		351.5			161.6			206.2			216.7	
Turn Bay Length (m)	50.0			40.0			15.0			35.0		
Base Capacity (vph)	230	1351		359	1057		153	400		258	547	
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	0.64	0.56		0.09	0.97		0.16	0.32		0.59	0.45	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 27.4		Intersection LOS: C	
Intersection Capacity Utilization 98.2%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 110: Upper Wellington St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	886	1001	15	5	10
Future Volume (Veh/h)	10	886	1001	15	5	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	10	913	1032	15	5	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (m)		186	187			
pX, platoon unblocked	0.54				0.68	0.54
vC, conflicting volume	1047				1965	1032
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	666				1286	638
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	98				96	96
cM capacity (veh/h)	507				116	261

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	10	913	1032	15	15
Volume Left	10	0	0	0	5
Volume Right	0	0	0	15	10
cSH	507	1700	1700	1700	349
Volume to Capacity	0.02	0.54	0.61	0.01	0.04
Queue Length 95th (m)	0.5	0.0	0.0	0.0	1.1
Control Delay (s)	12.2	0.0	0.0	0.0	25.4
Lane LOS	B				D
Approach Delay (s)	0.1		0.0		25.4
Approach LOS					D

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		



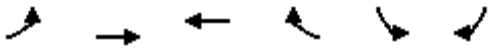
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	801	90	95	976	40	55
Future Volume (vph)	801	90	95	976	40	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		55.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			65.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.98	0.97
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1687	1696	1530	1335
Flt Permitted			0.228		0.950	
Satd. Flow (perm)	1900	1615	405	1696	1498	1299
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		63				59
Link Speed (k/h)	50			50	50	
Link Distance (m)	186.7			157.7	124.6	
Travel Time (s)	13.4			11.4	9.0	
Confl. Peds. (#/hr)					9	3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	7%	12%	18%	21%
Adj. Flow (vph)	852	96	101	1038	43	59
Shared Lane Traffic (%)						
Lane Group Flow (vph)	852	96	101	1038	43	59
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	30.0	30.0	5.0	30.0	10.0	10.0
Minimum Split (s)	35.6	35.6	8.0	35.6	31.8	31.8
Total Split (s)	74.6	74.6	13.2	74.6	32.2	32.2
Total Split (%)	62.2%	62.2%	11.0%	62.2%	26.8%	26.8%
Maximum Green (s)	69.0	69.0	10.2	69.0	26.4	26.4
Yellow Time (s)	3.7	3.7	3.0	3.7	3.3	3.3
All-Red Time (s)	1.9	1.9	0.0	1.9	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6	3.0	5.6	5.8	5.8
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)	17.0	17.0			12.0	12.0
Flash Dont Walk (s)	13.0	13.0			14.0	14.0
Pedestrian Calls (#/hr)	0	0			12	12
Act Effct Green (s)	85.1	85.1	98.0	96.5	16.4	16.4
Actuated g/C Ratio	0.71	0.71	0.82	0.80	0.14	0.14
v/c Ratio	0.63	0.08	0.25	0.76	0.21	0.26

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	12.2	3.0	4.2	19.1	45.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.2	3.0	4.2	19.1	45.0	12.6
LOS	B	A	A	B	D	B
Approach Delay	11.3			17.8	26.2	
Approach LOS	B			B	C	
Queue Length 50th (m)	65.6	1.7	1.9	255.7	10.2	0.0
Queue Length 95th (m)	168.2	m7.5	m9.1	m253.8	19.2	11.4
Internal Link Dist (m)	162.7			133.7	100.6	
Turn Bay Length (m)		55.0	35.0			
Base Capacity (vph)	1347	1163	439	1363	336	331
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.08	0.23	0.76	0.13	0.18

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 11 (9%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 70.5%	ICU Level of Service C
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 112: Turner Park Library & Rymal Rd.

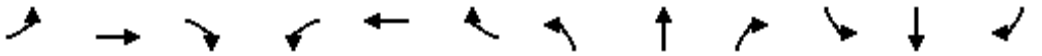




Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	850	1049	20	15	20
Future Volume (Veh/h)	10	850	1049	20	15	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	11	914	1128	22	16	22
Pedestrians		3	5		2	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		158	345			
pX, platoon unblocked	0.55				0.69	0.55
vC, conflicting volume	1152				2071	1133
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	865				1418	830
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	97				83	89
cM capacity (veh/h)	430				95	203

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	11	914	1128	22	16	22
Volume Left	11	0	0	0	16	0
Volume Right	0	0	0	22	0	22
cSH	430	1700	1700	1700	95	203
Volume to Capacity	0.03	0.54	0.66	0.01	0.17	0.11
Queue Length 95th (m)	0.6	0.0	0.0	0.0	4.6	2.9
Control Delay (s)	13.6	0.0	0.0	0.0	50.5	24.8
Lane LOS	B				F	C
Approach Delay (s)	0.2		0.0		35.6	
Approach LOS					E	

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		

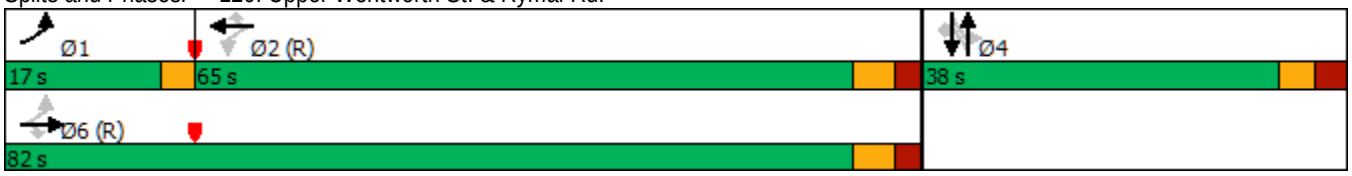


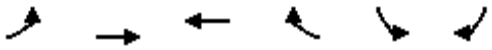
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	272	542	31	62	800	199	70	186	50	113	46	209
Future Volume (vph)	272	542	31	62	800	199	70	186	50	113	46	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		15.0	50.0		120.0	30.0		0.0	55.0		0.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	7.5			20.0			35.0			7.5		
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	0.99		0.97	0.97	0.99		0.98		0.95
Frt			0.850			0.850		0.968				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	1845	1404	1597	1557	1455	1752	1801	0	1597	1624	1553
Flt Permitted	0.065			0.442			0.724			0.384		
Satd. Flow (perm)	110	1845	1353	738	1557	1406	1295	1801	0	634	1624	1472
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			216		11				227
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.6			378.8			243.5			277.8	
Travel Time (s)		24.8			27.3			17.5			20.0	
Confl. Peds. (#/hr)	19		7	7		19	17		15	15		17
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 (%)	12%	3%	15%	13%	22%	11%	3%	0%	5%	13%	17%	4%
Adj. Flow (vph)	296	589	34	67	870	216	76	202	54	123	50	227
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	589	34	67	870	216	76	256	0	123	50	227
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6		6	2		2	4			4		4
Detector Phase	1	6	6	2	2	2	4	4		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	1.0	1.0	30.0	30.0	30.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	31.3	31.3	37.3	37.3	37.3	37.3	37.3		37.3	37.3	37.3
Total Split (s)	17.0	82.0	82.0	65.0	65.0	65.0	38.0	38.0		38.0	38.0	38.0
Total Split (%)	14.2%	68.3%	68.3%	54.2%	54.2%	54.2%	31.7%	31.7%		31.7%	31.7%	31.7%
Maximum Green (s)	14.0	75.7	75.7	58.7	58.7	58.7	31.7	31.7		31.7	31.7	31.7
Yellow Time (s)	3.0	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.6	2.6	2.6	2.6	2.6	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3		6.3	6.3	6.3
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
Flash Dont Walk (s)		13.0	13.0	19.0	19.0	19.0	19.0	19.0		19.0	19.0	19.0
Pedestrian Calls (#/hr)		7	7	19	19	19	32	32		32	32	32
Act Effct Green (s)	84.9	81.6	81.6	58.7	58.7	58.7	25.8	25.8		25.8	25.8	25.8
Actuated g/C Ratio	0.71	0.68	0.68	0.49	0.49	0.49	0.22	0.22		0.22	0.22	0.22
v/c Ratio	0.91	0.47	0.04	0.19	1.14	0.27	0.27	0.65		0.90	0.14	0.46

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	66.9	3.5	0.2	8.4	84.5	0.4	39.5	47.9		100.8	36.1	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	66.9	3.5	0.2	8.4	84.5	0.4	39.5	47.9		100.8	36.1	7.7
LOS	E	A	A	A	F	A	D	D		F	D	A
Approach Delay		23.8			64.3			46.0			39.8	
Approach LOS		C			E			D			D	
Queue Length 50th (m)	~69.3	51.9	0.5	3.9	~249.5	0.6	14.9	52.5		28.2	9.5	0.0
Queue Length 95th (m)	#128.5	13.0	m0.1	m3.5	m63.0	m0.0	28.7	79.6		#60.5	20.1	19.7
Internal Link Dist (m)		320.6			354.8			219.5			253.8	
Turn Bay Length (m)	80.0		15.0	50.0		120.0	30.0			55.0		
Base Capacity (vph)	326	1254	929	361	761	798	342	483		167	429	555
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.91	0.47	0.04	0.19	1.14	0.27	0.22	0.53		0.74	0.12	0.41

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 56 (47%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 135			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.14			
Intersection Signal Delay: 45.4		Intersection LOS: D	
Intersection Capacity Utilization 102.7%		ICU Level of Service G	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 120: Upper Wentworth St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	696	1050	35	35	10
Future Volume (Veh/h)	0	696	1050	35	35	10
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)	0	757	1141	38	38	11
Pedestrians			4		26	
Lane Width (m)			3.6		3.6	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		379				
pX, platoon unblocked					0.84	
vC, conflicting volume	1205				1947	1186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1205				2031	1186
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				27	95
cM capacity (veh/h)	563				52	227

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	0	757	1179	38	11
Volume Left	0	0	0	38	0
Volume Right	0	0	38	0	11
cSH	1700	1700	1700	52	227
Volume to Capacity	0.00	0.45	0.69	0.73	0.05
Queue Length 95th (m)	0.0	0.0	0.0	23.8	1.2
Control Delay (s)	0.0	0.0	0.0	173.9	21.7
Lane LOS				F	C
Approach Delay (s)	0.0		0.0	139.7	
Approach LOS				F	

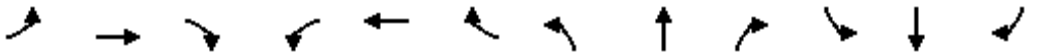
Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	766	10	5	1057	25	10
Future Volume (Veh/h)	766	10	5	1057	25	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	824	11	5	1137	27	11
Pedestrians				2	1	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	0	
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (m)				292		
pX, platoon unblocked					0.48	
vC, conflicting volume			836		1978	832
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			836		2487	832
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		0	97
cM capacity (veh/h)			806		16	371

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	835	5	1137	38
Volume Left	0	5	0	27
Volume Right	11	0	0	11
cSH	1700	806	1700	22
Volume to Capacity	0.49	0.01	0.67	1.73
Queue Length 95th (m)	0.0	0.1	0.0	39.3
Control Delay (s)	0.0	9.5	0.0	728.2
Lane LOS		A		F
Approach Delay (s)	0.0	0.0		728.2
Approach LOS				F

Intersection Summary			
Average Delay	13.8		
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

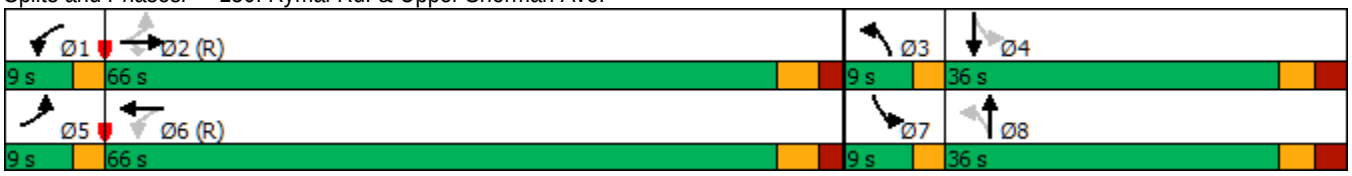


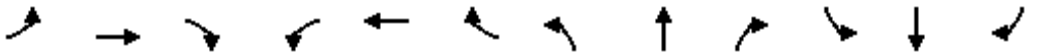
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	616	0	0	873	359	0	0	0	166	0	196
Future Volume (vph)	152	616	0	0	873	359	0	0	0	166	0	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		20.0	20.0		0.0	40.0		0.0	40.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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					0.956						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1612	1900	1827	1900	1633	0	1900	1900	0	1703	1573	0
Flt Permitted	0.059									0.493		
Satd. Flow (perm)	100	1900	1827	1900	1633	0	1900	1900	0	880	1573	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					25						250	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		291.6			340.9			113.6			275.5	
Travel Time (s)		21.0			24.5			8.2			19.8	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	4%	0%	12%	5%	0%	0%	0%	6%	9%	0%
Adj. Flow (vph)	167	677	0	0	959	395	0	0	0	182	0	215
Shared Lane Traffic (%)												
Lane Group Flow (vph)	167	677	0	0	1354	0	0	0	0	182	215	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		
Detector Phase	5	2	2	1	6		3 8	8		7 4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	30.1	30.1	8.0	30.1		8.0	34.3		8.0	34.3	
Total Split (s)	9.0	66.0	66.0	9.0	66.0		9.0	36.0		9.0	36.0	
Total Split (%)	7.5%	55.0%	55.0%	7.5%	55.0%		7.5%	30.0%		7.5%	30.0%	
Maximum Green (s)	6.0	59.9	59.9	6.0	59.9		6.0	29.7		6.0	29.7	
Yellow Time (s)	3.0	3.7	3.7	3.0	3.7		3.0	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.4	2.4	0.0	2.4		0.0	3.0		0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1		3.0	6.3		3.0	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	0.2	0.2	1.0	0.2		1.0	0.2		1.0	0.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	
Walk Time (s)		12.0	12.0		12.0			12.0			12.0	
Flash Dont Walk (s)		12.0	12.0		12.0			16.0			16.0	
Pedestrian Calls (#/hr)		3	3		8			3			2	
Act Effct Green (s)	90.4	87.3			69.9					23.6	20.3	
Actuated g/C Ratio	0.75	0.73			0.58					0.20	0.17	
v/c Ratio	0.65	0.49			1.41					0.63	0.45	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	41.2	9.7			210.6					52.4	5.3	
Queue Delay	0.0	0.0			0.0					0.0	0.0	
Total Delay	41.2	9.7			210.6					52.4	5.3	
LOS	D	A			F					D	A	
Approach Delay		15.9			210.6						26.9	
Approach LOS		B			F						C	
Queue Length 50th (m)	21.0	42.8			~440.4					41.9	0.0	
Queue Length 95th (m)	m#74.3	130.2			m#560.3					53.5	11.1	
Internal Link Dist (m)		267.6			316.9			89.6			251.5	
Turn Bay Length (m)	20.0									40.0		
Base Capacity (vph)	257	1382			961					367	593	
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	0.65	0.49			1.41					0.50	0.36	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 145			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.41			
Intersection Signal Delay: 119.2		Intersection LOS: F	
Intersection Capacity Utilization 106.7%		ICU Level of Service G	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 130: Rymal Rd. & Upper Sherman Ave.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	701	59	90	940	10	176	15	110	5	10	20
Future Volume (vph)	10	701	59	90	940	10	176	15	110	5	10	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		10.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		1	0		0	1		0
Taper Length (m)	7.5			7.5			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		0.99		1.00	0.98	
Frt		0.988				0.850		0.951			0.902	
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1805	1745	0	1752	1667	1292	0	1719	0	1656	1551	0
Flt Permitted	0.171			0.184				0.802		0.579		
Satd. Flow (perm)	325	1745	0	339	1667	1252	0	1415	0	1008	1551	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				25		22			21	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		340.9			498.9			153.4			80.6	
Travel Time (s)		24.5			35.9			11.0			5.8	
Confl. Peds. (#/hr)	4		1	1		4	2		1	1		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	8%	0%	3%	14%	25%	1%	0%	2%	9%	12%	7%
Adj. Flow (vph)	11	746	63	96	1000	11	187	16	117	5	11	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	809	0	96	1000	11	0	320	0	5	32	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		1	6	6	4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	27.7	27.7		8.0	27.7	27.7	31.7	31.7		31.7	31.7	
Total Split (s)	70.0	70.0		18.0	88.0	88.0	32.0	32.0		32.0	32.0	
Total Split (%)	58.3%	58.3%		15.0%	73.3%	73.3%	26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	64.3	64.3		15.0	82.3	82.3	26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0	2.0	2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	5.7	5.7		3.0	5.7	5.7		5.7		5.7	5.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)	10.0	10.0			10.0	10.0	10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0	12.0	16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	1	1			4	4	1	1		2	2	
Act Effct Green (s)	71.8	71.8		85.0	82.3	82.3		26.3		26.3	26.3	
Actuated g/C Ratio	0.60	0.60		0.71	0.69	0.69		0.22		0.22	0.22	
v/c Ratio	0.06	0.77		0.29	0.87	0.01		0.98		0.02	0.09	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.0	23.1		3.5	18.5	0.0		88.6		37.4	20.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	7.0	23.1		3.5	18.5	0.0		88.6		37.4	20.4	
LOS	A	C		A	B	A		F		D	C	
Approach Delay		22.8			17.0			88.6			22.7	
Approach LOS		C			B			F			C	
Queue Length 50th (m)	0.9	170.4		2.0	220.6	0.0		74.7		1.0	2.2	
Queue Length 95th (m)	m1.4	110.0		m2.0	#306.2	m0.0		#135.3		4.6	10.9	
Internal Link Dist (m)		316.9			474.9			129.4			56.6	
Turn Bay Length (m)	30.0			30.0		10.0				20.0		
Base Capacity (vph)	194	1045		416	1143	866		327		220	356	
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	0.77		0.23	0.87	0.01		0.98		0.02	0.09	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 11 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 29.2		Intersection LOS: C	
Intersection Capacity Utilization 104.4%		ICU Level of Service G	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 131: Miles Rd./Eva St. & Rymal Rd.



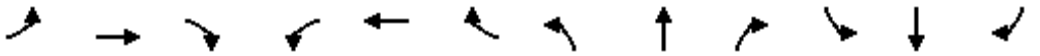
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	581	12	23	721	249	85	147	44	155	46	193
Future Volume (vph)	236	581	12	23	721	249	85	147	44	155	46	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	90.0		40.0	45.0		45.0	50.0		30.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			35.0			7.5		
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		0.99		0.97	0.99		0.95	0.97		0.97
Frt		0.997				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1722	0	1597	1667	1509	1687	1881	1615	1687	1776	1292
Flt Permitted	0.203			0.425			0.725			0.573		
Satd. Flow (perm)	367	1722	0	710	1667	1468	1276	1881	1531	991	1776	1254
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				132			59			205
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		498.9			509.5			366.2			122.9	
Travel Time (s)		35.9			36.7			26.4			8.8	
Confl. Peds. (#/hr)	14		9	9		14	4		15	15		4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	10%	7%	13%	14%	7%	7%	1%	0%	7%	7%	25%
Adj. Flow (vph)	251	618	13	24	767	265	90	156	47	165	49	205
Shared Lane Traffic (%)												
Lane Group Flow (vph)	251	631	0	24	767	265	90	156	47	165	49	205
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6			2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Detector Phase	1	6		2	2	2	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0	35.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	8.0	41.5		41.5	41.5	41.5	32.2	32.2	32.2	32.2	32.2	32.2
Total Split (s)	16.0	86.0		70.0	70.0	70.0	34.0	34.0	34.0	34.0	34.0	34.0
Total Split (%)	13.3%	71.7%		58.3%	58.3%	58.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%
Maximum Green (s)	13.0	79.5		63.5	63.5	63.5	27.8	27.8	27.8	27.8	27.8	27.8
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	0.0	2.8		2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5		6.5	6.5	6.5	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		12.0		12.0	12.0	12.0				12.0	12.0	12.0
Flash Dont Walk (s)		20.0		20.0	20.0	20.0				14.0	14.0	14.0
Pedestrian Calls (#/hr)		9		14	14	14				19	19	19
Act Effct Green (s)	87.6	84.1		70.2	70.2	70.2	23.2	23.2	23.2	23.2	23.2	23.2
Actuated g/C Ratio	0.73	0.70		0.58	0.58	0.58	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.64	0.52		0.06	0.79	0.29	0.37	0.43	0.14	0.86	0.14	0.50

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	10.2	8.4		13.7	28.3	7.9	45.0	45.3	7.6	84.1	39.0	9.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	8.4		13.7	28.3	7.9	45.0	45.3	7.6	84.1	39.0	9.7
LOS	B	A		B	C	A	D	D	A	F	D	A
Approach Delay		8.9			22.8			39.2			42.4	
Approach LOS		A			C			D			D	
Queue Length 50th (m)	15.5	98.5		2.5	144.8	14.9	19.2	33.8	0.0	39.3	10.0	0.0
Queue Length 95th (m)	m18.7	m103.1		7.5	#244.5	33.6	34.6	53.2	7.7	#71.3	20.5	20.6
Internal Link Dist (m)		474.9			485.5			342.2			98.9	
Turn Bay Length (m)	30.0			90.0		40.0	45.0		45.0	50.0		30.0
Base Capacity (vph)	414	1207		415	975	913	295	435	400	229	411	448
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.52		0.06	0.79	0.29	0.31	0.36	0.12	0.72	0.12	0.46

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 75 (63%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 23.1		Intersection LOS: C	
Intersection Capacity Utilization 107.8%		ICU Level of Service G	
Analysis Period (min) 15			
#	95th percentile volume exceeds capacity, queue may be longer.		
	Queue shown is maximum after two cycles.		
m	Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 140: Upper Gage Ave. & Rymal Rd.



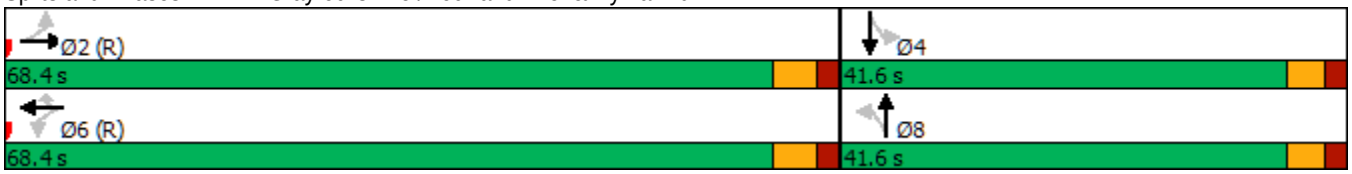


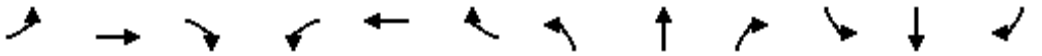
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	766	5	5	885	10	5	0	15	10	0	20
Future Volume (vph)	20	766	5	5	885	10	5	0	15	10	0	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		5.0	35.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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			0.98	
Frt		0.999				0.850		0.900			0.910	
Flt Protected	0.950			0.950				0.987			0.984	
Satd. Flow (prot)	1805	1898	0	1805	1776	1615	0	1605	0	0	1644	0
Flt Permitted	0.209			0.267				0.942			0.918	
Satd. Flow (perm)	397	1898	0	507	1776	1567	0	1529	0	0	1534	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				20		26			26	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		509.5			351.2			177.4			122.5	
Travel Time (s)		36.7			25.3			12.8			8.8	
Confl. Peds. (#/hr)	11					11	4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	0%	0%	0%	7%	0%	0%	0%	7%	5%	11%	0%
Adj. Flow (vph)	22	861	6	6	994	11	6	0	17	11	0	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	867	0	6	994	11	0	23	0	0	33	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	
Minimum Split (s)	41.0	41.0		41.0	41.0	41.0	25.6	25.6		41.6	41.6	
Total Split (s)	68.4	68.4		68.4	68.4	68.4	41.6	41.6		41.6	41.6	
Total Split (%)	62.2%	62.2%		62.2%	62.2%	62.2%	37.8%	37.8%		37.8%	37.8%	
Maximum Green (s)	62.8	62.8		62.8	62.8	62.8	36.6	36.6		36.6	36.6	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.9	1.9		1.9	1.9	1.9	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6	5.6		5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)										15.0	15.0	
Flash Dont Walk (s)										21.0	21.0	
Pedestrian Calls (#/hr)										1	1	
Act Effct Green (s)	88.4	88.4		88.4	88.4	88.4		23.2			23.2	
Actuated g/C Ratio	0.80	0.80		0.80	0.80	0.80		0.21			0.21	
v/c Ratio	0.07	0.57		0.01	0.70	0.01		0.07			0.10	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.9	10.7		7.8	14.4	2.3		10.0			14.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay	7.9	10.7		7.8	14.4	2.3		10.0			14.4	
LOS	A	B		A	B	A		A			B	
Approach Delay		10.6			14.2			10.0			14.4	
Approach LOS		B			B			A			B	
Queue Length 50th (m)	1.3	87.3		0.3	123.6	0.0		0.0			1.3	
Queue Length 95th (m)	6.3	198.2		2.5	#300.3	1.6		5.4			8.0	
Internal Link Dist (m)		485.5			327.2			153.4			98.5	
Turn Bay Length (m)	30.0			35.0		20.0						
Base Capacity (vph)	319	1526		407	1427	1263		526			527	
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	0.07	0.57		0.01	0.70	0.01		0.04			0.06	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 58 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 12.6		Intersection LOS: B	
Intersection Capacity Utilization 73.7%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 141: Grayrocks Ave./Rockland Ave. & Rymal Rd.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	575	37	23	710	305	62	93	25	264	77	120
Future Volume (vph)	180	575	37	23	710	305	62	93	25	264	77	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	30.0		10.0	35.0		50.0	50.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	*0.65	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.99		0.99		0.99		
Frt		0.991				0.850		0.968				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1556	1294	0	1570	1583	1482	1165	1758	0	1671	1652	1170
Flt Permitted	0.192			0.401			0.704			0.636		
Satd. Flow (perm)	314	1294	0	662	1583	1460	863	1758	0	1108	1652	1170
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		6				64		15				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		351.2			400.2			147.9			323.0	
Travel Time (s)		25.3			28.8			10.6			23.3	
Confl. Peds. (#/hr)	3		1	1		3			5	5		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	16%	47%	19%	15%	20%	9%	55%	31%	50%	8%	15%	38%
Adj. Flow (vph)	191	612	39	24	755	324	66	99	27	281	82	128
Shared Lane Traffic (%)												
Lane Group Flow (vph)	191	651	0	24	755	324	66	126	0	281	82	128
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6		6	4			8		8
Detector Phase	5	2		6	6	6	4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0	35.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	48.2		48.2	48.2	48.2	31.0	31.0		31.0	31.0	31.0
Total Split (s)	15.0	87.0		72.0	72.0	72.0	33.0	33.0		33.0	33.0	33.0
Total Split (%)	12.5%	72.5%		60.0%	60.0%	60.0%	27.5%	27.5%		27.5%	27.5%	27.5%
Maximum Green (s)	12.0	80.8		65.8	65.8	65.8	27.0	27.0		27.0	27.0	27.0
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.5		2.5	2.5	2.5	2.7	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.2		6.2	6.2	6.2	6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		20.0		20.0	20.0	20.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		22.0		22.0	22.0	22.0	18.0	18.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)		1		3	3	3	5	5		0	0	0
Act Effct Green (s)	84.0	80.8		67.5	67.5	67.5	27.0	27.0		27.0	27.0	27.0
Actuated g/C Ratio	0.70	0.67		0.56	0.56	0.56	0.22	0.22		0.22	0.22	0.22
v/c Ratio	0.59	0.75		0.06	0.85	0.38	0.34	0.31		1.13	0.22	0.49

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	13.8	19.4		17.3	40.8	19.2	44.9	36.4		138.9	39.9	47.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	13.8	19.4		17.3	40.8	19.2	44.9	36.4		138.9	39.9	47.8
LOS	B	B		B	D	B	D	D		F	D	D
Approach Delay		18.2			34.0			39.4			98.6	
Approach LOS		B			C			D			F	
Queue Length 50th (m)	14.6	95.8		3.6	184.3	47.8	13.8	17.6		~80.7	16.7	27.8
Queue Length 95th (m)	23.2	150.1		m4.6	#240.9	m68.9	28.3	31.6		#136.4	31.4	48.6
Internal Link Dist (m)		327.2			376.2			123.9			299.0	
Turn Bay Length (m)	45.0			30.0		10.0	35.0			50.0		
Base Capacity (vph)	344	873		372	890	849	194	407		249	371	263
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	0.75		0.06	0.85	0.38	0.34	0.31		1.13	0.22	0.49

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 116 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.13			
Intersection Signal Delay: 41.4		Intersection LOS: D	
Intersection Capacity Utilization 100.8%		ICU Level of Service G	
Analysis Period (min) 15			
* User Entered Value			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 150: Upper Ottawa St. & Rymal Rd.



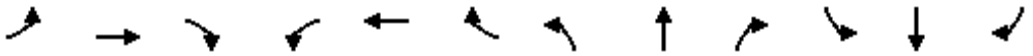
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	732	40	80	895	76	65	165	78	38	55	53
Future Volume (vph)	79	732	40	80	895	76	65	165	78	38	55	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	45.0		0.0	20.0		20.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			30.0			7.5		
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		0.97	0.99	0.98	
Frt		0.992			0.988				0.850		0.926	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1631	0	1556	1701	0	1530	1759	1179	1719	1393	0
Flt Permitted	0.175			0.270			0.546			0.376		
Satd. Flow (perm)	268	1631	0	442	1701	0	858	1759	1145	676	1393	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			8				68		39	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		400.2			349.0			199.0			219.6	
Travel Time (s)		28.8			25.1			14.3			15.8	
Confl. Peds. (#/hr)	9		4	4		9	13		4	4		13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	24%	16%	4%	16%	10%	10%	18%	8%	37%	5%	7%	40%
Adj. Flow (vph)	88	813	44	89	994	84	72	183	87	42	61	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	88	857	0	89	1078	0	72	183	87	42	120	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Detector Phase	2	2		2	2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	25.0	25.0		25.0	25.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.5	29.5		29.5	29.5		29.4	29.4	29.4	29.4	29.4	
Total Split (s)	85.0	85.0		85.0	85.0		35.0	35.0	35.0	35.0	35.0	
Total Split (%)	70.8%	70.8%		70.8%	70.8%		29.2%	29.2%	29.2%	29.2%	29.2%	
Maximum Green (s)	82.0	82.0		82.0	82.0		31.6	31.6	31.6	31.6	31.6	
Yellow Time (s)	2.0	2.0		2.0	2.0		2.4	2.4	2.4	2.4	2.4	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.4	3.4	3.4	3.4	3.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		16.0	16.0	16.0	16.0	16.0	
Pedestrian Calls (#/hr)	13	13		13	13		17	17	17	17	17	
Act Effct Green (s)	94.3	94.3		94.3	94.3		19.3	19.3	19.3	19.3	19.3	
Actuated g/C Ratio	0.79	0.79		0.79	0.79		0.16	0.16	0.16	0.16	0.16	
v/c Ratio	0.42	0.67		0.26	0.81		0.53	0.65	0.36	0.39	0.47	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	10.5	9.9		2.1	10.0		58.2	57.0	17.9	53.3	35.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	10.5	9.9		2.1	10.0		58.2	57.0	17.9	53.3	35.0	
LOS	B	A		A	B		E	E	B	D	D	
Approach Delay		10.0			9.4			47.3			39.8	
Approach LOS		A			A			D			D	
Queue Length 50th (m)	5.9	105.2		0.6	55.2		16.8	43.7	4.1	9.6	18.4	
Queue Length 95th (m)	m10.3	m130.1		m1.6	44.7		30.8	63.8	18.4	20.3	35.4	
Internal Link Dist (m)		376.2			325.0			175.0			195.6	
Turn Bay Length (m)	50.0			45.0			20.0		20.0			
Base Capacity (vph)	210	1282		347	1338		225	463	351	178	395	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.42	0.67		0.26	0.81		0.32	0.40	0.25	0.24	0.30	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 30 (25%), Referenced to phase 2:EBWB and 6:, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 16.4		Intersection LOS: B	
Intersection Capacity Utilization 97.8%		ICU Level of Service F	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 160: Nebo Rd. & Rymal Rd.



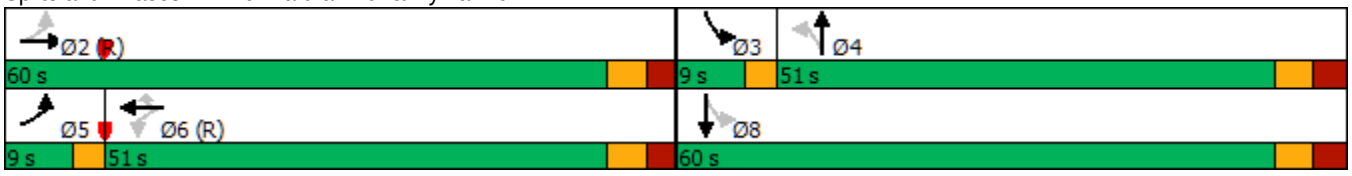


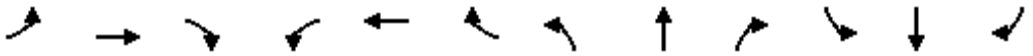
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	414	28	46	706	371	32	232	25	93	162	297
Future Volume (vph)	191	414	28	46	706	371	32	232	25	93	162	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		150.0	60.0		60.0	85.0		0.0	30.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			55.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.65	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor							1.00				0.99	
Frt		0.991				0.850		0.985			0.903	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3314	0	1421	2266	1509	1805	2990	0	1480	2693	0
Flt Permitted	0.106			0.470			0.429			0.402		
Satd. Flow (perm)	181	3314	0	703	2266	1509	811	2990	0	626	2693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				278		11			185	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		106.4			328.2			269.5			224.1	
Travel Time (s)		7.7			23.6			19.4			16.1	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	11%	8%	7%	27%	9%	7%	0%	17%	37%	22%	9%	25%
Adj. Flow (vph)	215	465	31	52	793	417	36	261	28	104	182	334
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	496	0	52	793	417	36	289	0	104	516	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		
Detector Phase	5	2		6	6	6	4	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	20.0		20.0	20.0	20.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	36.3		36.3	36.3	36.3	37.6	37.6		8.0	27.6	
Total Split (s)	9.0	60.0		51.0	51.0	51.0	51.0	51.0		9.0	60.0	
Total Split (%)	7.5%	50.0%		42.5%	42.5%	42.5%	42.5%	42.5%		7.5%	50.0%	
Maximum Green (s)	6.0	53.7		44.7	44.7	44.7	44.4	44.4		6.0	53.4	
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	3.3	3.3		0.0	3.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3		6.3	6.3	6.3	6.6	6.6		3.0	6.6	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)		12.0		12.0	12.0	12.0	10.0	10.0			10.0	
Flash Dont Walk (s)		18.0		18.0	18.0	18.0	21.0	21.0			1.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			3	
Act Effct Green (s)	84.7	81.4		52.3	52.3	52.3	16.7	16.7		29.3	25.7	
Actuated g/C Ratio	0.71	0.68		0.44	0.44	0.44	0.14	0.14		0.24	0.21	
v/c Ratio	0.49	0.22		0.17	0.80	0.51	0.32	0.68		0.53	0.71	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	16.2	6.5		21.9	36.6	9.8	53.0	55.2		47.0	33.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	16.2	6.5		21.9	36.6	9.8	53.0	55.2		47.0	33.2	
LOS	B	A		C	D	A	D	E		D	C	
Approach Delay		9.5			27.2			54.9			35.5	
Approach LOS		A			C			D			D	
Queue Length 50th (m)	25.2	28.4		7.2	120.6	19.7	8.1	34.9		21.1	40.6	
Queue Length 95th (m)	44.6	26.5		17.1	170.6	50.2	18.2	47.4		35.0	56.8	
Internal Link Dist (m)		82.4			304.2			245.5			200.1	
Turn Bay Length (m)	50.0			60.0		60.0	85.0			30.0		
Base Capacity (vph)	441	2250		306	988	815	300	1113		195	1301	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.49	0.22		0.17	0.80	0.51	0.12	0.26		0.53	0.40	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 27.7		Intersection LOS: C	
Intersection Capacity Utilization 77.4%		ICU Level of Service D	
Analysis Period (min) 15			
* User Entered Value			

Splits and Phases: 170: Dartnall Rd. & Rymal Rd.





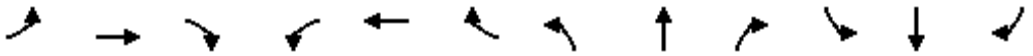
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	1062	43	82	1105	10	11	0	56	5	0	20
Future Volume (vph)	25	1062	43	82	1105	10	11	0	56	5	0	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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									
Frt			0.850		0.999			0.887			0.890	
Flt Protected	0.950			0.950				0.992			0.991	
Satd. Flow (prot)	1805	1900	1615	1770	1842	0	0	1555	0	0	1636	0
Flt Permitted	0.166			0.189				0.935			0.934	
Satd. Flow (perm)	315	1900	1570	352	1842	0	0	1466	0	0	1542	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			44		1			60			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		170.2			375.5			112.3			153.5	
Travel Time (s)		12.3			27.0			8.1			11.1	
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	2%	3%	11%	0%	0%	9%	0%	4%	3%
Adj. Flow (vph)	27	1142	46	88	1188	11	12	0	60	5	0	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	1142	46	88	1199	0	0	72	0	0	27	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	30.0	30.0	30.0	30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	35.6	35.6	35.6	35.6	35.6		29.7	29.7		29.7	29.7	
Total Split (s)	89.0	89.0	89.0	89.0	89.0		31.0	31.0		31.0	31.0	
Total Split (%)	74.2%	74.2%	74.2%	74.2%	74.2%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	83.4	83.4	83.4	83.4	83.4		25.3	25.3		25.3	25.3	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9	1.9	1.9	1.9		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6	5.6	5.6	5.6			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	21.0	21.0	21.0	21.0	21.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	9.0	9.0	9.0	9.0	9.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	3	3	3	0	0		0	0		0	0	
Act Effct Green (s)	102.7	102.7	102.7	102.7	102.7			10.3			10.3	
Actuated g/C Ratio	0.86	0.86	0.86	0.86	0.86			0.09			0.09	
v/c Ratio	0.10	0.70	0.03	0.29	0.76			0.40			0.18	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	3.1	7.3	0.7	4.6	8.1			23.7			23.6	
Queue Delay	0.0	0.0	0.0	0.0	0.1			0.0			0.0	
Total Delay	3.1	7.3	0.7	4.6	8.2			23.7			23.6	
LOS	A	A	A	A	A			C			C	
Approach Delay		7.0			8.0			23.7			23.6	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	1.0	97.6	0.1	4.6	117.1			2.8			0.7	
Queue Length 95th (m)	3.2	152.8	2.0	m5.4	m125.9			17.5			10.1	
Internal Link Dist (m)		146.2			351.5			88.3			129.5	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	269	1626	1350	301	1576			356			344	
Starvation Cap Reductn	0	0	0	0	25			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	0.10	0.70	0.03	0.29	0.77			0.20			0.08	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 114 (95%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 8.1		Intersection LOS: A	
Intersection Capacity Utilization 85.9%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 101: Springside Dr./Atessa Dr. & Rymal Rd.



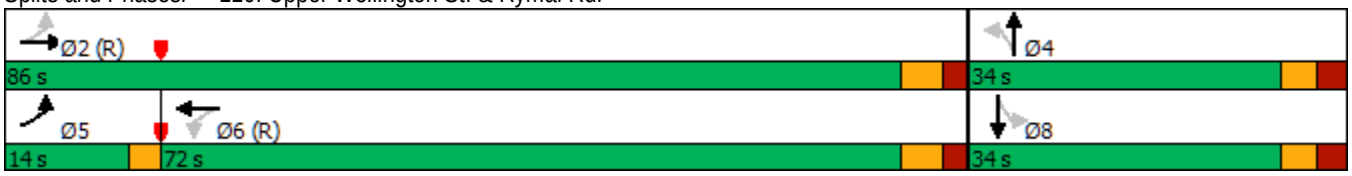


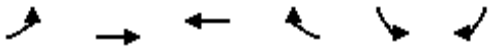
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	900	31	69	897	113	25	44	56	147	75	275
Future Volume (vph)	169	900	31	69	897	113	25	44	56	147	75	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		10.0	40.0		0.0	15.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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	1.00		1.00	0.98		0.99	0.98	
Frt		0.995			0.983			0.916			0.882	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1853	0	1805	1802	0	1703	1706	0	1805	1582	0
Flt Permitted	0.054			0.211			0.169			0.690		
Satd. Flow (perm)	100	1853	0	401	1802	0	302	1706	0	1293	1582	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			8			49			143	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		375.5			185.6			230.2			240.7	
Travel Time (s)		27.0			13.4			16.6			17.3	
Confl. Peds. (#/hr)	3		2	2		3	5		7	7		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	2%	0%	0%	3%	6%	6%	0%	0%	0%	1%	4%
Adj. Flow (vph)	176	938	32	72	934	118	26	46	58	153	78	286
Shared Lane Traffic (%)												
Lane Group Flow (vph)	176	970	0	72	1052	0	26	104	0	153	364	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	9.5	36.0		36.0	36.0		33.1	33.1		33.1	33.1	
Total Split (s)	14.0	86.0		72.0	72.0		34.0	34.0		34.0	34.0	
Total Split (%)	11.7%	71.7%		60.0%	60.0%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	11.0	80.0		66.0	66.0		27.9	27.9		27.9	27.9	
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.3		2.3	2.3		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		6.0	6.0		6.1	6.1		6.1	6.1	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	2.0	0.2		0.2	0.2		5.0	5.0		5.0	5.0	
Recall Mode	None	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)		10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)		2		3	3		5	5		7	7	
Act Effct Green (s)	87.2	84.2		71.1	71.1		23.7	23.7		23.7	23.7	
Actuated g/C Ratio	0.73	0.70		0.59	0.59		0.20	0.20		0.20	0.20	
v/c Ratio	0.83	0.75		0.30	0.98		0.44	0.28		0.60	0.85	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	59.5	12.3		18.3	39.8		64.3	23.2		53.1	46.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	59.5	12.3		18.3	39.8		64.3	23.2		53.1	46.6	
LOS	E	B		B	D		E	C		D	D	
Approach Delay		19.5			38.4			31.4			48.5	
Approach LOS		B			D			C			D	
Queue Length 50th (m)	32.2	85.6		7.8	~279.6		5.5	11.1		33.7	53.3	
Queue Length 95th (m)	m#58.3	103.6		m13.9	#365.2		15.9	26.4		55.8	#92.4	
Internal Link Dist (m)		351.5			161.6			206.2			216.7	
Turn Bay Length (m)	50.0			40.0			15.0			35.0		
Base Capacity (vph)	228	1301		237	1071		70	434		300	477	
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	0.77	0.75		0.30	0.98		0.37	0.24		0.51	0.76	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 32.5		Intersection LOS: C	
Intersection Capacity Utilization 110.8%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 110: Upper Wellington St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	1105	1073	15	5	10
Future Volume (Veh/h)	5	1105	1073	15	5	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	1163	1129	16	5	11
Pedestrians					6	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (m)		186	187			
pX, platoon unblocked	0.57				0.76	0.57
vC, conflicting volume	1151				2308	1135
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	883				1278	855
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				96	95
cM capacity (veh/h)	436				139	203

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	5	1163	1129	16	16
Volume Left	5	0	0	0	5
Volume Right	0	0	0	16	11
cSH	436	1700	1700	1700	296
Volume to Capacity	0.01	0.68	0.66	0.01	0.05
Queue Length 95th (m)	0.3	0.0	0.0	0.0	1.4
Control Delay (s)	13.4	0.0	0.0	0.0	26.3
Lane LOS	B				D
Approach Delay (s)	0.1		0.0		26.3
Approach LOS					D

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

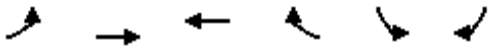
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1030	75	95	993	90	115
Future Volume (vph)	1030	75	95	993	90	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		55.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			65.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98			0.98	0.93
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1805	1845	1787	1615
Flt Permitted			0.095		0.950	
Satd. Flow (perm)	1900	1576	180	1845	1750	1499
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		41				116
Link Speed (k/h)	50			50	50	
Link Distance (m)	186.7			157.7	124.6	
Travel Time (s)	13.4			11.4	9.0	
Confl. Peds. (#/hr)		2	2		9	23
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%
Adj. Flow (vph)	1040	76	96	1003	91	116
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1040	76	96	1003	91	116
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	30.0	30.0	5.0	30.0	10.0	10.0
Minimum Split (s)	35.6	35.6	8.0	35.6	31.8	31.8
Total Split (s)	74.6	74.6	13.2	74.6	32.2	32.2
Total Split (%)	62.2%	62.2%	11.0%	62.2%	26.8%	26.8%
Maximum Green (s)	69.0	69.0	10.2	69.0	26.4	26.4
Yellow Time (s)	3.7	3.7	3.0	3.7	3.3	3.3
All-Red Time (s)	1.9	1.9	0.0	1.9	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6	3.0	5.6	5.8	5.8
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)	17.0	17.0			12.0	12.0
Flash Dont Walk (s)	13.0	13.0			14.0	14.0
Pedestrian Calls (#/hr)	2	2			32	32
Act Effct Green (s)	78.2	78.2	91.6	89.0	19.6	19.6
Actuated g/C Ratio	0.65	0.65	0.76	0.74	0.16	0.16
v/c Ratio	0.84	0.07	0.40	0.73	0.31	0.34

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	19.9	3.7	7.8	20.9	44.8	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	3.7	7.8	20.9	44.8	9.8
LOS	B	A	A	C	D	A
Approach Delay	18.8			19.8	25.2	
Approach LOS	B			B	C	
Queue Length 50th (m)	201.0	1.3	8.5	254.8	18.8	0.0
Queue Length 95th (m)	#336.8	m4.1	m8.9	m243.8	34.1	15.7
Internal Link Dist (m)	162.7			133.7	100.6	
Turn Bay Length (m)		55.0	35.0			
Base Capacity (vph)	1238	1041	276	1367	393	420
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.07	0.35	0.73	0.23	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 11 (9%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 19.8		Intersection LOS: B	
Intersection Capacity Utilization 87.8%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 112: Turner Park Library & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	1115	1067	35	10	25
Future Volume (Veh/h)	35	1115	1067	35	10	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	36	1138	1089	36	10	26
Pedestrians		4	7		3	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	1		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		158	345			
pX, platoon unblocked	0.53				0.61	0.53
vC, conflicting volume	1128				2309	1096
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	801				1099	741
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				92	88
cM capacity (veh/h)	441				131	222

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	36	1138	1089	36	10	26
Volume Left	36	0	0	0	10	0
Volume Right	0	0	0	36	0	26
cSH	441	1700	1700	1700	131	222
Volume to Capacity	0.08	0.67	0.64	0.02	0.08	0.12
Queue Length 95th (m)	2.1	0.0	0.0	0.0	2.0	3.1
Control Delay (s)	13.9	0.0	0.0	0.0	34.7	23.4
Lane LOS	B				D	C
Approach Delay (s)	0.4		0.0		26.5	
Approach LOS					D	

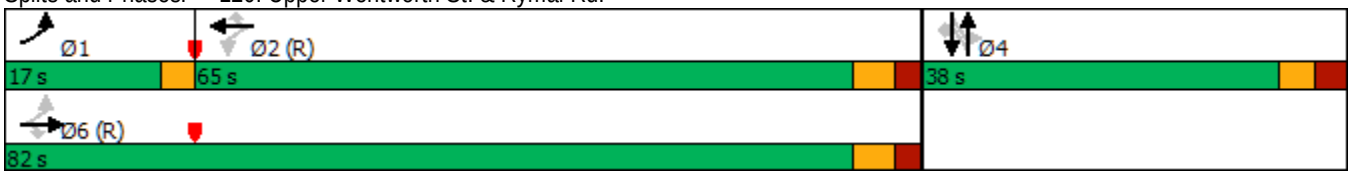
Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

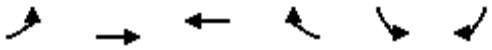
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	269	828	25	44	885	173	31	81	44	201	62	210
Future Volume (vph)	269	828	25	44	885	173	31	81	44	201	62	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		15.0	50.0		120.0	30.0		0.0	55.0		0.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	7.5			20.0			35.0			7.5		
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		0.94	0.96	0.99		0.98		0.93
Frt			0.850			0.850		0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1759	1495	1626	1712	1495	1597	1657	0	1687	1712	1538
Flt Permitted	0.065			0.288			0.715			0.648		
Satd. Flow (perm)	112	1759	1441	491	1712	1413	1149	1657	0	1132	1712	1434
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			182		22				221
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.6			378.8			243.5			277.8	
Travel Time (s)		24.8			27.3			17.5			20.0	
Confl. Peds. (#/hr)	38		7	7		38	25		10	10		25
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	10%	8%	8%	11%	11%	8%	13%	5%	11%	7%	11%	5%
Adj. Flow (vph)	283	872	26	46	932	182	33	85	46	212	65	221
Shared Lane Traffic (%)												
Lane Group Flow (vph)	283	872	26	46	932	182	33	131	0	212	65	221
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6		6	2		2	4			4		4
Detector Phase	1	6	6	2	2	2	4	4		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	1.0	1.0	30.0	30.0	30.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	31.3	31.3	37.3	37.3	37.3	37.3	37.3		37.3	37.3	37.3
Total Split (s)	17.0	82.0	82.0	65.0	65.0	65.0	38.0	38.0		38.0	38.0	38.0
Total Split (%)	14.2%	68.3%	68.3%	54.2%	54.2%	54.2%	31.7%	31.7%		31.7%	31.7%	31.7%
Maximum Green (s)	14.0	75.7	75.7	58.7	58.7	58.7	31.7	31.7		31.7	31.7	31.7
Yellow Time (s)	3.0	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.6	2.6	2.6	2.6	2.6	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3		6.3	6.3	6.3
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
Flash Dont Walk (s)		13.0	13.0	19.0	19.0	19.0	19.0	19.0		19.0	19.0	19.0
Pedestrian Calls (#/hr)		7	7	38	38	38	35	35		35	35	35
Act Effct Green (s)	83.8	80.5	80.5	58.7	58.7	58.7	26.9	26.9		26.9	26.9	26.9
Actuated g/C Ratio	0.70	0.67	0.67	0.49	0.49	0.49	0.22	0.22		0.22	0.22	0.22
v/c Ratio	0.89	0.74	0.03	0.19	1.11	0.23	0.13	0.34		0.83	0.17	0.45

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	64.4	5.1	0.1	9.3	72.7	0.5	35.8	33.3		70.5	36.5	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	64.4	5.1	0.1	9.3	72.7	0.5	35.8	33.3		70.5	36.5	7.6
LOS	E	A	A	A	E	A	D	C		E	D	A
Approach Delay		19.2			58.9			33.8			38.1	
Approach LOS		B			E			C			D	
Queue Length 50th (m)	~60.4	13.8	0.0	2.2	~259.9	0.1	6.3	21.5		48.1	12.5	0.0
Queue Length 95th (m)	m#95.9	26.4	m0.1	m2.9	m#227.7	m0.0	15.1	39.3		#82.3	24.4	19.5
Internal Link Dist (m)		320.6			354.8			219.5			253.8	
Turn Bay Length (m)	80.0		15.0	50.0		120.0	30.0			55.0		
Base Capacity (vph)	317	1179	976	240	837	784	303	453		299	452	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.89	0.74	0.03	0.19	1.11	0.23	0.11	0.29		0.71	0.14	0.41

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 56 (47%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 145			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.11			
Intersection Signal Delay: 38.5		Intersection LOS: D	
Intersection Capacity Utilization 116.1%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 120: Upper Wentworth St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	1061	1112	50	35	10
Future Volume (Veh/h)	15	1061	1112	50	35	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	15	1072	1123	51	35	10
Pedestrians					22	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		379				
pX, platoon unblocked					0.57	
vC, conflicting volume	1196				2272	1170
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1196				2863	1170
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				0	96
cM capacity (veh/h)	580				10	233

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	15	1072	1174	35	10
Volume Left	15	0	0	35	0
Volume Right	0	0	51	0	10
cSH	580	1700	1700	10	233
Volume to Capacity	0.03	0.63	0.69	3.43	0.04
Queue Length 95th (m)	0.6	0.0	0.0	Err	1.1
Control Delay (s)	11.4	0.0	0.0	Err	21.2
Lane LOS	B			F	C
Approach Delay (s)	0.2		0.0	7781.7	
Approach LOS				F	

Intersection Summary			
Average Delay	151.9		
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1096	25	15	1175	20	15
Future Volume (Veh/h)	1096	25	15	1175	20	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1166	27	16	1250	21	16
Pedestrians				2		
Lane Width (m)				3.6		
Walking Speed (m/s)				1.2		
Percent Blockage				0		
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (m)				292		
pX, platoon unblocked					0.55	
vC, conflicting volume			1193		2462	1182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1193		3247	1182
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		0	93
cM capacity (veh/h)			592		6	233

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1193	16	1250	37
Volume Left	0	16	0	21
Volume Right	27	0	0	16
cSH	1700	592	1700	10
Volume to Capacity	0.70	0.03	0.74	3.77
Queue Length 95th (m)	0.0	0.7	0.0	Err
Control Delay (s)	0.0	11.2	0.0	Err
Lane LOS		B		F
Approach Delay (s)	0.0	0.1		Err
Approach LOS				F

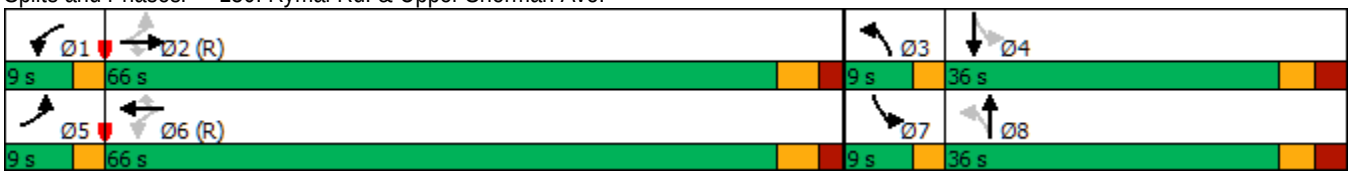
Intersection Summary			
Average Delay	148.3		
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

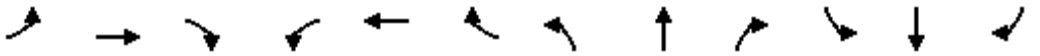
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	890	0	0	977	183	0	0	0	346	0	220
Future Volume (vph)	175	890	0	0	977	183	0	0	0	346	0	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		20.0	20.0		0.0	40.0		0.0	40.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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						0.92				0.99	0.97	
Frt						0.850					0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1770	1900	1881	1900	1863	1553	1900	1900	0	1787	1562	0
Flt Permitted	0.069									0.502		
Satd. Flow (perm)	129	1900	1881	1900	1863	1431	1900	1900	0	938	1562	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						123					227	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		291.6			340.9			113.6			275.5	
Travel Time (s)		21.0			24.5			8.2			19.8	
Confl. Peds. (#/hr)	24		6	6		24	6		3	3		6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	1%	0%	2%	4%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	192	978	0	0	1074	201	0	0	0	380	0	242
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	978	0	0	1074	201	0	0	0	380	242	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt			pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	3 8	8		7 4	4	
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)	8.0	30.1	30.1	8.0	30.1	30.1	8.0	34.3		8.0	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)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.3		3.0	6.3	
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	C-Max	C-Max	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)		6	6		24	24		6			3	
Act Effct Green (s)	78.3	75.2			59.9	59.9				35.7	32.4	
Actuated g/C Ratio	0.65	0.63			0.50	0.50				0.30	0.27	
v/c Ratio	0.76	0.82			1.16	0.26				0.79	0.41	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	44.2	25.0			102.0	8.8				51.5	7.1	
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	
Total Delay	44.2	25.0			102.0	8.8				51.5	7.1	
LOS	D	C			F	A				D	A	
Approach Delay		28.1			87.3						34.2	
Approach LOS		C			F						C	
Queue Length 50th (m)	26.0	182.1			~311.1	6.6				83.7	2.7	
Queue Length 95th (m)	m#77.0	#313.5			m#381.7	m14.4				#155.4	21.3	
Internal Link Dist (m)		267.6			316.9			89.6			251.5	
Turn Bay Length (m)	20.0									40.0		
Base Capacity (vph)	251	1189			929	775				492	603	
Starvation Cap Reductn	0	0			0	0				0	0	
Spillback Cap Reductn	0	0			0	0				0	0	
Storage Cap Reductn	0	0			0	0				0	0	
Reduced v/c Ratio	0.76	0.82			1.16	0.26				0.77	0.40	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 145			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 54.0		Intersection LOS: D	
Intersection Capacity Utilization 100.6%		ICU Level of Service G	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 130: Rymal Rd. & Upper Sherman Ave.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	952	214	160	993	20	130	20	180	5	20	20
Future Volume (vph)	15	952	214	160	993	20	130	20	180	5	20	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		10.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		1	0		0	1		0
Taper Length (m)	7.5			7.5			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						0.97		0.98		1.00	0.99	
Frt		0.973				0.850		0.926			0.925	
Flt Protected	0.950			0.950				0.981		0.950		
Satd. Flow (prot)	1504	1709	0	1787	1863	1615	0	1662	0	1805	1686	0
Flt Permitted	0.106			0.057				0.852		0.431		
Satd. Flow (perm)	168	1709	0	107	1863	1561	0	1437	0	818	1686	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14				25		46			22	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		340.9			498.9			153.4			80.6	
Travel Time (s)		24.5			35.9			11.0			5.8	
Confl. Peds. (#/hr)	5					5	9		2	2		9
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	20%	10%	0%	1%	2%	0%	2%	10%	2%	0%	4%	2%
Adj. Flow (vph)	17	1070	240	180	1116	22	146	22	202	6	22	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	1310	0	180	1116	22	0	370	0	6	44	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		1	6	6	4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	27.7	27.7		8.0	27.7	27.7	31.7	31.7		31.7	31.7	
Total Split (s)	70.0	70.0		18.0	88.0	88.0	32.0	32.0		32.0	32.0	
Total Split (%)	58.3%	58.3%		15.0%	73.3%	73.3%	26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	64.3	64.3		15.0	82.3	82.3	26.3	26.3		26.3	26.3	
Yellow Time (s)	3.7	3.7		3.0	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		0.0	2.0	2.0	2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	5.7	5.7		3.0	5.7	5.7		5.7		5.7	5.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)	10.0	10.0			10.0	10.0	10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0			12.0	12.0	16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0			5	5	2	2		9	9	
Act Effct Green (s)	67.4	67.4		85.0	82.3	82.3		26.3		26.3	26.3	
Actuated g/C Ratio	0.56	0.56		0.71	0.69	0.69		0.22		0.22	0.22	
v/c Ratio	0.18	1.36		0.74	0.87	0.02		1.06		0.03	0.11	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	14.6	188.3		47.1	15.7	0.1		103.8		37.8	23.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	14.6	188.3		47.1	15.7	0.1		103.8		37.8	23.4	
LOS	B	F		D	B	A		F		D	C	
Approach Delay		186.1			19.7			103.8			25.2	
Approach LOS		F			B			F			C	
Queue Length 50th (m)	1.3	~438.3		22.0	239.8	0.1		~90.9		1.2	4.4	
Queue Length 95th (m)	m2.0	#515.1		m36.9	285.2	m0.1		#150.2		5.0	14.5	
Internal Link Dist (m)		316.9			474.9			129.4			56.6	
Turn Bay Length (m)	30.0			30.0		10.0				20.0		
Base Capacity (vph)	94	965		285	1277	1078		350		179	386	
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	0.18	1.36		0.63	0.87	0.02		1.06		0.03	0.11	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 11 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.36			
Intersection Signal Delay: 102.0		Intersection LOS: F	
Intersection Capacity Utilization 110.9%		ICU Level of Service H	
Analysis Period (min) 15			
~	Volume exceeds capacity, queue is theoretically infinite.		
	Queue shown is maximum after two cycles.		
#	95th percentile volume exceeds capacity, queue may be longer.		
	Queue shown is maximum after two cycles.		
m	Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 131: Miles Rd./Eva St. & Rymal Rd.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	900	31	50	816	255	56	75	37	254	149	324
Future Volume (vph)	273	900	31	50	816	255	56	75	37	254	149	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	90.0		40.0	45.0		45.0	50.0		30.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			35.0			7.5		
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		0.96	0.98		0.93	0.95		0.96
Frt		0.995				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1886	0	1805	1881	1583	1805	1900	1615	1770	1845	1553
Flt Permitted	0.106			0.194			0.597			0.706		
Satd. Flow (perm)	196	1886	0	367	1881	1526	1114	1900	1494	1244	1845	1487
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				120			59			282
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		498.9			509.5			366.2			122.9	
Travel Time (s)		35.9			36.7			26.4			8.8	
Confl. Peds. (#/hr)	22		13	13		22	10		26	26		10
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	0%	3%	0%	1%	2%	0%	0%	0%	2%	3%	4%
Adj. Flow (vph)	284	938	32	52	850	266	58	78	39	265	155	338
Shared Lane Traffic (%)												
Lane Group Flow (vph)	284	970	0	52	850	266	58	78	39	265	155	338
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6			2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Detector Phase	1	6		2	2	2	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0	35.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	8.0	41.5		41.5	41.5	41.5	32.2	32.2	32.2	32.2	32.2	32.2
Total Split (s)	16.0	86.0		70.0	70.0	70.0	34.0	34.0	34.0	34.0	34.0	34.0
Total Split (%)	13.3%	71.7%		58.3%	58.3%	58.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%
Maximum Green (s)	13.0	79.5		63.5	63.5	63.5	27.8	27.8	27.8	27.8	27.8	27.8
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	0.0	2.8		2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5		6.5	6.5	6.5	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		12.0		12.0	12.0	12.0				12.0	12.0	12.0
Flash Dont Walk (s)		20.0		20.0	20.0	20.0				14.0	14.0	14.0
Pedestrian Calls (#/hr)		13		22	22	22				36	36	36
Act Effct Green (s)	83.7	80.2		64.1	64.1	64.1	27.1	27.1	27.1	27.1	27.1	27.1
Actuated g/C Ratio	0.70	0.67		0.53	0.53	0.53	0.23	0.23	0.23	0.23	0.23	0.23
v/c Ratio	0.93	0.77		0.27	0.85	0.31	0.23	0.18	0.10	0.95	0.37	0.61

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	32.1	9.8		20.1	33.7	9.3	40.4	38.5	4.9	87.6	42.0	13.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.1	9.8		20.1	33.7	9.3	40.4	38.5	4.9	87.6	42.0	13.3
LOS	C	A		C	C	A	D	D	A	F	D	B
Approach Delay		14.8			27.5			31.6			45.2	
Approach LOS		B			C			C			D	
Queue Length 50th (m)	35.7	167.7		6.8	174.1	18.1	11.7	15.6	0.0	64.5	32.5	11.2
Queue Length 95th (m)	m17.2	m60.5		16.5	#244.4	35.3	24.3	29.4	5.3	#117.0	52.8	42.1
Internal Link Dist (m)		474.9			485.5			342.2			98.9	
Turn Bay Length (m)	30.0			90.0		40.0	45.0		45.0	50.0		30.0
Base Capacity (vph)	307	1261		196	1004	871	258	440	391	288	427	561
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.77		0.27	0.85	0.31	0.22	0.18	0.10	0.92	0.36	0.60

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 75 (63%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 27.0		Intersection LOS: C	
Intersection Capacity Utilization 127.2%		ICU Level of Service H	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 140: Upper Gage Ave. & Rymal Rd.

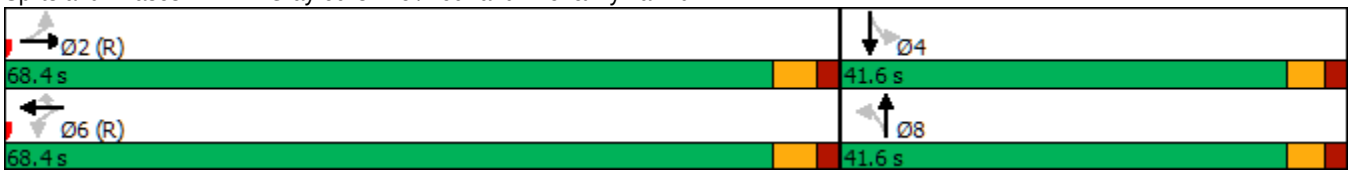


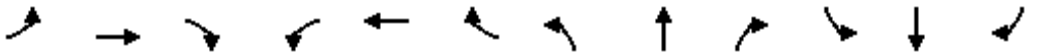
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	1184	10	45	1161	20	5	0	20	5	0	40
Future Volume (vph)	25	1184	10	45	1161	20	5	0	20	5	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		5.0	35.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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		1.00		0.97		1.00				
Frt		0.999				0.850		0.892			0.880	
Flt Protected	0.950			0.950				0.990			0.994	
Satd. Flow (prot)	1787	1898	0	1805	1652	1599	0	1678	0	0	1660	0
Flt Permitted	0.126			0.110				0.954			0.975	
Satd. Flow (perm)	237	1898	0	209	1652	1549	0	1615	0	0	1628	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				20		26			40	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		509.5			351.2			177.4			122.5	
Travel Time (s)		36.7			25.3			12.8			8.8	
Confl. Peds. (#/hr)	13		3	3		13	5					
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	0%	1%	0%	15%	1%	0%	0%	0%	1%	30%	0%
Adj. Flow (vph)	25	1196	10	45	1173	20	5	0	20	5	0	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	1206	0	45	1173	20	0	25	0	0	45	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	
Minimum Split (s)	41.0	41.0		41.0	41.0	41.0	25.6	25.6		41.6	41.6	
Total Split (s)	68.4	68.4		68.4	68.4	68.4	41.6	41.6		41.6	41.6	
Total Split (%)	62.2%	62.2%		62.2%	62.2%	62.2%	37.8%	37.8%		37.8%	37.8%	
Maximum Green (s)	62.8	62.8		62.8	62.8	62.8	36.6	36.6		36.6	36.6	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.9	1.9		1.9	1.9	1.9	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6	5.6		5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)										15.0	15.0	
Flash Dont Walk (s)										21.0	21.0	
Pedestrian Calls (#/hr)										5	5	
Act Effct Green (s)	88.4	88.4		88.4	88.4	88.4		23.2			23.2	
Actuated g/C Ratio	0.80	0.80		0.80	0.80	0.80		0.21			0.21	
v/c Ratio	0.13	0.79		0.27	0.88	0.02		0.07			0.12	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	9.8	17.4		14.1	24.3	3.5		10.9			11.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay	9.8	17.4		14.1	24.3	3.5		10.9			11.6	
LOS	A	B		B	C	A		B			B	
Approach Delay		17.3			23.6			10.9			11.6	
Approach LOS		B			C			B			B	
Queue Length 50th (m)	1.5	181.0		3.2	221.7	0.0		0.0			1.0	
Queue Length 95th (m)	8.1	#394.9		16.3	#410.0	3.3		6.1			8.9	
Internal Link Dist (m)		485.5			327.2			153.4			98.5	
Turn Bay Length (m)	30.0			35.0		20.0						
Base Capacity (vph)	190	1526		168	1328	1249		554			568	
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	0.13	0.79		0.27	0.88	0.02		0.05			0.08	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 58 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 145			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 88.4%		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: 141: Grayrocks Ave./Rockland Ave. & Rymal Rd.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	930	87	31	886	357	100	106	75	327	87	235
Future Volume (vph)	199	930	87	31	886	357	100	106	75	327	87	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	30.0		10.0	35.0		50.0	50.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	*0.65	0.95	1.00	1.00	1.00
Ped Bike Factor		1.00				0.98	1.00	0.99		1.00		0.98
Frt		0.987				0.850		0.938				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1645	0	1220	1667	1468	1530	1904	0	1656	1508	1468
Flt Permitted	0.068			0.072			0.696			0.472		
Satd. Flow (perm)	122	1645	0	92	1667	1444	1118	1904	0	819	1508	1435
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		7				82		45				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		351.2			400.2			147.9			323.0	
Travel Time (s)		25.3			28.8			10.6			23.3	
Confl. Peds. (#/hr)	5		2	2		5	1		3	3		1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	6%	12%	33%	48%	14%	10%	18%	17%	25%	9%	26%	10%
Adj. Flow (vph)	214	1000	94	33	953	384	108	114	81	352	94	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	214	1094	0	33	953	384	108	195	0	352	94	253
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		8
Detector Phase	5	2		6	6	6	4	4		3 8	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0	35.0	10.0	10.0		5.0	10.0	10.0
Minimum Split (s)	9.5	48.2		48.2	48.2	48.2	31.0	31.0		8.0	31.0	31.0
Total Split (s)	15.0	77.0		62.0	62.0	62.0	33.0	33.0		10.0	43.0	43.0
Total Split (%)	12.5%	64.2%		51.7%	51.7%	51.7%	27.5%	27.5%		8.3%	35.8%	35.8%
Maximum Green (s)	12.0	70.8		55.8	55.8	55.8	27.0	27.0		7.0	37.0	37.0
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3		3.0	3.3	3.3
All-Red Time (s)	0.0	2.5		2.5	2.5	2.5	2.7	2.7		0.0	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.2		6.2	6.2	6.2	6.0	6.0		3.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		20.0		20.0	20.0	20.0	7.0	7.0			7.0	7.0
Flash Dont Walk (s)		22.0		22.0	22.0	22.0	18.0	18.0			18.0	18.0
Pedestrian Calls (#/hr)		2		5	5	5	3	3			1	1
Act Effct Green (s)	74.0	70.8		55.8	55.8	55.8	27.0	27.0		40.0	37.0	37.0
Actuated g/C Ratio	0.62	0.59		0.46	0.46	0.46	0.22	0.22		0.33	0.31	0.31
v/c Ratio	0.92	1.12		0.79	1.23	0.54	0.43	0.42		1.10	0.20	0.57

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	71.2	94.8		100.5	144.2	23.0	46.2	33.5		115.2	32.1	41.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	71.2	94.8		100.5	144.2	23.0	46.2	33.5		115.2	32.1	41.0
LOS	E	F		F	F	C	D	C		F	C	D
Approach Delay		90.9			109.2			38.0			77.1	
Approach LOS		F			F			D			E	
Queue Length 50th (m)	36.3	~313.5		0.0	~301.6	69.4	23.1	24.3		~83.0	17.2	52.5
Queue Length 95th (m)	#84.1	#396.9		m#11.8	m#374.9	m92.5	42.0	42.2		#158.9	31.3	81.1
Internal Link Dist (m)		327.2			376.2			123.9			299.0	
Turn Bay Length (m)	45.0			30.0		10.0	35.0			50.0		
Base Capacity (vph)	233	973		42	775	715	251	463		321	464	442
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.92	1.12		0.79	1.23	0.54	0.43	0.42		1.10	0.20	0.57

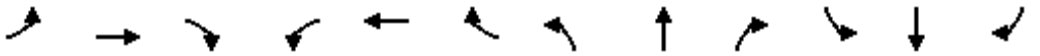
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.23
Intersection Signal Delay: 90.8 Intersection LOS: F
Intersection Capacity Utilization 129.7% ICU Level of Service H
Analysis Period (min) 15

* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 150: Upper Ottawa St. & Rymal Rd.



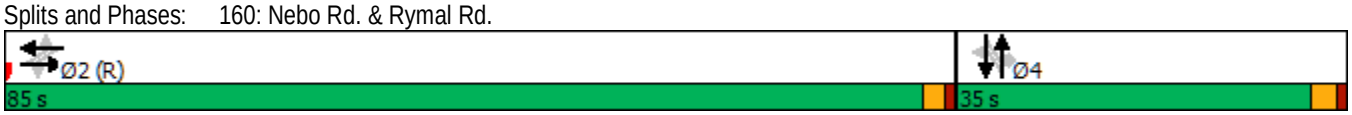


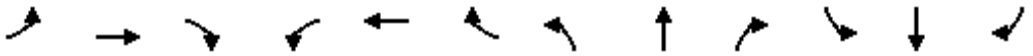
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	1063	90	111	1079	81	65	105	147	124	190	73
Future Volume (vph)	59	1063	90	111	1079	81	65	105	147	124	190	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	45.0		0.0	20.0		20.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			30.0			7.5		
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		0.99		0.97	0.99	0.99	
Frt		0.988			0.989				0.850		0.958	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1790	0	1456	1838	0	1752	1792	1538	1719	1658	0
Flt Permitted	0.090			0.093			0.258			0.610		
Satd. Flow (perm)	157	1790	0	142	1838	0	470	1792	1497	1098	1658	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			7				129		16	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		400.2			349.0			199.0			219.6	
Travel Time (s)		28.8			25.1			14.3			15.8	
Confl. Peds. (#/hr)	4		5	5		4	10		3	3		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	5%	0%	24%	2%	2%	3%	6%	5%	5%	6%	15%
Adj. Flow (vph)	61	1096	93	114	1112	84	67	108	152	128	196	75
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	1189	0	114	1196	0	67	108	152	128	271	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Detector Phase	2	2		2	2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	25.0	25.0		25.0	25.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.5	29.5		29.5	29.5		29.4	29.4	29.4	29.4	29.4	
Total Split (s)	85.0	85.0		85.0	85.0		35.0	35.0	35.0	35.0	35.0	
Total Split (%)	70.8%	70.8%		70.8%	70.8%		29.2%	29.2%	29.2%	29.2%	29.2%	
Maximum Green (s)	82.0	82.0		82.0	82.0		31.6	31.6	31.6	31.6	31.6	
Yellow Time (s)	2.0	2.0		2.0	2.0		2.4	2.4	2.4	2.4	2.4	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.4	3.4	3.4	3.4	3.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		16.0	16.0	16.0	16.0	16.0	
Pedestrian Calls (#/hr)	9	9		9	9		13	13	13	13	13	
Act Effct Green (s)	89.5	89.5		89.5	89.5		24.1	24.1	24.1	24.1	24.1	
Actuated g/C Ratio	0.75	0.75		0.75	0.75		0.20	0.20	0.20	0.20	0.20	
v/c Ratio	0.52	0.89		1.08	0.87		0.71	0.30	0.38	0.58	0.79	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	13.5	13.8		121.7	14.8		81.7	41.3	11.8	53.1	58.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	13.5	13.8		121.7	14.8		81.7	41.3	11.8	53.1	58.3	
LOS	B	B		F	B		F	D	B	D	E	
Approach Delay		13.8			24.1			35.9			56.6	
Approach LOS		B			C			D			E	
Queue Length 50th (m)	4.7	238.1		~19.6	71.9		15.5	22.8	4.7	28.8	60.3	
Queue Length 95th (m)	m6.5	m225.7		m#56.3	#379.5		#33.6	37.1	21.5	46.7	85.4	
Internal Link Dist (m)		376.2			325.0			175.0			195.6	
Turn Bay Length (m)	50.0			45.0			20.0		20.0			
Base Capacity (vph)	117	1337		106	1373		123	471	489	289	448	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.52	0.89		1.08	0.87		0.54	0.23	0.31	0.44	0.60	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 30 (25%), Referenced to phase 2:EBWB and 6:, Start of Green			
Natural Cycle: 130			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.08			
Intersection Signal Delay: 25.3		Intersection LOS: C	
Intersection Capacity Utilization 120.9%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 160: Nebo Rd. & Rymal Rd.



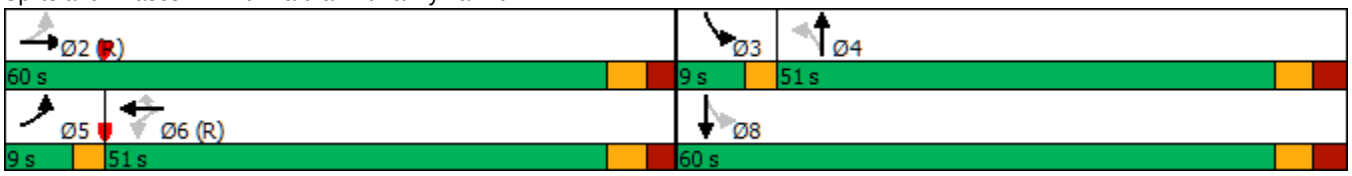


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	336	742	67	44	722	149	60	162	37	168	212	250
Future Volume (vph)	336	742	67	44	722	149	60	162	37	168	212	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		150.0	60.0		60.0	85.0		0.0	30.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			55.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.65	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00		1.00		0.99	0.99				0.98	
Frt		0.987				0.850		0.972			0.919	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3001	0	1656	2375	1495	1656	3195	0	1736	3013	0
Flt Permitted	0.084			0.332			0.468			0.511		
Satd. Flow (perm)	151	3001	0	579	2375	1476	808	3195	0	934	3013	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				109		26			192	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		106.4			328.2			269.5			224.1	
Travel Time (s)		7.7			23.6			19.4			16.1	
Confl. Peds. (#/hr)	1		1	1		1	6					6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	19%	14%	9%	4%	8%	9%	10%	9%	4%	5%	11%
Adj. Flow (vph)	354	781	71	46	760	157	63	171	39	177	223	263
Shared Lane Traffic (%)												
Lane Group Flow (vph)	354	852	0	46	760	157	63	210	0	177	486	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		
Detector Phase	5	2		6	6	6	4	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	20.0		20.0	20.0	20.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	36.3		36.3	36.3	36.3	37.6	37.6		8.0	27.6	
Total Split (s)	9.0	60.0		51.0	51.0	51.0	51.0	51.0		9.0	60.0	
Total Split (%)	7.5%	50.0%		42.5%	42.5%	42.5%	42.5%	42.5%		7.5%	50.0%	
Maximum Green (s)	6.0	53.7		44.7	44.7	44.7	44.4	44.4		6.0	53.4	
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	3.3	3.3		0.0	3.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3		6.3	6.3	6.3	6.6	6.6		3.0	6.6	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)		12.0		12.0	12.0	12.0	10.0	10.0			10.0	
Flash Dont Walk (s)		18.0		18.0	18.0	18.0	21.0	21.0			1.0	
Pedestrian Calls (#/hr)		0		1	1	1	0	0			6	
Act Effct Green (s)	86.0	82.7		44.7	44.7	44.7	15.4	15.4		28.0	24.4	
Actuated g/C Ratio	0.72	0.69		0.37	0.37	0.37	0.13	0.13		0.23	0.20	
v/c Ratio	0.63	0.41		0.21	0.86	0.25	0.61	0.48		0.69	0.63	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	26.8	5.8		29.1	46.1	10.1	72.3	45.2		53.6	29.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	26.8	5.8		29.1	46.1	10.1	72.3	45.2		53.6	29.2	
LOS	C	A		C	D	B	E	D		D	C	
Approach Delay		12.0			39.4			51.5			35.7	
Approach LOS		B			D			D			D	
Queue Length 50th (m)	47.6	32.5		7.7	132.4	7.7	15.1	22.6		38.0	35.4	
Queue Length 95th (m)	m79.3	m47.2		17.7	#184.3	23.0	29.0	32.8		54.9	49.5	
Internal Link Dist (m)		82.4			304.2			245.5			200.1	
Turn Bay Length (m)	50.0			60.0		60.0	85.0			30.0		
Base Capacity (vph)	560	2070		215	884	618	298	1198		258	1447	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.63	0.41		0.21	0.86	0.25	0.21	0.18		0.69	0.34	

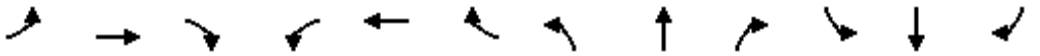
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 29.0		Intersection LOS: C	
Intersection Capacity Utilization 85.8%		ICU Level of Service E	
Analysis Period (min) 15			
* User Entered Value			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 170: Dartnall Rd. & Rymal Rd.



Appendix D

Synchro Analysis Worksheets
(2041 Volumes with Five-Lane Cross Section)



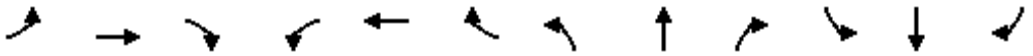
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	754	16	36	1009	5	28	5	102	5	0	35
Future Volume (vph)	25	754	16	36	1009	5	28	5	102	5	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00			0.99			1.00	
Frt		0.997			0.999			0.897			0.881	
Flt Protected	0.950			0.950				0.990			0.994	
Satd. Flow (prot)	1805	3593	0	1703	3337	0	0	1621	0	0	1486	0
Flt Permitted	0.239			0.327				0.919			0.965	
Satd. Flow (perm)	454	3593	0	585	3337	0	0	1505	0	0	1443	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			1			111			38	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		170.2			375.5			112.3			153.5	
Travel Time (s)		12.3			27.0			8.1			11.1	
Confl. Peds. (#/hr)	2		3	3		2			1	1		
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%	0%	6%	6%	8%	25%	0%	0%	4%	4%	8%	13%
Adj. Flow (vph)	27	820	17	39	1097	5	30	5	111	5	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	837	0	39	1102	0	0	146	0	0	43	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	30.0	30.0		30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	35.6	35.6		35.6	35.6		29.7	29.7		29.7	29.7	
Total Split (s)	70.0	70.0		70.0	70.0		30.0	30.0		30.0	30.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	64.4	64.4		64.4	64.4		24.3	24.3		24.3	24.3	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9		1.9	1.9		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	21.0	21.0		21.0	21.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	9.0		9.0	9.0		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	3	3		2	2		1	1		0	0	
Act Effct Green (s)	75.8	75.8		75.8	75.8			12.9			12.9	
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.13			0.13	
v/c Ratio	0.08	0.31		0.09	0.44			0.50			0.20	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	5.1	4.7		1.4	1.6			17.9			15.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.1	4.7		1.4	1.6			17.9			15.1	
LOS	A	A		A	A			B			B	
Approach Delay		4.7			1.6			17.9			15.1	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	1.0	19.4		0.4	5.3			6.7			0.9	
Queue Length 95th (m)	5.4	48.0		m1.2	10.9			21.9			9.6	
Internal Link Dist (m)		146.2			351.5			88.3			129.5	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	344	2724		443	2529			449			379	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.08	0.31		0.09	0.44			0.33			0.11	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 18 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 4.2		Intersection LOS: A	
Intersection Capacity Utilization 52.7%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 101: Springside Dr./Atessa Dr. & Rymal Rd.



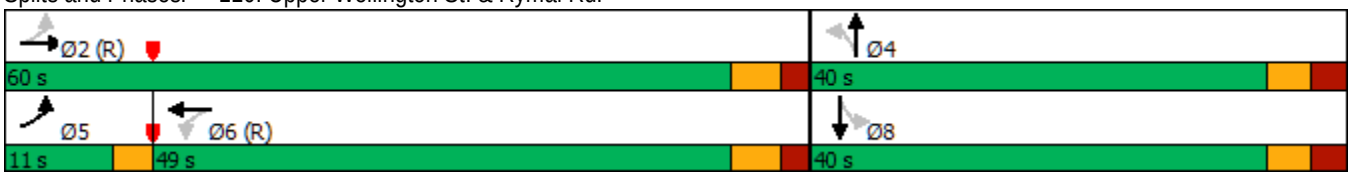


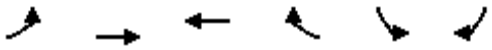
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	705	12	31	809	156	23	70	50	142	15	217
Future Volume (vph)	138	705	12	31	809	156	23	70	50	142	15	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		10.0	40.0		0.0	15.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		0.99	0.99	
Frt		0.997			0.976			0.937			0.860	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	3592	0	1641	3268	0	1805	1648	0	1703	1607	0
Flt Permitted	0.206			0.362			0.419			0.676		
Satd. Flow (perm)	359	3592	0	623	3268	0	795	1648	0	1201	1607	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			28			39			231	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		375.5			185.6			230.2			240.7	
Travel Time (s)		27.0			13.4			16.6			17.3	
Confl. Peds. (#/hr)	5		5	5		5	2		12	12		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	9%	0%	8%	10%	7%	9%	0%	2%	14%	6%	6%	0%
Adj. Flow (vph)	147	750	13	33	861	166	24	74	53	151	16	231
Shared Lane Traffic (%)												
Lane Group Flow (vph)	147	763	0	33	1027	0	24	127	0	151	247	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	9.5	36.0		36.0	36.0		39.1	39.1		39.1	39.1	
Total Split (s)	11.0	60.0		49.0	49.0		40.0	40.0		40.0	40.0	
Total Split (%)	11.0%	60.0%		49.0%	49.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	8.0	54.0		43.0	43.0		33.9	33.9		33.9	33.9	
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.3		2.3	2.3		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		6.0	6.0		6.1	6.1		6.1	6.1	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	2.0	0.2		0.2	0.2		5.0	5.0		5.0	5.0	
Recall Mode	None	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)		10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		17.0		17.0	17.0		23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)		5		5	5		2	2		12	12	
Act Effct Green (s)	69.9	66.9		56.7	56.7		21.0	21.0		21.0	21.0	
Actuated g/C Ratio	0.70	0.67		0.57	0.57		0.21	0.21		0.21	0.21	
v/c Ratio	0.43	0.32		0.09	0.55		0.14	0.34		0.60	0.48	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	15.1	11.3		6.7	6.8		30.3	23.3		44.2	7.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.1	11.3		6.7	6.8		30.3	23.3		44.2	7.9	
LOS	B	B		A	A		C	C		D	A	
Approach Delay		11.9			6.8			24.4			21.7	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	9.3	28.4		1.1	17.0		4.1	15.4		28.6	2.7	
Queue Length 95th (m)	37.2	87.6		3.4	25.3		9.6	26.7		41.7	19.4	
Internal Link Dist (m)		351.5			161.6			206.2			216.7	
Turn Bay Length (m)	50.0			40.0			15.0			35.0		
Base Capacity (vph)	358	2405		352	1864		269	584		407	697	
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	0.41	0.32		0.09	0.55		0.09	0.22		0.37	0.35	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 94 (94%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 87.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 110: Upper Wellington St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	886	1001	15	5	10
Future Volume (Veh/h)	10	886	1001	15	5	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	10	913	1032	15	5	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (m)		186	187			
pX, platoon unblocked	0.91				0.95	0.91
vC, conflicting volume	1047				1516	524
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	847				1064	271
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	725				191	665

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	10	456	456	688	359	15
Volume Left	10	0	0	0	0	5
Volume Right	0	0	0	0	15	10
cSH	725	1700	1700	1700	1700	574
Volume to Capacity	0.01	0.27	0.27	0.40	0.21	0.03
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0	0.6
Control Delay (s)	10.0	0.0	0.0	0.0	0.0	15.1
Lane LOS	B					C
Approach Delay (s)	0.1			0.0		15.1
Approach LOS						C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

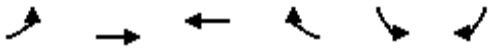
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	801	90	95	976	40	55
Future Volume (vph)	801	90	95	976	40	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		55.0	35.0		0.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			65.0		7.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor					0.99	0.98
Frt	0.985					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3556	0	1687	3223	1530	1335
Flt Permitted			0.262		0.950	
Satd. Flow (perm)	3556	0	465	3223	1514	1314
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	18					59
Link Speed (k/h)	50			50	50	
Link Distance (m)	186.7			157.7	124.6	
Travel Time (s)	13.4			11.4	9.0	
Confl. Peds. (#/hr)					9	3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	7%	12%	18%	21%
Adj. Flow (vph)	852	96	101	1038	43	59
Shared Lane Traffic (%)						
Lane Group Flow (vph)	948	0	101	1038	43	59
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases			6			4
Detector Phase	2		1	6	4	4
Switch Phase						
Minimum Initial (s)	30.0		5.0	30.0	10.0	10.0
Minimum Split (s)	35.6		8.0	35.6	31.8	31.8
Total Split (s)	57.0		11.0	68.0	32.0	32.0
Total Split (%)	57.0%		11.0%	68.0%	32.0%	32.0%
Maximum Green (s)	51.4		8.0	62.4	26.2	26.2
Yellow Time (s)	3.7		3.0	3.7	3.3	3.3
All-Red Time (s)	1.9		0.0	1.9	2.5	2.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6		3.0	5.6	5.8	5.8
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	17.0				7.0	7.0
Flash Dont Walk (s)	13.0				19.0	19.0
Pedestrian Calls (#/hr)	0				12	12
Act Effct Green (s)	71.6		81.2	79.7	13.2	13.2
Actuated g/C Ratio	0.72		0.81	0.80	0.13	0.13
v/c Ratio	0.37		0.22	0.40	0.21	0.26

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	3.5		1.7	1.7	38.9	11.9
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	3.5		1.7	1.7	38.9	11.9
LOS	A		A	A	D	B
Approach Delay	3.5			1.7	23.3	
Approach LOS	A			A	C	
Queue Length 50th (m)	28.2		0.9	5.9	8.3	0.0
Queue Length 95th (m)	30.8		m2.1	27.3	15.7	10.0
Internal Link Dist (m)	162.7			133.7	100.6	
Turn Bay Length (m)			35.0			
Base Capacity (vph)	2552		475	2568	400	387
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	0.37		0.21	0.40	0.11	0.15

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 82 (82%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.40			
Intersection Signal Delay: 3.5		Intersection LOS: A	
Intersection Capacity Utilization 52.7%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 112: Turner Park Library & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	850	1049	20	15	20
Future Volume (Veh/h)	10	850	1049	20	15	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	11	914	1128	22	16	22
Pedestrians		3	5		2	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		158	345			
pX, platoon unblocked	0.80				0.85	0.80
vC, conflicting volume	1152				1625	580
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	694				853	0
tC, single (s)	4.1				7.1	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	98				93	97
cM capacity (veh/h)	729				232	871

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	11	457	457	752	398	16	22
Volume Left	11	0	0	0	0	16	0
Volume Right	0	0	0	0	22	0	22
cSH	729	1700	1700	1700	1700	232	871
Volume to Capacity	0.02	0.27	0.27	0.44	0.23	0.07	0.03
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	1.8	0.6
Control Delay (s)	10.0	0.0	0.0	0.0	0.0	21.7	9.2
Lane LOS	B					C	A
Approach Delay (s)	0.1			0.0		14.5	
Approach LOS						B	

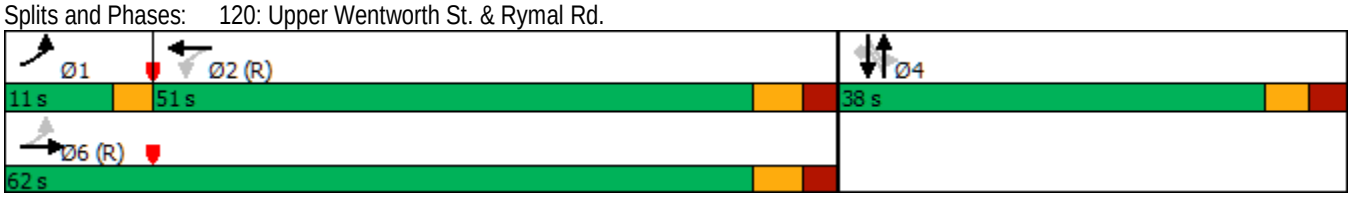
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

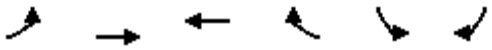
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	272	542	31	62	800	199	70	186	50	113	46	209
Future Volume (vph)	272	542	31	62	800	199	70	186	50	113	46	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		15.0	50.0		120.0	30.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			20.0			35.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	0.99		0.98	0.99		0.99		0.97
Frt		0.992			0.970			0.968				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	3448	0	1597	2905	0	1752	1810	0	1597	1624	1553
Flt Permitted	0.140			0.416			0.724			0.447		
Satd. Flow (perm)	237	3448	0	695	2905	0	1315	1810	0	745	1624	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			39			14				227
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.6			378.8			243.5			277.8	
Travel Time (s)		24.8			27.3			17.5			20.0	
Confl. Peds. (#/hr)	19		7	7		19	17		15	15		17
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 (%)	12%	3%	15%	13%	22%	11%	3%	0%	5%	13%	17%	4%
Adj. Flow (vph)	296	589	34	67	870	216	76	202	54	123	50	227
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	623	0	67	1086	0	76	256	0	123	50	227
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Detector Phase	1	6		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	1.0		30.0	30.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	31.3		37.3	37.3		37.3	37.3		37.3	37.3	37.3
Total Split (s)	11.0	62.0		51.0	51.0		38.0	38.0		38.0	38.0	38.0
Total Split (%)	11.0%	62.0%		51.0%	51.0%		38.0%	38.0%		38.0%	38.0%	38.0%
Maximum Green (s)	8.0	55.7		44.7	44.7		31.7	31.7		31.7	31.7	31.7
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.6		2.6	2.6		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.3		6.3	6.3		6.3	6.3		6.3	6.3	6.3
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	None
Walk Time (s)		12.0		12.0	12.0		12.0	12.0		12.0	12.0	12.0
Flash Dont Walk (s)		13.0		19.0	19.0		19.0	19.0		19.0	19.0	19.0
Pedestrian Calls (#/hr)		7		19	19		32	32		32	32	32
Act Effct Green (s)	66.3	63.0		45.0	45.0		24.4	24.4		24.4	24.4	24.4
Actuated g/C Ratio	0.66	0.63		0.45	0.45		0.24	0.24		0.24	0.24	0.24
v/c Ratio	0.81	0.29		0.21	0.82		0.24	0.57		0.68	0.13	0.42

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	43.2	4.0		10.7	17.5		29.3	34.9		51.4	26.7	6.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	43.2	4.0		10.7	17.5		29.3	34.9		51.4	26.7	6.1
LOS	D	A		B	B		C	C		D	C	A
Approach Delay		16.7			17.1			33.6			22.6	
Approach LOS		B			B			C			C	
Queue Length 50th (m)	~37.8	32.1		3.3	80.6		11.3	39.3		20.6	7.2	0.0
Queue Length 95th (m)	#77.1	5.2		m6.6	62.8		22.8	62.4		40.3	16.0	16.6
Internal Link Dist (m)		320.6			354.8			219.5			253.8	
Turn Bay Length (m)	80.0			50.0			30.0			55.0		
Base Capacity (vph)	364	2177		312	1327		416	583		236	514	633
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.81	0.29		0.21	0.82		0.18	0.44		0.52	0.10	0.36

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 29 (29%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 93.3%	ICU Level of Service F
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 120: Upper Wentworth St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	696	1050	35	35	10
Future Volume (Veh/h)	0	696	1050	35	35	10
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)	0	757	1141	38	38	11
Pedestrians			4		26	
Lane Width (m)			3.6		3.6	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		379				
pX, platoon unblocked					0.99	
vC, conflicting volume	1205				1568	616
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1205				1547	616
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				63	97
cM capacity (veh/h)	557				103	429

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	0	378	378	761	418	38	11
Volume Left	0	0	0	0	0	38	0
Volume Right	0	0	0	0	38	0	11
cSH	1700	1700	1700	1700	1700	103	429
Volume to Capacity	0.00	0.22	0.22	0.45	0.25	0.37	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	11.9	0.6
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	59.2	13.6
Lane LOS						F	B
Approach Delay (s)	0.0			0.0		49.0	
Approach LOS						E	

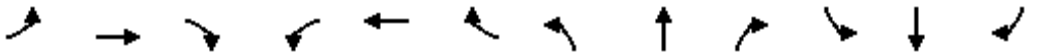
Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	766	10	5	1057	25	10
Future Volume (Veh/h)	766	10	5	1057	25	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	824	11	5	1137	27	11
Pedestrians				2	1	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	0	
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (m)				292		
pX, platoon unblocked					0.84	
vC, conflicting volume			836		1409	420
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			836		1103	420
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		84	98
cM capacity (veh/h)			806		174	586

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	549	286	5	568	568	38
Volume Left	0	0	5	0	0	27
Volume Right	0	11	0	0	0	11
cSH	1700	1700	806	1700	1700	245
Volume to Capacity	0.32	0.17	0.01	0.33	0.33	0.16
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.0	4.3
Control Delay (s)	0.0	0.0	9.5	0.0	0.0	24.2
Lane LOS			A			C
Approach Delay (s)	0.0		0.0			24.2
Approach LOS						C

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	39.9%	ICU Level of Service		A
Analysis Period (min)	15			



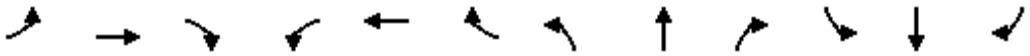
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	616	0	0	873	359	0	0	0	166	0	196
Future Volume (vph)	152	616	0	0	873	359	0	0	0	166	0	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		20.0	20.0		0.0	40.0		0.0	40.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99					1.00	0.98	
Frt					0.956						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1612	3610	0	1900	3105	0	1900	1900	0	1703	1591	0
Flt Permitted	0.122									0.757		
Satd. Flow (perm)	207	3610	0	1900	3105	0	1900	1900	0	1354	1591	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					86						218	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		291.6			340.9			113.6			275.5	
Travel Time (s)		21.0			24.5			8.2			19.8	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	4%	0%	12%	5%	0%	0%	0%	6%	9%	0%
Adj. Flow (vph)	167	677	0	0	959	395	0	0	0	182	0	215
Shared Lane Traffic (%)												
Lane Group Flow (vph)	167	677	0	0	1354	0	0	0	0	182	215	0
Turn Type	pm+pt	NA		Perm	NA		Perm			Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3 8	8		7 4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	8.0	30.1		30.1	30.1		34.3	34.3		34.3	34.3	
Total Split (s)	11.0	65.0		54.0	54.0		35.0	35.0		35.0	35.0	
Total Split (%)	11.0%	65.0%		54.0%	54.0%		35.0%	35.0%		35.0%	35.0%	
Maximum Green (s)	8.0	58.9		47.9	47.9		28.7	28.7		28.7	28.7	
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.1		6.1	6.1		6.3	6.3		6.3	6.3	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	1.0	0.2		0.2	0.2		0.2	0.2		0.2	0.2	
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		12.0		12.0	12.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)		3		8	8		3	3		2	2	
Act Effct Green (s)	73.3	70.2			58.5					17.4	17.4	
Actuated g/C Ratio	0.73	0.70			0.58					0.17	0.17	
v/c Ratio	0.61	0.27			0.73					0.77	0.47	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	26.4	4.9			11.3					59.5	7.7	
Queue Delay	0.0	0.0			0.0					0.0	0.0	
Total Delay	26.4	4.9			11.3					59.5	7.7	
LOS	C	A			B					E	A	
Approach Delay		9.1			11.3						31.4	
Approach LOS		A			B						C	
Queue Length 50th (m)	9.9	14.7			38.8					36.3	0.0	
Queue Length 95th (m)	#37.5	36.4			#127.7					52.7	16.7	
Internal Link Dist (m)		267.6			316.9			89.6			251.5	
Turn Bay Length (m)	20.0									40.0		
Base Capacity (vph)	282	2533			1853					388	612	
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	0.59	0.27			0.73					0.47	0.35	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 74 (74%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 13.7		Intersection LOS: B	
Intersection Capacity Utilization 74.5%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 130: Rymal Rd. & Upper Sherman Ave.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	701	59	90	940	10	176	15	110	5	10	20
Future Volume (vph)	10	701	59	90	940	10	176	15	110	5	10	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		10.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00			0.99		1.00	0.99	
Frt		0.988			0.998			0.951			0.902	
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1805	3316	0	1752	3156	0	0	1725	0	1656	1562	0
Flt Permitted	0.279			0.275				0.802		0.577		
Satd. Flow (perm)	529	3316	0	507	3156	0	0	1422	0	1005	1562	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			2			32			21	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		340.9			498.9			153.4			80.6	
Travel Time (s)		24.5			35.9			11.0			5.8	
Confl. Peds. (#/hr)	4		1	1		4	2		1	1		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	8%	0%	3%	14%	25%	1%	0%	2%	9%	12%	7%
Adj. Flow (vph)	11	746	63	96	1000	11	187	16	117	5	11	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	809	0	96	1011	0	0	320	0	5	32	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		
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		8.0	27.7		32.7	32.7		32.7	32.7	
Total Split (s)	49.0	49.0		11.0	60.0		40.0	40.0		40.0	40.0	
Total Split (%)	49.0%	49.0%		11.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	43.3	43.3		8.0	54.3		34.3	34.3		34.3	34.3	
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)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-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		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	1	1			4		1	1		2	2	
Act Effct Green (s)	54.3	54.3		65.5	62.8			25.8		25.8	25.8	
Actuated g/C Ratio	0.54	0.54		0.66	0.63			0.26		0.26	0.26	
v/c Ratio	0.04	0.45		0.23	0.51			0.82		0.02	0.08	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	14.2	13.7		4.1	5.7			47.9		23.8	13.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	14.2	13.7		4.1	5.7			47.9		23.8	13.5	
LOS	B	B		A	A			D		C	B	
Approach Delay		13.7			5.6			47.9			14.9	
Approach LOS		B			A			D			B	
Queue Length 50th (m)	0.8	46.0		1.9	14.8			55.6		0.8	1.7	
Queue Length 95th (m)	m4.1	64.0		m5.8	44.6			79.7		3.3	8.0	
Internal Link Dist (m)		316.9			474.9			129.4			56.6	
Turn Bay Length (m)	30.0			30.0						20.0		
Base Capacity (vph)	287	1806		433	1984			508		344	549	
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	0.45		0.22	0.51			0.63		0.01	0.06	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 69 (69%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 14.6		Intersection LOS: B	
Intersection Capacity Utilization 81.2%		ICU Level of Service D	
Analysis Period (min) 15			
m	Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 131: Miles Rd./Eva St. & Rymal Rd.



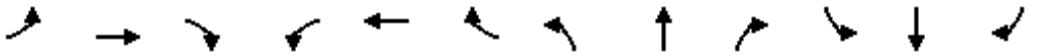
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	581	12	23	721	249	85	147	44	155	46	193
Future Volume (vph)	236	581	12	23	721	249	85	147	44	155	46	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	90.0		40.0	45.0		45.0	50.0		30.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			35.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	0.99		1.00		0.97	0.99		0.98
Frt		0.997			0.961				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	3272	0	1597	3072	0	1687	1881	1615	1687	1776	1292
Flt Permitted	0.199			0.412			0.725			0.616		
Satd. Flow (perm)	359	3272	0	689	3072	0	1282	1881	1569	1079	1776	1271
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			68				71			205
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		498.9			509.5			366.2			122.9	
Travel Time (s)		35.9			36.7			26.4			8.8	
Confl. Peds. (#/hr)	14		9	9		14	4		15	15		4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	10%	7%	13%	14%	7%	7%	1%	0%	7%	7%	25%
Adj. Flow (vph)	251	618	13	24	767	265	90	156	47	165	49	205
Shared Lane Traffic (%)												
Lane Group Flow (vph)	251	631	0	24	1032	0	90	156	47	165	49	205
Turn Type	pm+pt	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6			2			8			4	
Permitted Phases	6			2			8		8	4		4
Detector Phase	1	6		2	2		8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0		15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	8.0	41.5		41.5	41.5		32.2	32.2	32.2	32.2	32.2	32.2
Total Split (s)	11.0	67.0		56.0	56.0		33.0	33.0	33.0	33.0	33.0	33.0
Total Split (%)	11.0%	67.0%		56.0%	56.0%		33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Maximum Green (s)	8.0	60.5		49.5	49.5		26.8	26.8	26.8	26.8	26.8	26.8
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	0.0	2.8		2.8	2.8		2.9	2.9	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5		6.5	6.5		6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max		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)		20.0		20.0	20.0					14.0	14.0	14.0
Pedestrian Calls (#/hr)		9		14	14					19	19	19
Act Effct Green (s)	70.0	66.5		54.3	54.3		20.8	20.8	20.8	20.8	20.8	20.8
Actuated g/C Ratio	0.70	0.66		0.54	0.54		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.67	0.29		0.06	0.61		0.34	0.40	0.12	0.74	0.13	0.48

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	16.9	3.3		8.5	10.1		35.7	36.1	4.0	55.7	30.8	8.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	3.3		8.5	10.1		35.7	36.1	4.0	55.7	30.8	8.3
LOS	B	A		A	B		D	D	A	E	C	A
Approach Delay		7.1			10.1			30.8			29.6	
Approach LOS		A			B			C			C	
Queue Length 50th (m)	3.5	4.7		1.3	28.5		16.0	28.0	0.0	32.1	8.3	0.0
Queue Length 95th (m)	#23.7	8.2		2.9	25.3		28.5	43.3	5.0	51.9	16.8	17.3
Internal Link Dist (m)		474.9			485.5			342.2			98.9	
Turn Bay Length (m)	30.0			90.0			45.0		45.0	50.0		30.0
Base Capacity (vph)	376	2176		373	1698		343	504	472	289	475	490
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	0.67	0.29		0.06	0.61		0.26	0.31	0.10	0.57	0.10	0.42

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 16 (16%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 14.5		Intersection LOS: B	
Intersection Capacity Utilization 105.6%		ICU Level of Service G	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 140: Upper Gage Ave. & Rymal Rd.



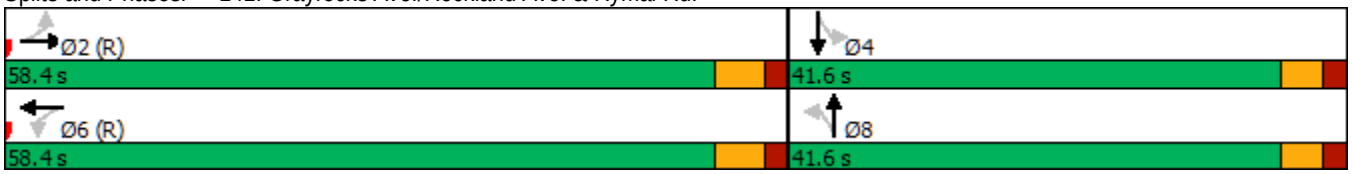


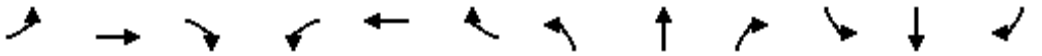
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	766	5	5	885	10	0	0	0	0	0	0
Future Volume (vph)	20	766	5	5	885	10	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		5.0	35.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt		0.999			0.998							
Flt Protected	0.950			0.950								
Satd. Flow (prot)	1805	3606	0	1805	3368	0	0	1900	0	0	1712	0
Flt Permitted	0.279			0.325								
Satd. Flow (perm)	529	3606	0	618	3368	0	0	1900	0	0	1712	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			2							
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		509.5			351.2			177.4			122.5	
Travel Time (s)		36.7			25.3			12.8			8.8	
Confl. Peds. (#/hr)	11					11	4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	0%	0%	0%	7%	0%	0%	0%	7%	5%	11%	0%
Adj. Flow (vph)	22	861	6	6	994	11	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	867	0	6	1005	0	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA							
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		25.6	25.6		41.6	41.6	
Total Split (s)	58.4	58.4		58.4	58.4		41.6	41.6		41.6	41.6	
Total Split (%)	58.4%	58.4%		58.4%	58.4%		41.6%	41.6%		41.6%	41.6%	
Maximum Green (s)	52.8	52.8		52.8	52.8		36.6	36.6		36.6	36.6	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.9	1.9		1.9	1.9		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)										15.0	15.0	
Flash Dont Walk (s)										21.0	21.0	
Pedestrian Calls (#/hr)										1	1	
Act Effct Green (s)	90.7	90.7		90.7	90.7							
Actuated g/C Ratio	0.91	0.91		0.91	0.91							
v/c Ratio	0.05	0.27		0.01	0.33							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.8	4.9		2.6	2.3							
Queue Delay	0.0	0.0		0.0	0.0							
Total Delay	7.8	4.9		2.6	2.3							
LOS	A	A		A	A							
Approach Delay		5.0			2.3							
Approach LOS		A			A							
Queue Length 50th (m)	0.0	0.0		0.0	0.0							
Queue Length 95th (m)	m6.3	64.0		m0.7	60.6							
Internal Link Dist (m)		485.5			327.2			153.4			98.5	
Turn Bay Length (m)	30.0			35.0								
Base Capacity (vph)	480	3270		560	3054							
Starvation Cap Reductn	0	0		0	0							
Spillback Cap Reductn	0	0		0	0							
Storage Cap Reductn	0	0		0	0							
Reduced v/c Ratio	0.05	0.27		0.01	0.33							

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 97 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.33			
Intersection Signal Delay: 3.6		Intersection LOS: A	
Intersection Capacity Utilization 52.0%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 141: Grayrocks Ave./Rockland Ave. & Rymal Rd.





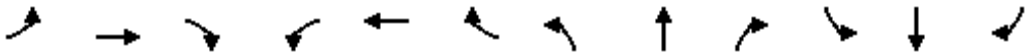
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	575	37	23	710	305	62	93	25	264	77	120
Future Volume (vph)	180	575	37	23	710	305	62	93	25	264	77	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	30.0		10.0	35.0		50.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	*0.65	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00			1.00		1.00		
Frt		0.991			0.955			0.968				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1556	2459	0	1570	2942	0	1165	1764	0	1671	1652	1170
Flt Permitted	0.160			0.404			0.704			0.636		
Satd. Flow (perm)	262	2459	0	667	2942	0	863	1764	0	1114	1652	1170
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		11			90			20				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		351.2			400.2			147.9			323.0	
Travel Time (s)		25.3			28.8			10.6			23.3	
Confl. Peds. (#/hr)	3		1	1		3			5	5		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	16%	47%	19%	15%	20%	9%	55%	31%	50%	8%	15%	38%
Adj. Flow (vph)	191	612	39	24	755	324	66	99	27	281	82	128
Shared Lane Traffic (%)												
Lane Group Flow (vph)	191	651	0	24	1079	0	66	126	0	281	82	128
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		6	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	48.2		48.2	48.2		33.0	33.0		33.0	33.0	33.0
Total Split (s)	11.0	64.0		53.0	53.0		36.0	36.0		36.0	36.0	36.0
Total Split (%)	11.0%	64.0%		53.0%	53.0%		36.0%	36.0%		36.0%	36.0%	36.0%
Maximum Green (s)	8.0	57.8		46.8	46.8		30.0	30.0		30.0	30.0	30.0
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.5		2.5	2.5		2.7	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.2		6.2	6.2		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	None
Walk Time (s)		20.0		20.0	20.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		22.0		22.0	22.0		20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		1		3	3		5	5		0	0	0
Act Effct Green (s)	63.2	60.0		48.6	48.6		27.8	27.8		27.8	27.8	27.8
Actuated g/C Ratio	0.63	0.60		0.49	0.49		0.28	0.28		0.28	0.28	0.28
v/c Ratio	0.70	0.44		0.07	0.73		0.28	0.25		0.91	0.18	0.39

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	31.5	9.5		11.5	13.6		30.6	24.0		68.1	27.5	32.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	31.5	9.5		11.5	13.6		30.6	24.0		68.1	27.5	32.6
LOS	C	A		B	B		C	C		E	C	C
Approach Delay		14.5			13.6			26.3			52.0	
Approach LOS		B			B			C			D	
Queue Length 50th (m)	11.2	22.0		1.7	35.7		10.2	12.3		53.5	12.3	20.4
Queue Length 95th (m)	#54.4	72.7		m4.1	49.7		22.0	23.8		#99.9	24.2	37.7
Internal Link Dist (m)		327.2			376.2			123.9			299.0	
Turn Bay Length (m)	45.0			30.0			35.0			50.0		
Base Capacity (vph)	274	1480		324	1477		258	543		334	495	351
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.70	0.44		0.07	0.73		0.26	0.23		0.84	0.17	0.36

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 56 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 22.0		Intersection LOS: C	
Intersection Capacity Utilization 100.8%		ICU Level of Service G	
Analysis Period (min) 15			
* User Entered Value			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 150: Upper Ottawa St. & Rymal Rd.





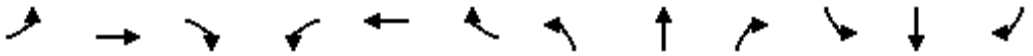
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	732	40	80	895	76	65	165	78	38	55	53
Future Volume (vph)	79	732	40	80	895	76	65	165	78	38	55	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	45.0		0.0	20.0		20.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		0.99		0.98	1.00	0.99	
Frt		0.992			0.988				0.850		0.926	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	3099	0	1556	3233	0	1530	1759	1179	1719	1410	0
Flt Permitted	0.232			0.307			0.680			0.542		
Satd. Flow (perm)	354	3099	0	502	3233	0	1082	1759	1160	978	1410	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			15				85		50	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		400.2			349.0			199.0			219.6	
Travel Time (s)		28.8			25.1			14.3			15.8	
Confl. Peds. (#/hr)	9		4	4		9	13		4	4		13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	24%	16%	4%	16%	10%	10%	18%	8%	37%	5%	7%	40%
Adj. Flow (vph)	88	813	44	89	994	84	72	183	87	42	61	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	88	857	0	89	1078	0	72	183	87	42	120	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Detector Phase	2	2		2	2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	25.0	25.0		25.0	25.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		35.1	35.1	35.1	35.1	35.1	
Total Split (s)	64.0	64.0		64.0	64.0		36.0	36.0	36.0	36.0	36.0	
Total Split (%)	64.0%	64.0%		64.0%	64.0%		36.0%	36.0%	36.0%	36.0%	36.0%	
Maximum Green (s)	58.4	58.4		58.4	58.4		29.9	29.9	29.9	29.9	29.9	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.9	1.9		1.9	1.9		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6		6.1	6.1	6.1	6.1	6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		19.0	19.0	19.0	19.0	19.0	
Pedestrian Calls (#/hr)	13	13		13	13		17	17	17	17	17	
Act Effct Green (s)	68.9	68.9		68.9	68.9		19.4	19.4	19.4	19.4	19.4	
Actuated g/C Ratio	0.69	0.69		0.69	0.69		0.19	0.19	0.19	0.19	0.19	
v/c Ratio	0.36	0.40		0.26	0.48		0.34	0.54	0.30	0.22	0.38	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	8.6	4.6		3.4	3.1		36.3	40.4	9.2	33.1	22.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	8.6	4.6		3.4	3.1		36.3	40.4	9.2	33.1	22.2	
LOS	A	A		A	A		D	D	A	C	C	
Approach Delay		4.9			3.1			31.6			25.0	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	2.4	12.3		0.7	4.0		13.4	35.5	0.4	7.6	12.8	
Queue Length 95th (m)	m6.4	m19.2		m1.5	13.6		23.2	49.2	11.8	15.2	25.4	
Internal Link Dist (m)		376.2			325.0			175.0			195.6	
Turn Bay Length (m)	50.0			45.0			20.0		20.0			
Base Capacity (vph)	243	2138		345	2232		323	525	406	292	456	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.36	0.40		0.26	0.48		0.22	0.35	0.21	0.14	0.26	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 46 (46%), Referenced to phase 2:EBWB and 6:, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay: 8.8		Intersection LOS: A	
Intersection Capacity Utilization 89.8%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 160: Nebo Rd. & Rymal Rd.



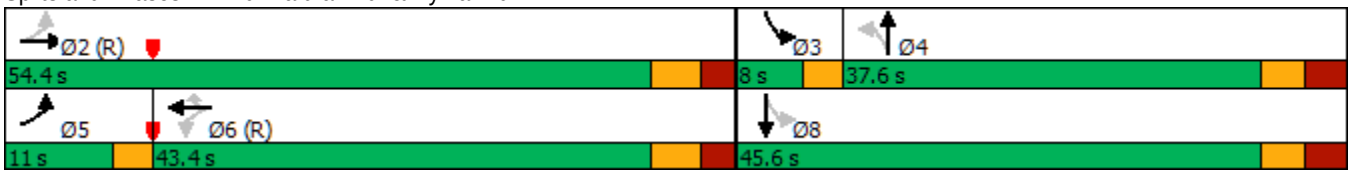


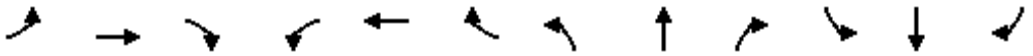
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	414	28	46	706	371	32	232	25	93	162	297
Future Volume (vph)	191	414	28	46	706	371	32	232	25	93	162	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		150.0	60.0		60.0	85.0		0.0	30.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			55.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.65	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor							1.00				0.99	
Frt		0.991				0.850		0.985			0.903	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3314	0	1421	2266	1509	1805	2990	0	1480	2696	0
Flt Permitted	0.119			0.470			0.451			0.435		
Satd. Flow (perm)	204	3314	0	703	2266	1509	853	2990	0	677	2696	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				333		12			245	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		106.4			328.2			269.5			224.1	
Travel Time (s)		7.7			23.6			19.4			16.1	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	11%	8%	7%	27%	9%	7%	0%	17%	37%	22%	9%	25%
Adj. Flow (vph)	215	465	31	52	793	417	36	261	28	104	182	334
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	496	0	52	793	417	36	289	0	104	516	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		
Detector Phase	5	2		6	6	6	4	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	20.0		20.0	20.0	20.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	36.3		36.3	36.3	36.3	37.6	37.6		8.0	27.6	
Total Split (s)	11.0	54.4		43.4	43.4	43.4	37.6	37.6		8.0	45.6	
Total Split (%)	11.0%	54.4%		43.4%	43.4%	43.4%	37.6%	37.6%		8.0%	45.6%	
Maximum Green (s)	8.0	48.1		37.1	37.1	37.1	31.0	31.0		5.0	39.0	
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	3.3	3.3		0.0	3.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3		6.3	6.3	6.3	6.6	6.6		3.0	6.6	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)		12.0		12.0	12.0	12.0	10.0	10.0			10.0	
Flash Dont Walk (s)		18.0		18.0	18.0	18.0	21.0	21.0			1.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			3	
Act Effct Green (s)	69.4	66.1		45.8	45.8	45.8	14.6	14.6		24.6	21.0	
Actuated g/C Ratio	0.69	0.66		0.46	0.46	0.46	0.15	0.15		0.25	0.21	
v/c Ratio	0.56	0.23		0.16	0.76	0.48	0.29	0.65		0.50	0.68	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	21.3	4.9		20.7	30.7	6.9	42.9	45.0		38.0	22.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	21.3	4.9		20.7	30.7	6.9	42.9	45.0		38.0	22.6	
LOS	C	A		C	C	A	D	D		D	C	
Approach Delay		9.9			22.4			44.8			25.2	
Approach LOS		A			C			D			C	
Queue Length 50th (m)	13.9	6.2		6.1	101.8	9.7	6.6	28.4		16.9	25.8	
Queue Length 95th (m)	32.9	16.9		16.3	#174.9	36.5	15.7	40.0		29.2	40.6	
Internal Link Dist (m)		82.4			304.2			245.5			200.1	
Turn Bay Length (m)	50.0			60.0		60.0	85.0			30.0		
Base Capacity (vph)	387	2192		321	1037	871	264	935		206	1200	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.56	0.23		0.16	0.76	0.48	0.14	0.31		0.50	0.43	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 22.4		Intersection LOS: C	
Intersection Capacity Utilization 77.4%		ICU Level of Service D	
Analysis Period (min) 15			
* User Entered Value			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 170: Dartnall Rd. & Rymal Rd.





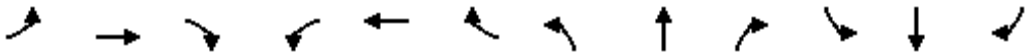
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	1062	43	82	1105	10	11	0	56	5	0	20
Future Volume (vph)	25	1062	43	82	1105	10	11	0	56	5	0	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Frt		0.994			0.999			0.887			0.890	
Flt Protected	0.950			0.950				0.992			0.991	
Satd. Flow (prot)	1805	3585	0	1770	3499	0	0	1555	0	0	1636	0
Flt Permitted	0.221			0.224				0.935			0.948	
Satd. Flow (perm)	420	3585	0	417	3499	0	0	1466	0	0	1565	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			2			60			28	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		170.2			375.5			112.3			153.5	
Travel Time (s)		12.3			27.0			8.1			11.1	
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	2%	3%	11%	0%	0%	9%	0%	4%	3%
Adj. Flow (vph)	27	1142	46	88	1188	11	12	0	60	5	0	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	1188	0	88	1199	0	0	72	0	0	27	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	30.0	30.0		30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	35.6	35.6		35.6	35.6		29.7	29.7		29.7	29.7	
Total Split (s)	70.0	70.0		70.0	70.0		30.0	30.0		30.0	30.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	64.4	64.4		64.4	64.4		24.3	24.3		24.3	24.3	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9		1.9	1.9		2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	21.0	21.0		21.0	21.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	9.0		9.0	9.0		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	3	3		0	0		0	0		0	0	
Act Effct Green (s)	82.8	82.8		82.8	82.8			10.1			10.1	
Actuated g/C Ratio	0.83	0.83		0.83	0.83			0.10			0.10	
v/c Ratio	0.08	0.40		0.26	0.41			0.36			0.15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	3.1	3.4		3.5	2.1			19.8			16.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	3.1	3.4		3.5	2.1			19.8			16.6	
LOS	A	A		A	A			B			B	
Approach Delay		3.4			2.2			19.8			16.6	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	1.0	31.5		2.2	15.9			2.3			0.0	
Queue Length 95th (m)	3.0	41.2		m5.2	23.8			15.7			8.0	
Internal Link Dist (m)		146.2			351.5			88.3			129.5	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	348	2971		345	2899			401			401	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.08	0.40		0.26	0.41			0.18			0.07	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 16 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.41			
Intersection Signal Delay: 3.4		Intersection LOS: A	
Intersection Capacity Utilization 78.3%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 101: Springside Dr./Atessa Dr. & Rymal Rd.



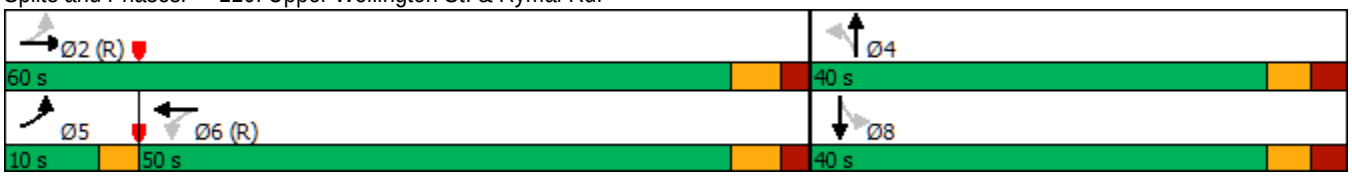


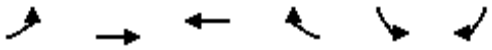
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	900	31	69	897	113	25	44	56	147	75	275
Future Volume (vph)	169	900	31	69	897	113	25	44	56	147	75	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		10.0	40.0		0.0	15.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		0.99	0.99	
Frt		0.995			0.983			0.916			0.882	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3521	0	1805	3424	0	1703	1723	0	1805	1600	0
Flt Permitted	0.197			0.295			0.190			0.690		
Satd. Flow (perm)	363	3521	0	560	3424	0	340	1723	0	1304	1600	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			17			58			200	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		375.5			185.6			230.2			240.7	
Travel Time (s)		27.0			13.4			16.6			17.3	
Confl. Peds. (#/hr)	3		2	2		3	5		7	7		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	2%	0%	0%	3%	6%	6%	0%	0%	0%	1%	4%
Adj. Flow (vph)	176	938	32	72	934	118	26	46	58	153	78	286
Shared Lane Traffic (%)												
Lane Group Flow (vph)	176	970	0	72	1052	0	26	104	0	153	364	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		30.0	30.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	9.5	36.0		36.0	36.0		39.1	39.1		39.1	39.1	
Total Split (s)	10.0	60.0		50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	10.0%	60.0%		50.0%	50.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	7.0	54.0		44.0	44.0		33.9	33.9		33.9	33.9	
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.3		2.3	2.3		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		6.0	6.0		6.1	6.1		6.1	6.1	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	2.0	0.2		0.2	0.2		5.0	5.0		5.0	5.0	
Recall Mode	None	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)		10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		17.0		17.0	17.0		23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)		2		3	3		5	5		7	7	
Act Effct Green (s)	69.9	66.9		56.3	56.3		21.0	21.0		21.0	21.0	
Actuated g/C Ratio	0.70	0.67		0.56	0.56		0.21	0.21		0.21	0.21	
v/c Ratio	0.49	0.41		0.23	0.54		0.37	0.26		0.56	0.74	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	15.5	9.1		8.2	7.2		45.0	15.6		41.5	24.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.5	9.1		8.2	7.2		45.0	15.6		41.5	24.4	
LOS	B	A		A	A		D	B		D	C	
Approach Delay		10.1			7.2			21.5			29.5	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	10.0	39.9		2.6	19.5		4.7	7.8		28.6	31.7	
Queue Length 95th (m)	34.4	74.9		6.7	68.8		11.5	18.6		41.5	54.6	
Internal Link Dist (m)		351.5			161.6			206.2			216.7	
Turn Bay Length (m)	50.0			40.0			15.0			35.0		
Base Capacity (vph)	363	2357		315	1934		115	622		442	674	
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	0.48	0.41		0.23	0.54		0.23	0.17		0.35	0.54	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 12.9		Intersection LOS: B	
Intersection Capacity Utilization 88.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 110: Upper Wellington St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	1105	1073	15	5	10
Future Volume (Veh/h)	5	1105	1073	15	5	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	1163	1129	16	5	11
Pedestrians					6	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (m)		186	187			
pX, platoon unblocked	0.88				0.94	0.88
vC, conflicting volume	1151				1734	578
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	887				1065	233
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	98
cM capacity (veh/h)	672				204	675

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	5	582	582	753	392	16
Volume Left	5	0	0	0	0	5
Volume Right	0	0	0	0	16	11
cSH	672	1700	1700	1700	1700	654
Volume to Capacity	0.01	0.34	0.34	0.44	0.23	0.02
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.0	0.6
Control Delay (s)	10.4	0.0	0.0	0.0	0.0	14.4
Lane LOS	B					B
Approach Delay (s)	0.0			0.0		14.4
Approach LOS						B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

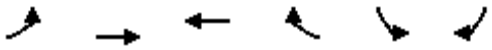
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1030	75	95	993	90	115
Future Volume (vph)	1030	75	95	993	90	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		55.0	35.0		0.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			65.0		7.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor	1.00		1.00		0.99	0.96
Frt	0.990					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3568	0	1805	3505	1787	1615
Flt Permitted			0.187		0.950	
Satd. Flow (perm)	3568	0	355	3505	1769	1554
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	11					116
Link Speed (k/h)	50			50	50	
Link Distance (m)	186.7			157.7	124.6	
Travel Time (s)	13.4			11.4	9.0	
Confl. Peds. (#/hr)		2	2		9	23
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%
Adj. Flow (vph)	1040	76	96	1003	91	116
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1116	0	96	1003	91	116
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases			6			4
Detector Phase	2		1	6	4	4
Switch Phase						
Minimum Initial (s)	30.0		5.0	30.0	10.0	10.0
Minimum Split (s)	35.6		8.0	35.6	31.8	31.8
Total Split (s)	57.0		11.0	68.0	32.0	32.0
Total Split (%)	57.0%		11.0%	68.0%	32.0%	32.0%
Maximum Green (s)	51.4		8.0	62.4	26.2	26.2
Yellow Time (s)	3.7		3.0	3.7	3.3	3.3
All-Red Time (s)	1.9		0.0	1.9	2.5	2.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6		3.0	5.6	5.8	5.8
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	17.0				7.0	7.0
Flash Dont Walk (s)	13.0				19.0	19.0
Pedestrian Calls (#/hr)	2				32	32
Act Effct Green (s)	60.6		71.6	69.0	19.6	19.6
Actuated g/C Ratio	0.61		0.72	0.69	0.20	0.20
v/c Ratio	0.51		0.27	0.41	0.26	0.29

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	9.8		2.7	2.0	33.5	7.7
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	9.8		2.7	2.0	33.5	7.7
LOS	A		A	A	C	A
Approach Delay	9.8			2.0	19.0	
Approach LOS	A			A	B	
Queue Length 50th (m)	60.5		1.5	9.2	14.5	0.0
Queue Length 95th (m)	77.0		m1.9	9.8	27.9	13.4
Internal Link Dist (m)	162.7			133.7	100.6	
Turn Bay Length (m)			35.0			
Base Capacity (vph)	2167		371	2418	468	492
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	0.51		0.26	0.41	0.19	0.24

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 84 (84%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 7.1		Intersection LOS: A	
Intersection Capacity Utilization 64.4%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 112: Turner Park Library & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	1115	1067	35	10	25
Future Volume (Veh/h)	35	1115	1067	35	10	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	36	1138	1089	36	10	26
Pedestrians		4	7		3	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	1		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		158	345			
pX, platoon unblocked	0.79				0.88	0.79
vC, conflicting volume	1128				1758	570
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	632				684	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				97	97
cM capacity (veh/h)	757				321	857

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	36	569	569	726	399	10	26
Volume Left	36	0	0	0	0	10	0
Volume Right	0	0	0	0	36	0	26
cSH	757	1700	1700	1700	1700	321	857
Volume to Capacity	0.05	0.33	0.33	0.43	0.23	0.03	0.03
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	0.8	0.8
Control Delay (s)	10.0	0.0	0.0	0.0	0.0	16.6	9.3
Lane LOS	A					C	A
Approach Delay (s)	0.3			0.0		11.3	
Approach LOS						B	

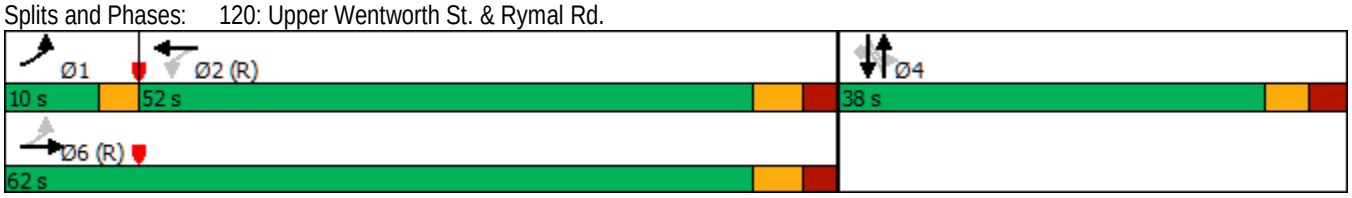
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

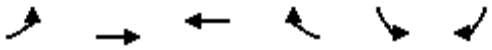
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	269	828	25	44	885	173	31	81	44	201	62	210
Future Volume (vph)	269	828	25	44	885	173	31	81	44	201	62	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		15.0	50.0		120.0	30.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			20.0			35.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	0.99		0.98	0.99		0.99		0.96
Frt		0.996			0.975			0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	3326	0	1626	3160	0	1597	1667	0	1687	1712	1538
Flt Permitted	0.135			0.317			0.715			0.673		
Satd. Flow (perm)	232	3326	0	540	3160	0	1176	1667	0	1185	1712	1483
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			30			29				194
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.6			378.8			243.5			277.8	
Travel Time (s)		24.8			27.3			17.5			20.0	
Confl. Peds. (#/hr)	38		7	7		38	25		10	10		25
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	10%	8%	8%	11%	11%	8%	13%	5%	11%	7%	11%	5%
Adj. Flow (vph)	283	872	26	46	932	182	33	85	46	212	65	221
Shared Lane Traffic (%)												
Lane Group Flow (vph)	283	898	0	46	1114	0	33	131	0	212	65	221
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Detector Phase	1	6		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	1.0		30.0	30.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	31.3		37.3	37.3		37.3	37.3		37.3	37.3	37.3
Total Split (s)	10.0	62.0		52.0	52.0		38.0	38.0		38.0	38.0	38.0
Total Split (%)	10.0%	62.0%		52.0%	52.0%		38.0%	38.0%		38.0%	38.0%	38.0%
Maximum Green (s)	7.0	55.7		45.7	45.7		31.7	31.7		31.7	31.7	31.7
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.6		2.6	2.6		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.3		6.3	6.3		6.3	6.3		6.3	6.3	6.3
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	None
Walk Time (s)		12.0		12.0	12.0		12.0	12.0		12.0	12.0	12.0
Flash Dont Walk (s)		13.0		19.0	19.0		19.0	19.0		19.0	19.0	19.0
Pedestrian Calls (#/hr)		7		38	38		35	35		35	35	35
Act Effct Green (s)	65.3	62.0		45.7	45.7		25.4	25.4		25.4	25.4	25.4
Actuated g/C Ratio	0.65	0.62		0.46	0.46		0.25	0.25		0.25	0.25	0.25
v/c Ratio	0.83	0.44		0.19	0.76		0.11	0.30		0.71	0.15	0.42

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	41.6	4.6		11.5	12.4		26.3	23.0		45.9	26.9	8.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	41.6	4.6		11.5	12.4		26.3	23.0		45.9	26.9	8.1
LOS	D	A		B	B		C	C		D	C	A
Approach Delay		13.5			12.4			23.6			26.7	
Approach LOS		B			B			C			C	
Queue Length 50th (m)	~21.9	26.0		1.9	23.2		4.8	15.2		36.2	9.5	3.9
Queue Length 95th (m)	#84.6	23.7		m4.6	46.6		12.1	30.1		60.7	19.6	21.1
Internal Link Dist (m)		320.6			354.8			219.5			253.8	
Turn Bay Length (m)	80.0			50.0			30.0			55.0		
Base Capacity (vph)	339	2064		246	1460		372	548		375	542	602
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.83	0.44		0.19	0.76		0.09	0.24		0.57	0.12	0.37

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 36 (36%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 15.8		Intersection LOS: B	
Intersection Capacity Utilization 96.3%		ICU Level of Service F	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 120: Upper Wentworth St. & Rymal Rd.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	1061	1112	50	50	10
Future Volume (Veh/h)	15	1061	1112	50	50	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	15	1072	1123	51	51	10
Pedestrians					22	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		379				
pX, platoon unblocked					0.91	
vC, conflicting volume	1196				1736	609
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1196				1610	609
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				40	98
cM capacity (veh/h)	580				85	435

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	15	536	536	749	425	51	10
Volume Left	15	0	0	0	0	51	0
Volume Right	0	0	0	0	51	0	10
cSH	580	1700	1700	1700	1700	85	435
Volume to Capacity	0.03	0.32	0.32	0.44	0.25	0.60	0.02
Queue Length 95th (m)	0.6	0.0	0.0	0.0	0.0	22.0	0.6
Control Delay (s)	11.4	0.0	0.0	0.0	0.0	98.0	13.5
Lane LOS	B					F	B
Approach Delay (s)	0.2			0.0		84.2	
Approach LOS						F	

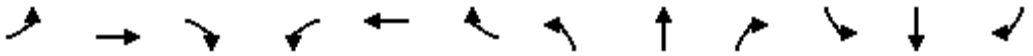
Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1096	25	15	1175	20	15
Future Volume (Veh/h)	1096	25	15	1175	20	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1166	27	16	1250	21	16
Pedestrians				2		
Lane Width (m)				3.6		
Walking Speed (m/s)				1.2		
Percent Blockage				0		
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (m)				292		
pX, platoon unblocked					0.73	
vC, conflicting volume			1193		1836	598
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1193		1405	598
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		78	96
cM capacity (veh/h)			592		94	449

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	777	416	16	625	625	37
Volume Left	0	0	16	0	0	21
Volume Right	0	27	0	0	0	16
cSH	1700	1700	592	1700	1700	166
Volume to Capacity	0.46	0.24	0.03	0.37	0.37	0.22
Queue Length 95th (m)	0.0	0.0	0.7	0.0	0.0	6.6
Control Delay (s)	0.0	0.0	11.2	0.0	0.0	36.3
Lane LOS			B			E
Approach Delay (s)	0.0		0.1			36.3
Approach LOS						E

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		



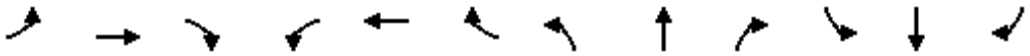
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	890	0	0	977	183	0	0	0	346	0	220
Future Volume (vph)	175	890	0	0	977	183	0	0	0	346	0	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	40.0		0.0	40.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99					1.00	0.98	
Frt					0.976						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1770	3610	0	1900	3406	0	1900	1900	0	1787	1585	0
Flt Permitted	0.095									0.757		
Satd. Flow (perm)	177	3610	0	1900	3406	0	1900	1900	0	1419	1585	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					27						198	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		291.6			340.9			113.6			275.5	
Travel Time (s)		21.0			24.5			8.2			19.8	
Confl. Peds. (#/hr)	24		6	6		24	6		3	3		6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	1%	0%	2%	4%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	192	978	0	0	1074	201	0	0	0	380	0	242
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	978	0	0	1275	0	0	0	0	380	242	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm			Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	8.0	30.1		8.0	30.1		34.3	34.3		34.3	34.3	
Total Split (s)	11.0	49.0		11.0	49.0		40.0	40.0		40.0	40.0	
Total Split (%)	11.0%	49.0%		11.0%	49.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	8.0	42.9		8.0	42.9		33.7	33.7		33.7	33.7	
Yellow Time (s)	3.0	3.7		3.0	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.4		0.0	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.1		3.0	6.1		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	1.0	0.2		1.0	0.2		0.2	0.2		0.2	0.2	
Recall Mode	None	C-Max		None	C-Max		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		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)		6			24		6	6		3	3	
Act Effct Green (s)	61.7	58.6			47.1					29.0	29.0	
Actuated g/C Ratio	0.62	0.59			0.47					0.29	0.29	
v/c Ratio	0.79	0.46			0.79					0.92	0.40	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	49.5	6.9			17.1					63.1	8.1	
Queue Delay	0.0	0.0			0.0					0.0	0.0	
Total Delay	49.5	6.9			17.1					63.1	8.1	
LOS	D	A			B					E	A	
Approach Delay		13.9			17.1						41.7	
Approach LOS		B			B						D	
Queue Length 50th (m)	22.8	29.1			102.0					73.0	6.4	
Queue Length 95th (m)	#61.5	42.2			54.3					#117.8	24.0	
Internal Link Dist (m)		267.6			316.9			89.6			251.5	
Turn Bay Length (m)	20.0									40.0		
Base Capacity (vph)	248	2114			1618					478	665	
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	0.77	0.46			0.79					0.79	0.36	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 87 (87%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 20.9		Intersection LOS: C	
Intersection Capacity Utilization 82.4%		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: 130: Rymal Rd. & Upper Sherman Ave.



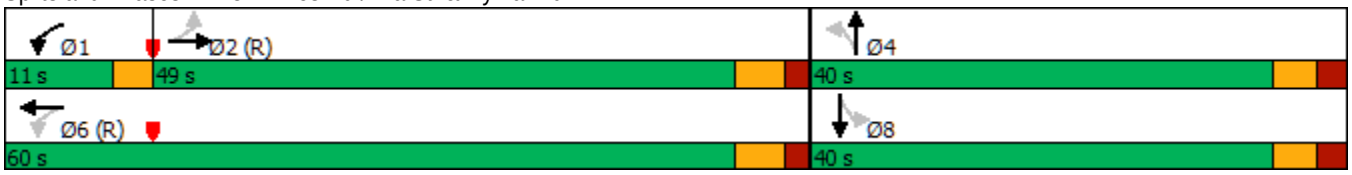


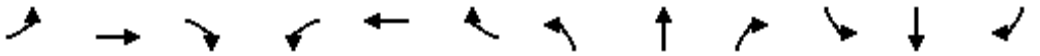
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	952	214	160	993	20	130	20	180	5	20	20
Future Volume (vph)	15	952	214	160	993	20	130	20	180	5	20	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		10.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			0.99		1.00	0.99	
Frt		0.973			0.997			0.926			0.925	
Flt Protected	0.950			0.950				0.981		0.950		
Satd. Flow (prot)	1504	3247	0	1787	3528	0	0	1671	0	1805	1688	0
Flt Permitted	0.246			0.095				0.852		0.462		
Satd. Flow (perm)	389	3247	0	179	3528	0	0	1446	0	877	1688	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			3			66			22	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		340.9			498.9			153.4			80.6	
Travel Time (s)		24.5			35.9			11.0			5.8	
Confl. Peds. (#/hr)	5					5	9		2	2		9
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	20%	10%	0%	1%	2%	0%	2%	10%	2%	0%	4%	2%
Adj. Flow (vph)	17	1070	240	180	1116	22	146	22	202	6	22	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	1310	0	180	1138	0	0	370	0	6	44	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		
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		8.0	27.7		32.7	32.7		32.7	32.7	
Total Split (s)	49.0	49.0		11.0	60.0		40.0	40.0		40.0	40.0	
Total Split (%)	49.0%	49.0%		11.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	43.3	43.3		8.0	54.3		34.3	34.3		34.3	34.3	
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)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-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		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	0	0			5		2	2		9	9	
Act Effct Green (s)	49.5	49.5		64.7	62.0			26.6		26.6	26.6	
Actuated g/C Ratio	0.50	0.50		0.65	0.62			0.27		0.27	0.27	
v/c Ratio	0.09	0.81		0.67	0.52			0.85		0.03	0.09	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	13.8	19.5		31.0	7.2			46.7		23.4	14.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	13.8	19.5		31.0	7.2			46.7		23.4	14.9	
LOS	B	B		C	A			D		C	B	
Approach Delay		19.5			10.4			46.7			16.0	
Approach LOS		B			B			D			B	
Queue Length 50th (m)	1.4	68.7		11.0	21.0			59.4		0.9	3.3	
Queue Length 95th (m)	m2.9	#170.3		m#48.3	72.1			86.2		3.7	10.4	
Internal Link Dist (m)		316.9			474.9			129.4			56.6	
Turn Bay Length (m)	30.0			30.0						20.0		
Base Capacity (vph)	192	1625		268	2188			539		300	593	
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	0.09	0.81		0.67	0.52			0.69		0.02	0.07	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 86 (86%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 18.8		Intersection LOS: B	
Intersection Capacity Utilization 85.1%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 131: Miles Rd./Eva St. & Rymal Rd.





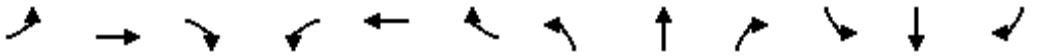
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	900	31	50	816	255	56	75	37	254	149	324
Future Volume (vph)	273	900	31	50	816	255	56	75	37	254	149	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	90.0		40.0	45.0		45.0	50.0		30.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			35.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	0.99		0.99		0.96	0.97		0.98
Frt		0.995			0.964				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3584	0	1805	3411	0	1805	1900	1615	1770	1845	1553
Flt Permitted	0.153			0.295			0.634			0.706		
Satd. Flow (perm)	281	3584	0	558	3411	0	1194	1900	1551	1280	1845	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			58				71			236
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		498.9			509.5			366.2			122.9	
Travel Time (s)		35.9			36.7			26.4			8.8	
Confl. Peds. (#/hr)	22		13	13		22	10		26	26		10
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	0%	3%	0%	1%	2%	0%	0%	0%	2%	3%	4%
Adj. Flow (vph)	284	938	32	52	850	266	58	78	39	265	155	338
Shared Lane Traffic (%)												
Lane Group Flow (vph)	284	970	0	52	1116	0	58	78	39	265	155	338
Turn Type	pm+pt	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6			2			8			4	
Permitted Phases	6			2			8		8	4		4
Detector Phase	1	6		2	2		8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0		15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	8.0	41.5		41.5	41.5		32.2	32.2	32.2	32.2	32.2	32.2
Total Split (s)	11.0	66.0		55.0	55.0		34.0	34.0	34.0	34.0	34.0	34.0
Total Split (%)	11.0%	66.0%		55.0%	55.0%		34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Maximum Green (s)	8.0	59.5		48.5	48.5		27.8	27.8	27.8	27.8	27.8	27.8
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	0.0	2.8		2.8	2.8		2.9	2.9	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5		6.5	6.5		6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max		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)		20.0		20.0	20.0					14.0	14.0	14.0
Pedestrian Calls (#/hr)		13		22	22					36	36	36
Act Effct Green (s)	66.4	62.9		49.4	49.4		24.4	24.4	24.4	24.4	24.4	24.4
Actuated g/C Ratio	0.66	0.63		0.49	0.49		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.84	0.43		0.19	0.65		0.20	0.17	0.09	0.85	0.34	0.62

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	33.3	3.7		5.9	8.1		30.2	29.2	2.5	60.0	32.4	15.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.3	3.7		5.9	8.1		30.2	29.2	2.5	60.0	32.4	15.1
LOS	C	A		A	A		C	C	A	E	C	B
Approach Delay		10.4			8.0			23.6			34.4	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	13.9	13.3		3.3	61.4		9.1	12.1	0.0	49.7	25.2	16.3
Queue Length 95th (m)	m#37.0	13.4		1.3	0.0		19.6	23.8	3.0	#87.5	42.6	44.6
Internal Link Dist (m)		474.9			485.5			342.2			98.9	
Turn Bay Length (m)	30.0			90.0			45.0		45.0	50.0		30.0
Base Capacity (vph)	340	2254		275	1713		331	528	482	355	512	592
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	0.84	0.43		0.19	0.65		0.18	0.15	0.08	0.75	0.30	0.57

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 35 (35%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 107.1%		ICU Level of Service G	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 140: Upper Gage Ave. & Rymal Rd.



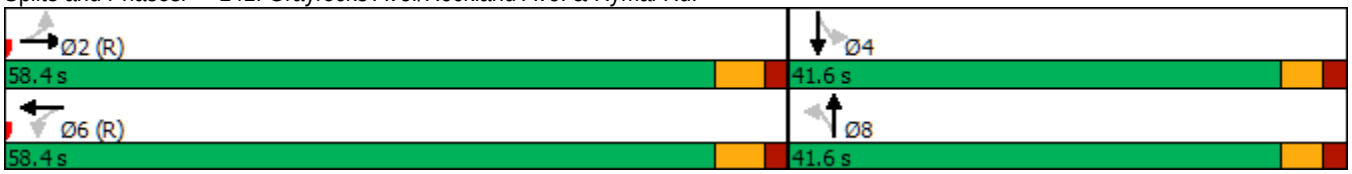


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	1184	10	45	1161	20	0	0	0	0	0	0
Future Volume (vph)	25	1184	10	45	1161	20	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		5.0	35.0		20.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00							
Frt		0.999			0.997							
Flt Protected	0.950			0.950								
Satd. Flow (prot)	1787	3605	0	1805	3134	0	0	1900	0	0	1462	0
Flt Permitted	0.225			0.222								
Satd. Flow (perm)	422	3605	0	422	3134	0	0	1900	0	0	1462	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			3							
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		509.5			351.2			177.4			122.5	
Travel Time (s)		36.7			25.3			12.8			8.8	
Confl. Peds. (#/hr)	13		3	3		13	5					
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	0%	1%	0%	15%	1%	0%	0%	0%	1%	30%	0%
Adj. Flow (vph)	25	1196	10	45	1173	20	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	1206	0	45	1193	0	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA							
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		25.6	25.6		41.6	41.6	
Total Split (s)	58.4	58.4		58.4	58.4		41.6	41.6		41.6	41.6	
Total Split (%)	58.4%	58.4%		58.4%	58.4%		41.6%	41.6%		41.6%	41.6%	
Maximum Green (s)	52.8	52.8		52.8	52.8		36.6	36.6		36.6	36.6	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.9	1.9		1.9	1.9		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)										15.0	15.0	
Flash Dont Walk (s)										21.0	21.0	
Pedestrian Calls (#/hr)										5	5	
Act Effct Green (s)	90.7	90.7		90.7	90.7							
Actuated g/C Ratio	0.91	0.91		0.91	0.91							
v/c Ratio	0.07	0.37		0.12	0.42							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	9.2	6.9		3.1	3.3							
Queue Delay	0.0	0.0		0.0	0.0							
Total Delay	9.2	6.9		3.1	3.3							
LOS	A	A		A	A							
Approach Delay		7.0			3.3							
Approach LOS		A			A							
Queue Length 50th (m)	0.0	0.0		0.0	0.0							
Queue Length 95th (m)	m8.6	128.1		m4.0	m103.3							
Internal Link Dist (m)		485.5			327.2			153.4			98.5	
Turn Bay Length (m)	30.0			35.0								
Base Capacity (vph)	383	3269		383	2842							
Starvation Cap Reductn	0	0		0	0							
Spillback Cap Reductn	0	0		0	0							
Storage Cap Reductn	0	0		0	0							
Reduced v/c Ratio	0.07	0.37		0.12	0.42							

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.42			
Intersection Signal Delay: 5.2		Intersection LOS: A	
Intersection Capacity Utilization 42.1%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 141: Grayrocks Ave./Rockland Ave. & Rymal Rd.



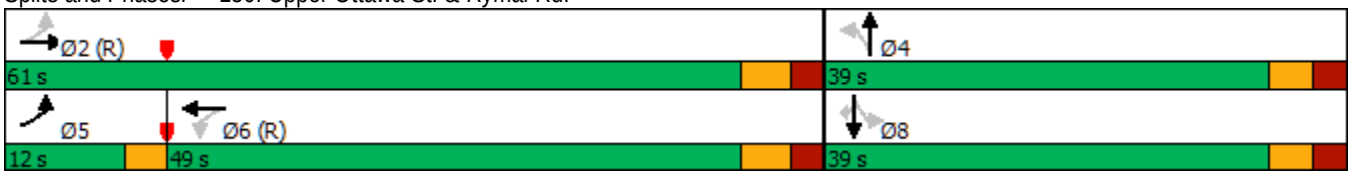
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	930	87	31	886	357	100	106	75	327	87	235
Future Volume (vph)	199	930	87	31	886	357	100	106	75	327	87	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	30.0		10.0	35.0		50.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	*0.65	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		1.00		0.99
Frt		0.987			0.957			0.938				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3125	0	1220	3048	0	1530	1913	0	1656	1508	1468
Flt Permitted	0.087			0.242			0.696			0.575		
Satd. Flow (perm)	156	3125	0	311	3048	0	1120	1913	0	1000	1508	1449
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		16			76			63				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		351.2			400.2			147.9			323.0	
Travel Time (s)		25.3			28.8			10.6			23.3	
Confl. Peds. (#/hr)	5		2	2		5	1		3	3		1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	6%	12%	33%	48%	14%	10%	18%	17%	25%	9%	26%	10%
Adj. Flow (vph)	214	1000	94	33	953	384	108	114	81	352	94	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	214	1094	0	33	1337	0	108	195	0	352	94	253
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		6	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	48.2		48.2	48.2		33.0	33.0		33.0	33.0	33.0
Total Split (s)	12.0	61.0		49.0	49.0		39.0	39.0		39.0	39.0	39.0
Total Split (%)	12.0%	61.0%		49.0%	49.0%		39.0%	39.0%		39.0%	39.0%	39.0%
Maximum Green (s)	9.0	54.8		42.8	42.8		33.0	33.0		33.0	33.0	33.0
Yellow Time (s)	3.0	3.7		3.7	3.7		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	0.0	2.5		2.5	2.5		2.7	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.2		6.2	6.2		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	None
Walk Time (s)		20.0		20.0	20.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		22.0		22.0	22.0		20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		2		5	5		3	3		1	1	1
Act Effct Green (s)	58.0	54.8		42.8	42.8		33.0	33.0		33.0	33.0	33.0
Actuated g/C Ratio	0.58	0.55		0.43	0.43		0.33	0.33		0.33	0.33	0.33
v/c Ratio	0.93	0.64		0.25	0.99		0.29	0.29		1.07	0.19	0.53

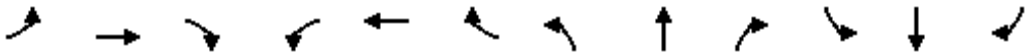
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	69.2	16.4		20.5	44.7		27.6	17.9		102.7	25.3	32.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	69.2	16.4		20.5	44.7		27.6	17.9		102.7	25.3	32.1
LOS	E	B		C	D		C	B		F	C	C
Approach Delay		25.0			44.2			21.3			66.7	
Approach LOS		C			D			C			E	
Queue Length 50th (m)	30.2	56.6		3.5	142.2		16.2	14.7		~79.8	13.6	41.6
Queue Length 95th (m)	#68.7	145.6		m8.8	#190.6		31.0	28.5		#135.8	26.1	67.1
Internal Link Dist (m)		327.2			376.2			123.9			299.0	
Turn Bay Length (m)	45.0			30.0			35.0			50.0		
Base Capacity (vph)	229	1719		133	1348		369	673		330	497	478
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.93	0.64		0.25	0.99		0.29	0.29		1.07	0.19	0.53

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 56 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 39.8		Intersection LOS: D	
Intersection Capacity Utilization 112.3%		ICU Level of Service H	
Analysis Period (min) 15			

* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 150: Upper Ottawa St. & Rymal Rd.





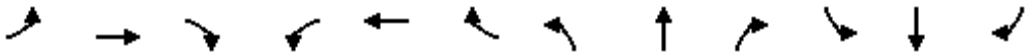
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	1063	90	111	1079	81	65	105	147	124	190	73
Future Volume (vph)	59	1063	90	111	1079	81	65	105	147	124	190	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	45.0		0.0	20.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		0.99		0.98	1.00	0.99	
Frt		0.988			0.989				0.850		0.958	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	3402	0	1456	3493	0	1752	1792	1538	1719	1667	0
Flt Permitted	0.193			0.195			0.373			0.687		
Satd. Flow (perm)	336	3402	0	298	3493	0	684	1792	1515	1240	1667	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			13				88		20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		400.2			349.0			199.0			219.6	
Travel Time (s)		28.8			25.1			14.3			15.8	
Confl. Peds. (#/hr)	4		5	5		4	10		3	3		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	5%	0%	24%	2%	2%	3%	6%	5%	5%	6%	15%
Adj. Flow (vph)	61	1096	93	114	1112	84	67	108	152	128	196	75
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	1189	0	114	1196	0	67	108	152	128	271	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Detector Phase	2	2		2	2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	25.0	25.0		25.0	25.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		35.1	35.1	35.1	35.1	35.1	
Total Split (s)	64.0	64.0		64.0	64.0		36.0	36.0	36.0	36.0	36.0	
Total Split (%)	64.0%	64.0%		64.0%	64.0%		36.0%	36.0%	36.0%	36.0%	36.0%	
Maximum Green (s)	58.4	58.4		58.4	58.4		29.9	29.9	29.9	29.9	29.9	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.9	1.9		1.9	1.9		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6		6.1	6.1	6.1	6.1	6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		19.0	19.0	19.0	19.0	19.0	
Pedestrian Calls (#/hr)	0	0		0	0		13	13	13	13	13	
Act Effct Green (s)	67.1	67.1		67.1	67.1		21.2	21.2	21.2	21.2	21.2	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.21	0.21	0.21	0.21	0.21	
v/c Ratio	0.27	0.52		0.57	0.51		0.46	0.28	0.39	0.49	0.73	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	13.9	11.4		26.1	10.9		43.0	33.0	16.7	39.5	45.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	13.9	11.4		26.1	10.9		43.0	33.0	16.7	39.5	45.2	
LOS	B	B		C	B		D	C	B	D	D	
Approach Delay		11.6			12.2			27.5			43.4	
Approach LOS		B			B			C			D	
Queue Length 50th (m)	6.4	72.0		9.7	52.6		12.0	18.6	10.8	23.0	48.1	
Queue Length 95th (m)	m14.2	m117.0		m20.0	m81.6		23.6	30.3	25.7	37.3	68.5	
Internal Link Dist (m)		376.2			325.0			175.0			195.6	
Turn Bay Length (m)	50.0			45.0			20.0					
Base Capacity (vph)	225	2287		200	2348		204	535	514	370	512	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.27	0.52		0.57	0.51		0.33	0.20	0.30	0.35	0.53	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 17.3		Intersection LOS: B	
Intersection Capacity Utilization 98.5%		ICU Level of Service F	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 160: Nebo Rd. & Rymal Rd.



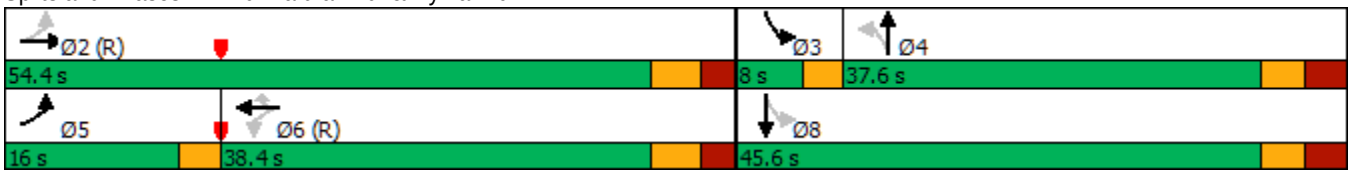


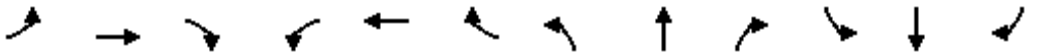
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	336	742	67	44	722	149	60	162	37	168	212	250
Future Volume (vph)	336	742	67	44	722	149	60	162	37	168	212	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		150.0	60.0		60.0	85.0		0.0	30.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			55.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.65	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.99	0.99				0.98	
Frt		0.987				0.850		0.972			0.919	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3001	0	1656	2375	1495	1656	3195	0	1736	3018	0
Flt Permitted	0.106			0.332			0.475			0.510		
Satd. Flow (perm)	190	3001	0	579	2375	1476	821	3195	0	932	3018	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13				121		28			263	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		106.4			328.2			269.5			224.1	
Travel Time (s)		7.7			23.6			19.4			16.1	
Confl. Peds. (#/hr)	1		1	1		1	6					6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	19%	14%	9%	4%	8%	9%	10%	9%	4%	5%	11%
Adj. Flow (vph)	354	781	71	46	760	157	63	171	39	177	223	263
Shared Lane Traffic (%)												
Lane Group Flow (vph)	354	852	0	46	760	157	63	210	0	177	486	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		
Detector Phase	5	2		6	6	6	4	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	20.0		20.0	20.0	20.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	36.3		36.3	36.3	36.3	37.6	37.6		8.0	27.6	
Total Split (s)	16.0	54.4		38.4	38.4	38.4	37.6	37.6		8.0	45.6	
Total Split (%)	16.0%	54.4%		38.4%	38.4%	38.4%	37.6%	37.6%		8.0%	45.6%	
Maximum Green (s)	13.0	48.1		32.1	32.1	32.1	31.0	31.0		5.0	39.0	
Yellow Time (s)	3.0	3.7		3.7	3.7	3.7	3.3	3.3		3.0	3.3	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	3.3	3.3		0.0	3.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3		6.3	6.3	6.3	6.6	6.6		3.0	6.6	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)		12.0		12.0	12.0	12.0	10.0	10.0			10.0	
Flash Dont Walk (s)		18.0		18.0	18.0	18.0	21.0	21.0			1.0	
Pedestrian Calls (#/hr)		0		1	1	1	0	0			6	
Act Effct Green (s)	68.5	65.2		34.8	34.8	34.8	13.9	13.9		25.5	21.9	
Actuated g/C Ratio	0.68	0.65		0.35	0.35	0.35	0.14	0.14		0.26	0.22	
v/c Ratio	0.65	0.43		0.23	0.92	0.27	0.55	0.45		0.64	0.56	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	23.8	16.4		27.5	49.7	8.5	57.3	36.3		42.0	17.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	23.8	16.4		27.5	49.7	8.5	57.3	36.3		42.0	17.4	
LOS	C	B		C	D	A	E	D		D	B	
Approach Delay		18.5			41.9			41.1			24.0	
Approach LOS		B			D			D			C	
Queue Length 50th (m)	50.7	66.6		6.3	108.7	4.7	12.3	18.3		30.4	20.5	
Queue Length 95th (m)	#91.6	93.1		17.1	#179.9	20.0	24.6	27.5		45.5	33.6	
Internal Link Dist (m)		82.4			304.2			245.5			200.1	
Turn Bay Length (m)	50.0			60.0		60.0	85.0			30.0		
Base Capacity (vph)	545	1961		201	826	592	254	1009		277	1337	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.65	0.43		0.23	0.92	0.27	0.25	0.21		0.64	0.36	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 98 (98%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 28.9		Intersection LOS: C	
Intersection Capacity Utilization 85.8%		ICU Level of Service E	
Analysis Period (min) 15			
* User Entered Value			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 170: Dartnall Rd. & Rymal Rd.



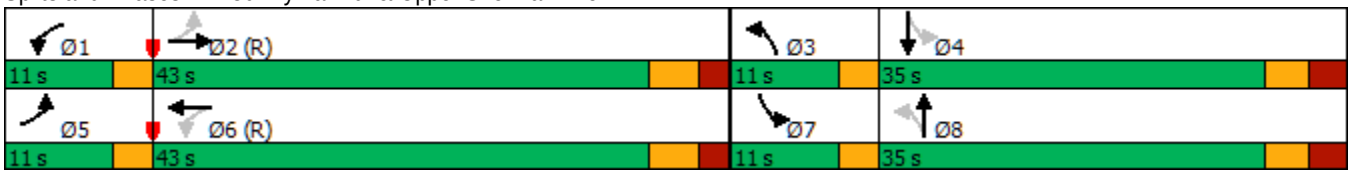


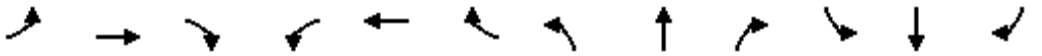
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	599	17	35	805	179	68	180	34	120	57	196
Future Volume (vph)	152	599	17	35	805	179	68	180	34	120	57	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		20.0	20.0		0.0	40.0		0.0	40.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Frt		0.996			0.973			0.976			0.884	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	3589	0	1805	3151	0	1805	1850	0	1703	1627	0
Flt Permitted	0.155			0.385			0.353			0.362		
Satd. Flow (perm)	262	3589	0	730	3151	0	669	1850	0	648	1627	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			30			9			172	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		291.6			340.9			113.6			275.5	
Travel Time (s)		21.0			24.5			8.2			19.8	
Confl. Peds. (#/hr)	8		3	3		8	3		2	2		3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	4%	0%	12%	5%	0%	0%	0%	6%	9%	0%
Adj. Flow (vph)	167	658	19	38	885	197	75	198	37	132	63	215
Shared Lane Traffic (%)												
Lane Group Flow (vph)	167	677	0	38	1082	0	75	235	0	132	278	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3 8	8		7 4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	30.1		9.5	30.1		9.5	34.3		9.5	34.3	
Total Split (s)	11.0	43.0		11.0	43.0		11.0	35.0		11.0	35.0	
Total Split (%)	11.0%	43.0%		11.0%	43.0%		11.0%	35.0%		11.0%	35.0%	
Maximum Green (s)	8.0	36.9		8.0	36.9		8.0	28.7		8.0	28.7	
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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.1		3.0	6.1		3.0	6.3		3.0	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	0.2		3.0	0.2		3.0	0.2		3.0	0.2	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
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)		3			8			3			2	
Act Effct Green (s)	62.6	54.0		57.8	48.3		27.5	16.7		28.6	18.9	
Actuated g/C Ratio	0.63	0.54		0.58	0.48		0.28	0.17		0.29	0.19	
v/c Ratio	0.60	0.35		0.08	0.70		0.28	0.74		0.49	0.62	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	24.2	12.1		7.6	16.4		25.4	51.5		30.8	20.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.2	12.1		7.6	16.4		25.4	51.5		30.8	20.4	
LOS	C	B		A	B		C	D		C	C	
Approach Delay		14.5			16.1			45.2			23.7	
Approach LOS		B			B			D			C	
Queue Length 50th (m)	9.6	25.1		2.2	44.8		11.2	45.2		20.5	19.8	
Queue Length 95th (m)	#38.2	66.9		5.6	#142.3		18.0	60.8		29.2	41.2	
Internal Link Dist (m)		267.6			316.9			89.6			251.5	
Turn Bay Length (m)	20.0			20.0			40.0			40.0		
Base Capacity (vph)	285	1940		520	1538		358	537		333	589	
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	0.59	0.35		0.07	0.70		0.21	0.44		0.40	0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 87 (87%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 20.1		Intersection LOS: C	
Intersection Capacity Utilization 73.8%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 130: Rymal Rd. & Upper Sherman Ave.





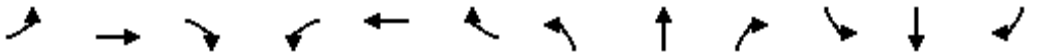
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	726	9	68	925	10	15	15	83	5	10	20
Future Volume (vph)	10	726	9	68	925	10	15	15	83	5	10	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		10.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00			0.99		1.00	0.99	
Frt		0.998			0.998			0.901			0.902	
Flt Protected	0.950			0.950				0.993		0.950		
Satd. Flow (prot)	1805	3338	0	1752	3156	0	0	1657	0	1656	1562	0
Flt Permitted	0.288			0.319				0.956		0.595		
Satd. Flow (perm)	546	3338	0	588	3156	0	0	1595	0	1036	1562	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			2			88			21	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		340.9			498.9			153.4			80.6	
Travel Time (s)		24.5			35.9			11.0			5.8	
Confl. Peds. (#/hr)	4		1	1		4	2		1	1		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	8%	0%	3%	14%	25%	1%	0%	2%	9%	12%	7%
Adj. Flow (vph)	11	772	10	72	984	11	16	16	88	5	11	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	782	0	72	995	0	0	120	0	5	32	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		
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		8.0	27.7		32.7	32.7		32.7	32.7	
Total Split (s)	56.0	56.0		11.0	67.0		33.0	33.0		33.0	33.0	
Total Split (%)	56.0%	56.0%		11.0%	67.0%		33.0%	33.0%		33.0%	33.0%	
Maximum Green (s)	50.3	50.3		8.0	61.3		27.3	27.3		27.3	27.3	
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)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-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		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	1	1			4		1	1		2	2	
Act Effct Green (s)	67.4	67.4		77.9	75.2			13.4		13.4	13.4	
Actuated g/C Ratio	0.67	0.67		0.78	0.75			0.13		0.13	0.13	
v/c Ratio	0.03	0.35		0.14	0.42			0.42		0.04	0.14	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	8.9	6.7		1.6	2.4			16.8		33.6	19.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	8.9	6.7		1.6	2.4			16.8		33.6	19.7	
LOS	A	A		A	A			B		C	B	
Approach Delay		6.7			2.3			16.8			21.6	
Approach LOS		A			A			B			C	
Queue Length 50th (m)	0.4	19.4		0.5	5.5			6.1		1.0	2.1	
Queue Length 95th (m)	m2.6	46.4		m2.7	40.0			18.8		3.7	9.0	
Internal Link Dist (m)		316.9			474.9			129.4			56.6	
Turn Bay Length (m)	30.0			30.0						20.0		
Base Capacity (vph)	367	2249		552	2374			499		282	441	
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	0.35		0.13	0.42			0.24		0.02	0.07	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 82 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.42			
Intersection Signal Delay: 5.2		Intersection LOS: A	
Intersection Capacity Utilization 70.6%		ICU Level of Service C	
Analysis Period (min) 15			
m	Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 131: Miles Rd./Eva St. & Rymal Rd.



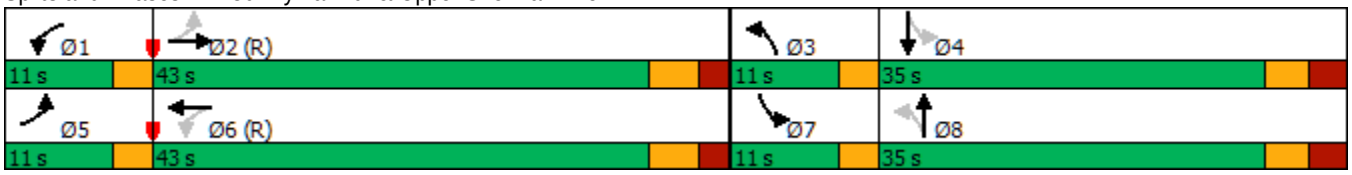


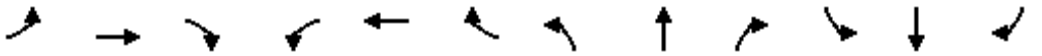
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	834	56	50	922	100	54	83	52	197	174	220
Future Volume (vph)	175	834	56	50	922	100	54	83	52	197	174	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		0.0	40.0		0.0	40.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	0.99		1.00	0.99		1.00	0.99	
Frt		0.990			0.985			0.942			0.916	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3564	0	1805	3456	0	1805	1779	0	1787	1715	0
Flt Permitted	0.109			0.212			0.173			0.598		
Satd. Flow (perm)	203	3564	0	402	3456	0	328	1779	0	1122	1715	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			13			32			64	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		291.6			340.9			113.6			275.5	
Travel Time (s)		21.0			24.5			8.2			19.8	
Confl. Peds. (#/hr)	24		6	6		24	6		3	3		6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	1%	0%	2%	4%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	192	916	62	55	1013	110	59	91	57	216	191	242
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	978	0	55	1123	0	59	148	0	216	433	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	8.0	30.1		8.0	30.1		9.5	34.3		9.5	34.3	
Total Split (s)	11.0	43.0		11.0	43.0		11.0	35.0		11.0	35.0	
Total Split (%)	11.0%	43.0%		11.0%	43.0%		11.0%	35.0%		11.0%	35.0%	
Maximum Green (s)	8.0	36.9		8.0	36.9		8.0	28.7		8.0	28.7	
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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.1		3.0	6.1		3.0	6.3		3.0	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	0.2		1.0	0.2		3.0	0.2		3.0	0.2	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
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)		6			24			6			3	
Act Effct Green (s)	56.4	46.9		50.8	42.3		33.2	22.8		35.0	25.3	
Actuated g/C Ratio	0.56	0.47		0.51	0.42		0.33	0.23		0.35	0.25	
v/c Ratio	0.77	0.58		0.20	0.77		0.28	0.34		0.48	0.90	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	47.2	15.1		13.3	25.4		21.2	25.5		25.7	53.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	47.2	15.1		13.3	25.4		21.2	25.5		25.7	53.3	
LOS	D	B		B	C		C	C		C	D	
Approach Delay		20.4			24.8			24.3			44.1	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	23.7	38.1		3.9	98.2		7.4	18.9		29.7	73.4	
Queue Length 95th (m)	#62.4	109.0		11.1	#83.5		14.9	34.6		45.0	#120.4	
Internal Link Dist (m)		267.6			316.9			89.6			251.5	
Turn Bay Length (m)	20.0			20.0			40.0			40.0		
Base Capacity (vph)	252	1677		326	1467		230	533		446	537	
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	0.76	0.58		0.17	0.77		0.26	0.28		0.48	0.81	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 90 (90%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 27.1		Intersection LOS: C	
Intersection Capacity Utilization 82.8%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 130: Rymal Rd. & Upper Sherman Ave.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	994	22	120	1025	20	20	20	135	5	20	20
Future Volume (vph)	15	994	22	120	1025	20	20	20	135	5	20	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		10.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			0.99		1.00	0.99	
Frt		0.997			0.997			0.895			0.925	
Flt Protected	0.950			0.950				0.994		0.950		
Satd. Flow (prot)	1504	3278	0	1787	3528	0	0	1625	0	1805	1688	0
Flt Permitted	0.241			0.194				0.958		0.367		
Satd. Flow (perm)	381	3278	0	365	3528	0	0	1564	0	696	1688	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			3			152			22	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		340.9			498.9			153.4			80.6	
Travel Time (s)		24.5			35.9			11.0			5.8	
Confl. Peds. (#/hr)	5					5	9		2	2		9
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	20%	10%	0%	1%	2%	0%	2%	10%	2%	0%	4%	2%
Adj. Flow (vph)	17	1117	25	135	1152	22	22	22	152	6	22	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	1142	0	135	1174	0	0	196	0	6	44	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		
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		8.0	27.7		32.7	32.7		32.7	32.7	
Total Split (s)	56.0	56.0		11.0	67.0		33.0	33.0		33.0	33.0	
Total Split (%)	56.0%	56.0%		11.0%	67.0%		33.0%	33.0%		33.0%	33.0%	
Maximum Green (s)	50.3	50.3		8.0	61.3		27.3	27.3		27.3	27.3	
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)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.7	5.7		3.0	5.7			5.7		5.7	5.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-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		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	0	0			5		2	2		9	9	
Act Effct Green (s)	64.8	64.8		77.6	74.9			13.7		13.7	13.7	
Actuated g/C Ratio	0.65	0.65		0.78	0.75			0.14		0.14	0.14	
v/c Ratio	0.07	0.54		0.35	0.44			0.57		0.06	0.18	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.4	7.1		3.5	2.9			16.9		34.6	22.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	7.4	7.1		3.5	2.9			16.9		34.6	22.3	
LOS	A	A		A	A			B		C	C	
Approach Delay		7.1			2.9			16.9			23.7	
Approach LOS		A			A			B			C	
Queue Length 50th (m)	0.7	29.4		1.2	7.2			8.5		1.1	4.2	
Queue Length 95th (m)	m1.9	48.3		m9.2	65.6			24.2		4.2	11.7	
Internal Link Dist (m)		316.9			474.9			129.4			56.6	
Turn Bay Length (m)	30.0			30.0						20.0		
Base Capacity (vph)	247	2126		397	2643			537		190	476	
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	0.07	0.54		0.34	0.44			0.36		0.03	0.09	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 94 (94%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 6.1		Intersection LOS: A	
Intersection Capacity Utilization 77.5%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 131: Miles Rd./Eva St. & Rymal Rd.

