SEBAGO TECHNICS

CIVIL ENGINEERING • SURVEYING • LANDSCAPE ARCHITECTURE

Memorandum

08316-01

To: Denise Clavette, Town of South Berwick
Tim Pellerin, Town of South Berwick
Jennifer Janelle, Town of South Berwick

Date: May 17, 2023

Subject: Addendum #1, Route 236 Planning Study, South Berwick

---

This memorandum serves as Addendum #1 to the Route 236 Planning Study, dated April 2023. The addendum provides additional information, as requested by the Maine Department of Transportation (MaineDOT) on May 3, 2023, specifically regarding the intersection option analysis at the intersection of Route 236 (Main Street) and Route 4 (Portland Street).

The Study reviewed opportunities to improve operations and safety at the intersection of Main Street and Portland Street through the use of signalized intersection control or a roundabout. Under 2022 traffic volumes, both the traffic signal and the roundabout had acceptable levels of service. For that reason, both options were reviewed from a feasibility standpoint, including conceptual plan development. Upon review of the concept plan for the roundabout, the following observations were discussed:

- A "compact" single-lane roundabout, with a dual northbound approach appeared to "fit" planimetrically. It was noted that the northbound approach angle did not have enough deflection which resulted in a substandard design. Properly designing approach angles to roundabouts is an important traffic-calming aspect as this slows incoming traffic as it enters the roundabout.

- Two of the three crosswalk locations were able to be provided close to the entry and exit lanes with refuge islands. The third crosswalk on the southbound approach was required to be pushed away approximately 130 feet from the intersection, with the splitter island being entirely mountable for trucks. The 2022 queue analysis demonstrated a 95th percentile southbound queue at the roundabout of 267 feet and 106 feet during the AM and PM peak hours, respectively. This analysis demonstrated that there may be times a pedestrian would have to walk between queued vehicles at this location. Providing improved pedestrian accommodations and safety was a priority for the Study.

- To layout the roundabout while minimizing impacts, the sidewalk width needed to be narrowed, resulting in vehicular traffic being closer to the building faces on both the westerly side and the easterly corner. On the easterly corner, the distance from the edge of the travel way to the building face is roughly 7 feet, much closer than what exists today. Additionally, the layout does not provide for much separation between vehicles and pedestrians.

- There are approximately 16 existing parking spaces along the businesses on the westerly side of Main Street. The roundabout option resulted in a complete loss of all 16 parking spaces, while the signalized option was able to retain 9 (eliminating 7 parking spaces). Additionally, more parking was able to be retained on the Portland Street approach with the signalized option. In the 2010 study by Sebago Technics, a signal was also recommended at this location. However, at the time, the removal of parking was enough for the Town to reconsider implementation. Parking continued to be a large topic of conversation during the most recent public outreach efforts. Retaining as much parking as possible was a priority as a part of the Study as it aids in retaining a downtown village feel through the Main Street corridor.

Considering the above, the signalized option also provided the following added benefits:

- Retaining wide sidewalks with possible green space along the business frontages. The Town expressed interest in not only improving delays to vehicles on the corridor but also having the ability to implement strategies to allow for "beautification" of the corridor allowing for this section of Main Street to serve as more of a destination than a bypass through Town. This additional green space afforded by the traffic signal option allows for planters, benches, banners, and other elements to help serve the Town's long-term interests.

- While both options have potential right-of-way impacts (based on the GIS parcel lines) to the Sarah Orne Jewett House parcel, the signalized option appears to have less impacts to this property. It will be essential to eliminate or minimize the impacts here as this is designated as a historic property.

- Signalization provides improved response time for emergency vehicles through traffic signal emergency preemption technology. This is especially important as emergency vehicles commonly enter this intersection by heading southbound on Main Street as the Fire Station is 1,200 feet from the subject intersection at 71 Norton Street.

- With signalization there is the benefit of retiming the corridor and providing coordination between the signals. As we heard from the Public, and as was reflected in the traffic volumes, cut-through traffic through the local neighborhoods commonly occurs. With these improvements, it is anticipated that traffic will be added and rebalanced to both major intersections. Signalization allows for this rebalancing to be monitored and timings adjusted accordingly.

75 John Roberts Road – Suite 4A, South Portland, ME 04106-6963 • 207.200.2100 • Fax: 207.856.2206

Based on the above, there were several determining factors outside of the vehicular capacity analysis that drove the recommendation for signalization. It was then determined that the recommended signalized alternative be reviewed for long-term considerations, which was reflected in the 2042 traffic analysis.

The roundabouts were also reviewed from a planning level perspective for 2042 volumes, however, given the discussion items above, and the 2042 operations showing favorable results for the signals, a more in-depth traffic analysis was not considered. The result of the planning level volume review was utilized as the basis for the qualifying statement that *"a single lane roundabout does not provide significant reserve capacity to accommodate future growth in traffic volumes"*.

As requested, additional capacity analysis was completed for discussion purposes between the roundabout and signalized option for Main Street and Portland Street. Table 1 outlines the level of service (LOS) results for the AM and PM periods under future 2042 conditions, based on the methodologies outlined in the Study.

Table 1 – Level of Service from Control Delay
2042 Future Volumes

Movement	Addendum 1		Recommended Alternative	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Main Street and Dow Highway	*Signalized*		*Signalized*	
Main Street NB Thru	27.4 (C)	34.3 (C)	30.2 (C)	46.0 (D)
Main Street NB Right	9.4 (A)	13.9 (B)	9.3 (A)	26.4 (C)
Main Street SB Left	15.4 (B)	32.7 (D)	29.7 (C)	31.0 (C)
Main Street SB Thru	18.4 (B)	40.6 (D)	34.9 (C)	42.7 (D)
Dow Highway NW Left	32.9 (C)	41.3 (D)	30.0 (C)	37.9 (D)
Dow Highway NW Right	11.3 (B)	29.0 (C)	15.3 (B)	30.1 (C)
Overall Intersection	17.2 (B)	32.0 (C)	25.8 (C)	36.4 (D)
Main Street and Portland Street	*Roundabout (Unsignalized)*		*Signalized*	
Main Street NB Thru	2.1 (A)	3.2 (A)	15.6 (B)	13.3 (B)
Main St NB Right	1.5 (A)	1.7 (A)	2.2 (A)	4.0 (A)
Main Street SB Left	29.4 (D)	6.4 (A)	34.5 (C)	35.9 (D)
Main Street SB Thru	25.9 (D)	6.5 (A)	33.1 (C)	11.1 (B)
Portland Street SW Left	17.7 (C)	13.3 (B)	40.1 (D)	31.3 (C)
Portland Street SW Right	17.0 (C)	13.3 (B)	15.3 (B)	10.5 (B)
Overall Intersection	13.9 (B)	5.5 (A)	24.3 (C)	13.9 (B)

As outlined above, the assumption from MaineDOT was confirmed in that the roundabout alternative retains capacity with 2042 traffic volumes. All movements are anticipated to operate at LOS "D" or better during the AM peak hour and LOS "B" or better during the PM peak hour.

75 John Roberts Road – Suite 4A, South Portland, ME 04106-6963 • 207.200.2100 • Fax: 207.856.2206

Given the information above, the recommendation of signalization was driven more so on the overall impacts to abutters and alternative modes of travel and less by the vehicular capacity results alone. We agree that the high-level volume review was overly conservative and that the Synchro / SimTraffic review provides a more appropriate representation of true long-term capacity. However, we hope the above supplemental information provides an improved understanding of the ultimate recommendations.

Please let us know if you have any additional questions.

Nikki Conant, P.E.
Director of Transportation Engineering

Bradley Lyon, P.E., PTOE
Vice President, Transportation Engineering

Attachments

SimTraffic Reports

75 John Roberts Road – Suite 4A, South Portland, ME 04106-6963 • 207.200.2100 • Fax: 207.856.2206

3: Main St & Dow Hwy Performance by movement

Movement	NBT	NBR	SBL	SBT	NWL	NWT	NWR	All
Denied Del/Veh (s)	0.6	1.8	0.0	0.1	0.3	0.0	0.1	0.3
Total Del/Veh (s)	27.4	9.4	15.4	18.4	32.9	1.1	11.3	17.2

5: Main St & Dunkin'/Academy St Performance by movement

Movement	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	85.8	93.0	0.2	0.3	1.0	1.3	0.2	0.0	5.7
Total Del/Veh (s)	8.4	488.8	355.3	17.5	5.0	5.3	15.2	0.6	0.2	29.3

7: Main St & Central Elem. South/Aroma Joe's Ent. Performance by movement

Movement	EBR	WBL	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.0	0.1
Total Del/Veh (s)	19.0	38.8	11.2	1.0	0.6	7.5	1.9	0.4	1.8

9: Main St & Central Elem. North/Driveway Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.3	38.0	93.7	162.4	0.1	0.1	0.2	0.6	2.2
Total Del/Veh (s)	379.7	192.2	260.3	123.7	24.7	1.2	1.4	0.8	9.0

11: Main St & Paul St Performance by movement

Movement	WBL	WBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	82.7	18.7	1.5	0.6	1.8	1.9

13: Main St & Portland St Performance by movement

Movement	NBT	NBR	SBL	SBT	SWL	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	1.4	0.5	0.6	0.6
Total Del/Veh (s)	2.1	1.5	29.4	25.9	17.7	17.0	13.9

15: Young St & Main St Performance by movement

Movement	SET	SER	NWL	NWT	NEL	NER	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	0.8	0.3	5.0	1.0	16.5	6.0	1.1

19: Main St & Norton St Performance by movement

Movement	SEL	SET	NWT	NWR	SWL	SWR	All
Denied Del/Veh (s)	11.3	10.5	0.0	0.0	46.4	67.0	13.9
Total Del/Veh (s)	7.8	5.6	0.2	0.1	71.4	56.9	11.5

21: Dow Hwy Performance by movement

Movement	SET	NWT	All
Denied Del/Veh (s)	0.0	0.4	0.2
Total Del/Veh (s)	2.9	1.1	2.2

Total Network Performance

Denied Del/Veh (s)	10.8
Total Del/Veh (s)	56.5

Intersection: 3: Main St & Dow Hwy

Movement	NB	NB	SB	SB	NW	NW
Directions Served	T	R	L	LT	L	R
Maximum Queue (ft)	368	225	227	274	165	286
Average Queue (ft)	168	68	143	189	49	124
95th Queue (ft)	296	179	215	256	116	246
Link Distance (ft)	1413		318	318		583
Upstream Blk Time (%)				0		0
Queuing Penalty (veh)				0		1
Storage Bay Dist (ft)		200			150	
Storage Blk Time (%)	5	0			0	4
Queuing Penalty (veh)	8	0			0	4

Intersection: 5: Main St & Dunkin'/Academy St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	R	LT	R	LTR	L	TR
Maximum Queue (ft)	80	690	90	314	65	72
Average Queue (ft)	34	381	45	87	33	11
95th Queue (ft)	64	874	114	263	66	46
Link Distance (ft)	228	711		318	44	44
Upstream Blk Time (%)		29		1	9	0
Queuing Penalty (veh)		0		11	48	2
Storage Bay Dist (ft)			65			
Storage Blk Time (%)		66	5			
Queuing Penalty (veh)		55	3			

Intersection: 7: Main St & Central Elem. South/Aroma Joe's Ent.

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	TR	L	TR
Maximum Queue (ft)	72	61	80	38	182
Average Queue (ft)	11	9	10	10	23
95th Queue (ft)	45	38	45	34	123
Link Distance (ft)	247	124	44		169
Upstream Blk Time (%)			1		3
Queuing Penalty (veh)			12		30
Storage Bay Dist (ft)				50	
Storage Blk Time (%)				0	3
Queuing Penalty (veh)				2	1

Intersection: 9: Main St & Central Elem. North/Driveway

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	251	100	72	167	135
Average Queue (ft)	67	45	32	14	16
95th Queue (ft)	231	108	66	92	87
Link Distance (ft)	278	95		169	140
Upstream Blk Time (%)	8	22		1	2
Queuing Penalty (veh)	0	0		11	23
Storage Bay Dist (ft)			50		
Storage Blk Time (%)			9	0	
Queuing Penalty (veh)			69	0	

Intersection: 11: Main St & Paul St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	55	103	93
Average Queue (ft)	10	19	11
95th Queue (ft)	38	71	60
Link Distance (ft)	488	140	60
Upstream Blk Time (%)		0	2
Queuing Penalty (veh)		0	27
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 13: Main St & Portland St

Movement	NB	NB	SB	SW
Directions Served	T	R	LT	LR
Maximum Queue (ft)	55	43	362	449
Average Queue (ft)	8	3	184	134
95th Queue (ft)	34	22	371	407
Link Distance (ft)	60	60	358	1001
Upstream Blk Time (%)	0	0	3	1
Queuing Penalty (veh)	0	0	22	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 15: Young St & Main St

Movement	SE	NW	NE
Directions Served	TR	LT	LR
Maximum Queue (ft)	48	76	41
Average Queue (ft)	7	10	13
95th Queue (ft)	34	43	38
Link Distance (ft)	13	358	407
Upstream Blk Time (%)	4		
Queuing Penalty (veh)	23		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 19: Main St & Norton St

Movement	SE	NW	SW
Directions Served	LT	TR	LR
Maximum Queue (ft)	164	28	205
Average Queue (ft)	40	2	82
95th Queue (ft)	165	14	255
Link Distance (ft)	232	13	416
Upstream Blk Time (%)	8	0	7
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 21: Dow Hwy

Movement	SE	SE	NW
Directions Served	T	T	T
Maximum Queue (ft)	94	113	16
Average Queue (ft)	32	38	1
95th Queue (ft)	80	98	20
Link Distance (ft)	583	583	959
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 349

3: Main St & Dow Hwy Performance by movement

Movement	NBT	NBR	SBL	SBT	NWL	NWT	NWR	All
Denied Del/Veh (s)	0.8	1.9	0.0	0.0	0.3	0.0	0.2	0.4
Total Del/Veh (s)	34.3	13.9	32.7	40.6	41.3	2.8	29.0	32.0

5: Main St & Dunkin'/Academy St Performance by movement

Movement	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	89.5	108.4	0.0	0.1	0.5	0.7	0.0	0.0	11.3
Total Del/Veh (s)	9.7	380.5	326.7	8.4	3.7	2.9	30.0	0.4	0.1	36.5

7: Main St & Central Elem. South/Aroma Joe's Ent. Performance by movement

Movement	EBL	EBR	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	158.8	43.7	27.6	1.0	0.4	16.8	1.4	1.9

9: Main St & Central Elem. North/Driveway Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	34.5	23.1		0.1	0.0	0.2	0.0	0.0	0.0	0.5
Total Del/Veh (s)	339.6	158.7		59.2	7.6	2.1	0.9	0.8	0.1	4.9

11: Main St & Paul St Performance by movement

Movement	WBL	WBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.1
Total Del/Veh (s)	365.8	80.5	3.4	1.9	1.1	3.3

13: Main St & Portland St Performance by movement

Movement	NBT	NBR	SBL	SBT	SWL	SWR	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.0	0.4	0.4	0.1
Total Del/Veh (s)	3.2	1.7	6.4	6.5	13.3	13.3	5.5

15: Young St & Main St Performance by movement

Movement	SET	SER	NWL	NWT	NEL	NER	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	0.4	0.2	4.0	1.3	11.9	4.6	1.1

19: Main St & Norton St Performance by movement

Movement	SEL	SET	NWT	NWR	SWL	SWR	All
Denied Del/Veh (s)	0.4	0.4	0.0	0.0	0.2	0.2	0.2
Total Del/Veh (s)	6.5	1.2	0.1	0.1	22.0	14.9	2.8

21: Dow Hwy Performance by movement

Movement	SET	NWT	All
Denied Del/Veh (s)	0.0	0.6	0.3
Total Del/Veh (s)	2.4	1.6	1.9

Total Network Performance

Denied Del/Veh (s)	9.0
Total Del/Veh (s)	62.2

Intersection: 3: Main St & Dow Hwy

Movement	NB	NB	SB	SB	NW	NW
Directions Served	T	R	L	LT	L	R
Maximum Queue (ft)	640	225	285	326	175	513
Average Queue (ft)	319	119	164	211	97	271
95th Queue (ft)	588	276	259	300	201	468
Link Distance (ft)	1413		318	318		583
Upstream Blk Time (%)			0	1		1
Queuing Penalty (veh)			1	5		4
Storage Bay Dist (ft)		200			150	
Storage Blk Time (%)	22	0			1	26
Queuing Penalty (veh)	37	1			6	32

Intersection: 5: Main St & Dunkin'/Academy St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	R	LT	R	LTR	L	TR
Maximum Queue (ft)	32	704	90	309	65	58
Average Queue (ft)	8	464	85	58	25	4
95th Queue (ft)	29	882	111	206	60	32
Link Distance (ft)	228	711		318	44	44
Upstream Blk Time (%)		35		0	8	1
Queuing Penalty (veh)		0		5	29	3
Storage Bay Dist (ft)			65			
Storage Blk Time (%)		11	84			
Queuing Penalty (veh)		21	21			

Intersection: 7: Main St & Central Elem. South/Aroma Joe's Ent.

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	TR	L	TR
Maximum Queue (ft)	43	65	77	35	167
Average Queue (ft)	6	24	20	9	15
95th Queue (ft)	29	57	59	32	91
Link Distance (ft)	247	124	44		169
Upstream Blk Time (%)			1		2
Queuing Penalty (veh)			11		12
Storage Bay Dist (ft)				50	
Storage Blk Time (%)				0	3
Queuing Penalty (veh)				1	1

Intersection: 9: Main St & Central Elem. North/Driveway

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	168	41	50	154	104
Average Queue (ft)	57	7	12	24	7
95th Queue (ft)	166	31	38	104	57
Link Distance (ft)	278	95		169	140
Upstream Blk Time (%)	3	0		0	1
Queuing Penalty (veh)	0	0		4	7
Storage Bay Dist (ft)			50		
Storage Blk Time (%)			0	2	
Queuing Penalty (veh)			1	0	

Intersection: 11: Main St & Paul St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	72	158	66
Average Queue (ft)	18	55	4
95th Queue (ft)	61	141	40
Link Distance (ft)	488	140	60
Upstream Blk Time (%)		1	1
Queuing Penalty (veh)		8	7
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 13: Main St & Portland St

Movement	NB	NB	SB	SW
Directions Served	T	R	LT	LR
Maximum Queue (ft)	89	89	203	315
Average Queue (ft)	48	9	67	105
95th Queue (ft)	84	46	148	236
Link Distance (ft)	60	60	358	1001
Upstream Blk Time (%)	3	0		
Queuing Penalty (veh)	17	2		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 15: Young St & Main St

Movement	SE	NW	NE
Directions Served	TR	LT	LR
Maximum Queue (ft)	31	84	48
Average Queue (ft)	3	16	21
95th Queue (ft)	16	59	47
Link Distance (ft)	13	358	407
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 19: Main St & Norton St

Movement	SE	NW	SW
Directions Served	LT	TR	LR
Maximum Queue (ft)	114	28	156
Average Queue (ft)	30	3	57
95th Queue (ft)	85	15	111
Link Distance (ft)	232	13	416
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		1	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 21: Dow Hwy

Movement	SE	SE	NW
Directions Served	T	T	T
Maximum Queue (ft)	68	74	56
Average Queue (ft)	13	11	4
95th Queue (ft)	49	47	50
Link Distance (ft)	583	583	959
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 240

3: Main St & Dow Hwy Performance by movement

Movement	NBT	NBR	SBL	SBT	NWL	NWT	NWR	All
Denied Del/Veh (s)	0.6	2.0	0.2	0.5	0.2	0.0	0.5	0.5
Total Del/Veh (s)	30.2	9.3	29.7	34.9	30.0	1.5	15.3	25.8

5: Main St & Dunkin'/Academy St Performance by movement

Movement	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	300.5	259.9	0.2	0.6	0.5	0.2	0.1	0.0	17.5
Total Del/Veh (s)	14.0	670.9	443.1	21.7	6.7	5.6	16.0	1.4	0.5	34.7

7: Main St & Central Elem. South/Aroma Joe's Ent. Performance by movement

Movement	EBR	WBL	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1		0.1	0.0	0.0	0.6	0.4	0.0	0.2
Total Del/Veh (s)	20.0	51.1	10.8	1.1	0.5	9.2	3.9	5.3	2.9

9: Main St & Central Elem. North/Driveway Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	61.2	50.7	151.8	153.8	0.1	0.1	0.3	0.8	3.0
Total Del/Veh (s)	294.3	203.1	282.2	181.7	25.4	1.2	2.9	2.3	10.4

11: Main St & Paul St Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	70.1	12.6	2.0	0.4	7.1	2.1	2.2

13: Main St & Portland St Performance by movement

Movement	NBT	NBR	SBL	SBT	SWL	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.5	2.6	1.1	3.7	1.2
Total Del/Veh (s)	15.6	2.2	34.5	33.1	40.1	15.3	24.3

15: Young St & Main St Performance by movement

Movement	SET	SER	NWL	NWT	NEL	NER	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.5	0.2	8.8	2.2	16.9	9.0	2.0

19: Main St & Norton St Performance by movement

Movement	SEL	SET	NWT	NWR	SWL	SWR	All
Denied Del/Veh (s)	7.7	10.4	0.0	0.0	64.0	72.1	14.8
Total Del/Veh (s)	10.2	10.0	0.4	0.1	119.4	114.1	20.1

21: Dow Hwy Performance by movement

Movement	SET	NWT	All
Denied Del/Veh (s)	0.0	0.4	0.2
Total Del/Veh (s)	3.6	1.0	2.6

Total Network Performance

Denied Del/Veh (s)	20.8
Total Del/Veh (s)	78.0

Intersection: 3: Main St & Dow Hwy

Movement	NB	NB	SB	SB	NW	NW
Directions Served	T	R	L	LT	L	R
Maximum Queue (ft)	402	224	344	348	166	406
Average Queue (ft)	190	77	222	256	54	144
95th Queue (ft)	330	195	347	356	132	319
Link Distance (ft)	1413		318	318		583
Upstream Blk Time (%)			4	6		0
Queuing Penalty (veh)			18	30		0
Storage Bay Dist (ft)		200			150	
Storage Blk Time (%)	8	0			0	8
Queuing Penalty (veh)	11	0			1	7

Intersection: 5: Main St & Dunkin'/Academy St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	R	LT	R	LTR	L	TR
Maximum Queue (ft)	72	721	90	333	74	98
Average Queue (ft)	35	431	38	101	36	25
95th Queue (ft)	64	927	107	299	70	77
Link Distance (ft)	228	711		318	44	44
Upstream Blk Time (%)		40		3	11	5
Queuing Penalty (veh)		0		27	57	26
Storage Bay Dist (ft)			65			
Storage Blk Time (%)		70	5			
Queuing Penalty (veh)		58	3			

Intersection: 7: Main St & Central Elem. South/Aroma Joe's Ent.

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	TR	L	TR
Maximum Queue (ft)	65	64	68	44	214
Average Queue (ft)	11	10	12	11	63
95th Queue (ft)	44	40	47	36	206
Link Distance (ft)	247	124	44		169
Upstream Blk Time (%)			1		6
Queuing Penalty (veh)			11		70
Storage Bay Dist (ft)				50	
Storage Blk Time (%)				0	9
Queuing Penalty (veh)				3	2

Intersection: 9: Main St & Central Elem. North/Driveway

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	274	100	69	174	159
Average Queue (ft)	76	43	31	20	41
95th Queue (ft)	255	104	65	108	146
Link Distance (ft)	278	85		169	142
Upstream Blk Time (%)	11	27		1	5
Queuing Penalty (veh)	0	0		11	53
Storage Bay Dist (ft)			50		
Storage Blk Time (%)			10	0	
Queuing Penalty (veh)			74	0	

Intersection: 11: Main St & Paul St

Movement	WB	NB	NB	SB
Directions Served	LR	T	TR	LT
Maximum Queue (ft)	53	140	114	110
Average Queue (ft)	11	31	12	46
95th Queue (ft)	39	105	59	119
Link Distance (ft)	500	142	142	86
Upstream Blk Time (%)		1	0	6
Queuing Penalty (veh)		3	0	72
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 13: Main St & Portland St

Movement	NB	NB	SB	SB	SW	SW
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	116	112	174	374	656	233
Average Queue (ft)	76	56	56	248	297	25
95th Queue (ft)	120	106	162	410	647	132
Link Distance (ft)	86	86		346	1002	
Upstream Blk Time (%)	12	1		13	2	
Queuing Penalty (veh)	47	6		76	0	
Storage Bay Dist (ft)			150			175
Storage Blk Time (%)			0	32	23	
Queuing Penalty (veh)			0	14	7	

Intersection: 15: Young St & Main St

Movement	SE	NW	NE
Directions Served	TR	LT	LR
Maximum Queue (ft)	53	94	49
Average Queue (ft)	13	13	13
95th Queue (ft)	43	55	40
Link Distance (ft)	13	346	400
Upstream Blk Time (%)	13		
Queuing Penalty (veh)	78		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 19: Main St & Norton St

Movement	SE	NW	SW
Directions Served	LT	TR	LR
Maximum Queue (ft)	230	30	295
Average Queue (ft)	75	2	124
95th Queue (ft)	240	13	357
Link Distance (ft)	232	13	416
Upstream Blk Time (%)	12	0	14
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 21: Dow Hwy

Movement	SE	SE	NW
Directions Served	T	T	T
Maximum Queue (ft)	118	128	7
Average Queue (ft)	41	48	0
95th Queue (ft)	97	112	7
Link Distance (ft)	583	583	959
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 765

3: Main St & Dow Hwy Performance by movement

Movement	NBT	NBR	SBL	SBT	NWL	NWT	NWR	All
Denied Del/Veh (s)	0.8	1.9	0.0	0.0	0.4	0.0	0.4	0.5
Total Del/Veh (s)	46.0	26.4	31.0	42.7	37.9	3.9	30.1	36.4

5: Main St & Dunkin'/Academy St Performance by movement

Movement	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	130.7	134.2	0.1	0.1	0.6	0.0	0.0	0.0	13.9
Total Del/Veh (s)	7.4	454.6	403.7	9.5	5.4	4.5	31.2	0.4	0.2	44.7

7: Main St & Central Elem. South/Aroma Joe's Ent. Performance by movement

Movement	EBL	EBR	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.2	0.0	0.0
Total Del/Veh (s)	110.6	6.8	25.6	1.4	0.6	19.2	1.0	1.9

9: Main St & Central Elem. North/Driveway Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.1
Total Del/Veh (s)	74.9	15.7	116.9	20.8	8.3	2.8	1.6	0.7	0.2	2.6

11: Main St & Paul St Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	67.9	19.0	5.8	2.2	18.5	1.1	4.3

13: Main St & Portland St Performance by movement

Movement	NBT	NBR	SBL	SBT	SWL	SWR	All
Denied Del/Veh (s)	0.2	0.2	0.1	0.0	0.6	2.7	0.3
Total Del/Veh (s)	13.3	4.0	35.9	11.1	31.3	10.5	13.9

15: Young St & Main St Performance by movement

Movement	SET	SER	NWL	NWT	NEL	NER	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	0.4	0.2	4.5	2.0	18.3	5.2	1.6

19: Main St & Norton St Performance by movement

Movement	SEL	SET	NWT	NWR	SWL	SWR	All
Denied Del/Veh (s)	0.4	0.4	0.0	0.0	0.2	0.2	0.2
Total Del/Veh (s)	8.0	1.7	0.3	0.2	21.3	13.1	3.0

21: Dow Hwy Performance by movement

Movement	SET	NWT	All
Denied Del/Veh (s)	0.0	0.6	0.3
Total Del/Veh (s)	2.3	1.6	1.9

Total Network Performance

Denied Del/Veh (s)	10.7
Total Del/Veh (s)	75.9

Intersection: 3: Main St & Dow Hwy

Movement	NB	NB	SB	SB	NW	NW
Directions Served	T	R	L	LT	L	R
Maximum Queue (ft)	833	225	287	331	175	567
Average Queue (ft)	404	140	157	212	102	274
95th Queue (ft)	784	297	254	309	212	492
Link Distance (ft)	1413		318	318		583
Upstream Blk Time (%)			0	1		1
Queuing Penalty (veh)			0	3		4
Storage Bay Dist (ft)		200			150	
Storage Blk Time (%)	30	0			0	26
Queuing Penalty (veh)	53	1			1	32

Intersection: 5: Main St & Dunkin'/Academy St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	R	LT	R	LTR	L	TR
Maximum Queue (ft)	32	708	90	332	64	44
Average Queue (ft)	9	547	86	107	26	3
95th Queue (ft)	32	936	112	305	61	23
Link Distance (ft)	228	711		318	44	44
Upstream Blk Time (%)		48		1	7	0
Queuing Penalty (veh)		0		16	24	1
Storage Bay Dist (ft)			65			
Storage Blk Time (%)		10	88			
Queuing Penalty (veh)		20	22			

Intersection: 7: Main St & Central Elem. South/Aroma Joe's Ent.

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	TR	L	TR
Maximum Queue (ft)	36	62	101	42	126
Average Queue (ft)	4	23	36	9	9
95th Queue (ft)	23	53	97	31	69
Link Distance (ft)	247	124	44		169
Upstream Blk Time (%)			4		1
Queuing Penalty (veh)			49		4
Storage Bay Dist (ft)				50	
Storage Blk Time (%)				0	1
Queuing Penalty (veh)				2	0

Intersection: 9: Main St & Central Elem. North/Driveway

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	69	37	56	209	51
Average Queue (ft)	23	8	11	72	2
95th Queue (ft)	54	30	41	203	29
Link Distance (ft)	278	85		169	142
Upstream Blk Time (%)		0		3	0
Queuing Penalty (veh)		0		36	2
Storage Bay Dist (ft)			50		
Storage Blk Time (%)			0	6	
Queuing Penalty (veh)			5	1	

Intersection: 11: Main St & Paul St

Movement	WB	NB	NB	SB
Directions Served	LR	T	TR	LT
Maximum Queue (ft)	48	169	159	92
Average Queue (ft)	14	122	71	10
95th Queue (ft)	41	191	154	55
Link Distance (ft)	500	142	142	86
Upstream Blk Time (%)		8	1	1
Queuing Penalty (veh)		53	5	10
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 13: Main St & Portland St

Movement	NB	NB	SB	SB	SW	SW
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	121	128	173	268	417	236
Average Queue (ft)	98	91	83	103	181	49
95th Queue (ft)	110	124	149	192	322	144
Link Distance (ft)	86	86		346	1002	
Upstream Blk Time (%)	36	7		0		
Queuing Penalty (veh)	243	48		0		
Storage Bay Dist (ft)			150			175
Storage Blk Time (%)			1	2	12	
Queuing Penalty (veh)			2	3	14	

Intersection: 15: Young St & Main St

Movement	SE	NW	NE
Directions Served	TR	LT	LR
Maximum Queue (ft)	30	136	59
Average Queue (ft)	3	20	21
95th Queue (ft)	16	85	47
Link Distance (ft)	13	346	400
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	1		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 19: Main St & Norton St

Movement	SE	NW	SW
Directions Served	LT	TR	LR
Maximum Queue (ft)	172	30	130
Average Queue (ft)	34	3	55
95th Queue (ft)	113	16	100
Link Distance (ft)	232	13	416
Upstream Blk Time (%)	0	0	
Queuing Penalty (veh)	0	1	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 21: Dow Hwy

Movement	SE	SE	NW
Directions Served	T	T	T
Maximum Queue (ft)	67	73	62
Average Queue (ft)	11	10	4
95th Queue (ft)	44	45	40
Link Distance (ft)	583	583	959
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 657