

REVISED January 26, 2016

Mayor Bourke and Committee
Township of Millburn
375 Millburn Avenue
Millburn, NJ 07041

Dear Mayor and Committee:

Sam Schwartz Engineering is pleased to provide this revised technical summary of the traffic evaluation for the downtown complete streets project. This report provides an overview of the methodology and analysis conducted to date. More detailed analysis and fine tuning of the design will be completed as the project moves forward; however, this summary will provide the Township, County and others with the basic findings and recommendations of the traffic evaluation as it currently stands.

Study Area

For purposes of the preliminary analysis, the study area is comprised of Millburn Avenue and Essex Street. These are the intersections which are most affected by the complete streets roadway/intersection modifications being proposed. The study area will be broadened once the preliminary analysis is complete and the proposed roadway modifications are conceptually agreed upon. The study area map is contained in the Appendix.

Crash History

A detailed review was conducted of the crash history at the critical intersections along Millburn Avenue and Essex Street within the study area. The crash reports were obtained from the Millburn Police Department for the past 3+ years (2012 through mid-2015). A summary table was prepared of the crashes in order to identify and sort by location, crash type, pedestrian/bike involvement, day, time, weather, as well as any other contributing factors. An illustrative summary of the crash history is contained within the Appendix.

**Sam
Schwartz
Engineering**
+ Analyzing
Inventing
Engaging
Researching
Planning
Strategizing
Collaborating
Evaluating
Designing
Organizing
Solving
Specifying
Updating
Inspecting
Surveying
Coordinating
Assessing
Maximizing
Publicizing
Directing
Activating
Expanding
Timing
Identifying
Measuring
Publishing
Integrating
Partnering
Managing
Anticipating
Envisioning
Consulting
Interacting
Creating
Implementing
Building
Transforming
Connecting
Changing
D.P.C.

Traffic Volume Recordings

Traffic volume recordings were conducted for the weekday peak periods in October of 2015 utilizing aerial photography. Specifically, the weekday morning peak period was conducted on Wednesday, October 7th and the weekday evening peak period was conducted on Thursday, October 8th. To note is that Saturday morning/mid-day traffic recordings were conducted at Millburn Avenue and Main Street and it was confirmed that the weekday peak periods experience higher traffic volumes and therefore a Saturday analysis was not warranted.

The weekday morning peak traffic hours occur between 8:00 and 9:00 AM and the weekday evening peak traffic hours occur 5:15 and 6:15 PM. (It should also be noted that the after school peak was recorded and it was determined that the evening peak hour 5:15-6:15 PM experiences higher traffic volumes and therefore should be utilized as the peak hour for analysis purposes)

The volume recordings identified passenger vehicles, trucks, buses and pedestrians in order to identify the most accurate representation of activity in the intersections.

A summary of the 2015 balanced existing traffic volumes is contained in the Appendix.

Future Traffic Projections

It is typical to forecast the traffic conditions and conduct a future conditions analysis for a project of this magnitude. For purposes of the downtown complete streets project, it was determined that a 20 year horizon should be utilized (2035).

Based upon discussions with Ms. Annoni in the Township Engineering office it was determined that a 0.5% annual growth rate should be applied to the 2015 traffic volumes in order to forecast the future traffic conditions in the downtown. The 0.5% annual growth rate when compounded over 20 years will equate to more than 10% growth over the existing conditions. It was agreed that this level of growth is appropriate considering the township population trends, comparison to historical traffic volumes as well as consideration of the downtown commercial space occupancy rate.

The projected 2035 traffic volumes are contained in the Appendix.

Proposed Recommendations

From a traffic perspective, the goal of the downtown complete streets plan is to improve the safety and efficiency of the downtown and its intersections for all users (pedestrians and motorists alike). Some of the recommendations may seem to reduce capacity (lane removal); however, we believe that there is an overall simplification at the intersections (turn restrictions) which will result in more efficient traffic flow. The following recommendations were identified in an effort to accomplish this goal.

- Remove one of the travel lanes along Millburn Avenue
- Create a New Road one-way from Essex to Millburn (adjacent to town hall)
- Eliminate the left turn movement from Millburn Avenue to Main Street
- Eliminate the left turn movement from Essex Street to Main Street
- Eliminate one of the northbound lanes on Main Street
- Eliminate the left turn movement from Main Street to Essex Street
- Convert Spring Street back to 2-way between Essex and Millburn
- Convert Holmes Street to 1-way northbound between Essex and Millburn
- Relocate the Essex Street pedestrian crossing to the parking garage
- Install a roundabout at the intersection of Millburn and Essex/Parkview

A summary graphic illustrating the proposed traffic related recommendations is contained in the Appendix.

Intersection Analyses

The intersections within the downtown study area were analyzed using Synchro traffic analysis software in order to identify the resulting levels of service and operational characteristics of the intersections (and the downtown as a whole) upon implementation of the proposed recommendations. The following is a brief summary of the physical changes and peak hour operational results each of the key intersections and the detailed LOS comparison charts are contained within the Appendix.

It should be restated that the simplification of the traffic movements at certain critical intersections will result in a more efficient traffic flow. The recommended modifications have been reviewed in detail with the Township Police Department and Engineering Office.

Please note that this evaluation includes an analysis of the weekday evening peak hour which is the critical peak hour.

Millburn Avenue and Essex Street (west)

Currently, the intersection provides geometry and lane widths that encourage speeding and discourage pedestrian crossing. Millburn Avenue EB provides 1 travel lane approaching this intersection which opens to 2 travel lanes within the intersection. This creates a difficult situation for the Essex Street SB left turn, encourages an increase in vehicle speed along Millburn Avenue, and creates a difficult weave entering the Wells Fargo bank driveway.

It is proposed to maintain Millburn Avenue as 1 lane through this intersection (the 1 lane section will extend to Town Hall). Additionally, it is proposed to narrow the Essex Street lanes and tighten the corner radii to provide a more traditional T-type intersection which would assist in slowing vehicles down, allow for a Gateway type intersection/streetscape design, and increasing the pedestrian safety. The gaps in the traffic stream along Millburn Avenue created by the upstream traffic signal at Short Hills Avenue platoon vehicles and allow the Essex Street left turns to operate efficiently. The Essex Street left turn would remain Stop controlled.

Millburn Avenue and Spring Street

Currently, Millburn Avenue provides two travel lanes through this intersection and Spring Street is designated as a one-way northbound.

It is proposed to continue Millburn Avenue as 1 lane through this intersection. The single Millburn Avenue lane will allow the sidewalks to increase in width and the sight lines at the intersection to be improved. It is proposed to reinstitute two-way traffic along Spring Street. The gaps in the traffic stream along Millburn Avenue created by the upstream traffic signal at Short Hills Avenue platoon vehicles and will provide the gaps necessary to allow the Spring Street movements to operate efficiently. The Spring Street approaches would remain Stop controlled.

Millburn Avenue and New Road

It is proposed to construct a New Road to extend between Essex Street and Millburn Avenue. This New Road would be a 1 lane road (parallel parking on both sides) and would be one-way southbound. Millburn Avenue continues as 1 lane through this intersection (would open to 2 lanes immediately after this intersection) and the New Road would be Stop controlled at Millburn Avenue. The gaps in the traffic stream along Millburn Avenue created by the upstream traffic signal at Short Hills Avenue platoon vehicles and allow the New Road left turns to operate efficiently.

It is envisioned that this New Road could be frequently closed to traffic in order to utilize it for programmed/municipal events and street fair type uses. Alternatively (yet along the same lines) the provision of this New Road will allow the more frequent temporary closings of Main Street between Essex Street and Millburn Avenue for programmed/municipal events and street fair type uses. This New Road will help accommodate the diverted Main Street southbound traffic volumes.

Downtown Millburn has a very good roadway network with multiple parallel alternatives between Millburn Avenue and Essex Street. The Township should take full advantage of this fact and more frequently utilize streets for programmed events in order to encourage downtown vitality.

Millburn Avenue and Main Street

This intersection has historically seen a high number of crashes (particularly those involving pedestrians). Currently, Millburn Avenue provides 3 travel lanes (left/thru, thru, thru/right), Main Street NB provides 2 travel lanes (thru, right) and Main Street SB provides 2 travel lanes (left, thru). The intersection is controlled by a traffic signal operating on a 3 phase 70 second cycle. The 3 phases include Millburn ROW, Main Street ROW and a Main Street SB lag. Currently Main Street experiences over capacity conditions and significant unmet demand during the peak periods (it is common that motorists wait through 2 or more traffic signal cycles to get through the intersection). The vehicle queues are significant along the Main Street northbound approach.

It is proposed to eliminate the Millburn Avenue left turn movement at this intersection. The left turns would be diverted to Lackawanna Place and the 2 travel lanes along Millburn Avenue will continue through this intersection (thru, thru/right). Main Street lane designations will remain; however, Main Street (between Millburn Avenue and Essex Street) will be reduced in width from 4 lanes to 3 (reduction of 10 feet in width). The reduction is due to the elimination of the Main Street NB left turn at Essex Street (this will be discussed more in the Essex/Main paragraph below). The traffic signal will remain as 3 phases in order to clear the Main Street segment, improve the stacking, and shorten the vehicle queue length. The "No Turn on Red" condition will remain. The traffic signal phasing and timing is continuing to be evaluated and an All Pedestrian Phase, Lead Pedestrian Phase and other pedestrian safety treatments are being considered as well. While it is understood that the recommendation to remove the travel lane along Millburn Avenue will seemingly reduce the capacity of Millburn Avenue, we believe that the removal of the left turn movement will simplify the intersection and possibly allow more green time to Main Street which will result in an overall benefit, more efficient traffic flow and a safer intersection for pedestrians.

Millburn Avenue and Lackawanna Place

Currently, Millburn Avenue provides 3 travel lanes through this intersection (left/thru, thru, thru) and Lackawanna Place provides a southbound double left turn lane. The intersection is controlled by a 2 phase traffic signal. The intersection is fairly wide resulting in speeding vehicles, vehicles turning at high speeds, and long crosswalks.

It is proposed to provide 2 travel lanes along Millburn Avenue. We are currently proposing that Lackawanna Place will provide a single left turn lane to accommodate the southbound traffic volume. The intersection will continue to be controlled by a 2 phase traffic signal.

Millburn Avenue and Holmes Street

Currently, Millburn Avenue provides 3 lanes through this intersection and Holmes Street provides two way traffic. The Holmes Street SB approach is controlled by a Stop sign.

It is proposed to provide 2 travel lanes along Millburn Avenue and convert Holmes Street to a one-way in the northbound direction. The conversion of Holmes Street to a one way northbound will simplify the traffic movements at this intersection and will allow for a widening of the sidewalks to accommodate the significant volume of pedestrians using Holmes Street as access to/from the train station.

Millburn Avenue and Essex Street (east) / Parkview Drive

Currently, the intersection provides geometry and lane widths that encourage speeding and discourage pedestrian crossing. Millburn Avenue EB provides 3 travel lanes approaching this intersection (left, thru, thru/right). Millburn Avenue westbound provide 2 thru lanes that become Essex Street by way of a very wide sweeping radius that encourages high speeds as vehicles enter the downtown area. The Millburn Avenue eastbound left to Essex Street is under Yield control.

It is recommended that a modern roundabout be installed at this intersection. There exists adequate space in the existing intersection to construct a roundabout within the existing ROW. Millburn Avenue eastbound would provide 2 travel lanes through the roundabout. Millburn Avenue westbound would be reduced from 2 travel lanes to one (the Millburn Avenue westbound lane drop could occur at the adjacent intersection of Wyoming Avenue by designating the right lane as a right turn only lane). (the two lanes could be maintained along Millburn Avenue westbound if deemed necessary by the county). The Parkview Drive approach would be reduced in size and normalized as it approaches the roundabout.

Millburn Avenue and Wyoming Avenue

Currently, Millburn Avenue provides 3 lanes along both the eastbound and westbound approaches (left, thru, thru/right). Wyoming Avenue southbound provides 2 lanes (left/thru, right) and Wyoming Avenue northbound provides a single lane. The intersection is controlled by a 3 phase traffic signal.

In an effort to set up the single lane along Essex Street, it is proposed to modify the Millburn Avenue westbound lane designations to remove one of the through lanes (the proposed lane designations at the traffic signal would be left, thru, right). Additionally, we would recommend revising the traffic signal cycle length from 90 seconds down to 70 seconds so that this intersection can be coordinated with the signals in the downtown area.

An alternative to the modification of the lane designations at the intersection would be to create a merge of the Millburn Avenue westbound through lanes beyond the intersection (prior to Essex Street). This segment of Millburn Avenue is straight and level and would effectively accommodate the lane merge. In either case, we would recommend creating a center left turn lane in place of one of the westbound lanes in order to improve the safety of accommodating the left turns into both the South Mountain residential access streets along the south side of Millburn Avenue and the commercial properties along the north side of Millburn Avenue.

Essex Street and Holmes

Currently Essex Street is one way westbound (2 lanes) and Holmes Street is two way with the northbound approach at Essex Street controlled by a Stop sign. There are significant pedestrian crossings at this intersection to/from the train station.

It is proposed to convert Holmes Street to one way northbound. The conversion of Holmes Street to a one way northbound will allow for a widening of the sidewalks to accommodate the significant volume of pedestrians using Holmes as access to/from the train station. The Holmes Street southbound movement will be relocated to Lackawanna Place.

Essex Street and Lackawanna Place

Currently Essex Street is one way westbound providing 3 traffic lanes (left/thru, thru, right). Lackawanna Place provides 2 lane approaches to the intersection (northbound provides left, thru and southbound provides thru, right). The intersection is currently controlled by a traffic signal operating with 2 phases (Essex Street ROW and Lackawanna Place ROW).

It is proposed to remove one of the travel lanes along Essex Street and provide 2 lanes (left/thru, thru/right). The Lackawanna Place approaches will remain. The traffic signal will continue to operate with 3 phases and will be coordinated with the adjacent traffic signals.

Essex Street and Pedestrian Crossing at Parking Garage

Currently there exists a signal controlled pedestrian crossing along Essex Street approximately 200 feet east of the Main Street intersection. This crossing is coordinated with the Main Street traffic signal.

It is proposed to relocate this pedestrian crossing approximately 125 feet to the east in order to align with the stair tower for the recently constructed parking garage. The new location would be close to being equidistant between Lackawanna Place and Main Street. It is proposed that the signal would remain "green" to Essex Street unless a pedestrian activates the signal by pushing the button. At that point the signal would allow the pedestrian crossing movement in coordination with the adjacent Essex Street traffic signals.

Essex Street and Main Street

This intersection has historically seen a high number of crashes (particularly those involving pedestrians). Currently, Essex Street provides 3 travel lanes (left/thru, thru, right), Main Street NB provides 2 travel lanes (left, thru) and Main Street SB provides 2 travel lanes (thru, thru/right). The intersection is controlled by a traffic signal operating on a 3 phase 70 second cycle. The 3 phases include Millburn ROW, Main Street ROW and a Main Street NB lag. Currently Main Street experiences over capacity conditions and significant unmet demand during the peak periods (it is common that motorists wait through 2 or more traffic signal cycles to get through the intersection). The vehicle queues are significant along the Main Street southbound approach.

It is proposed to eliminate the Essex Street left turn movement at this intersection. The 3 travel lanes along Essex Street will remain but will be redesignated (thru, thru, right). It is also proposed to eliminate the Main Street NB left turn onto Essex Street WB in order to simplify the Main Street movements and allow a reduction in the number of lanes on the Main Street NB approach from 2 to 1. The diverted Main Street NB left turn can occur via Millburn Avenue to Lackawanna to Essex or via Taylor Street or Rector Street (parallel roads to the south of Millburn Avenue). The northbound turn restriction and lane reduction is being proposed due to the relatively low traffic volume making the Main Street NB to Essex Street westbound move as well as a strong desire to improve the width and sidewalk space along both sides of Main Street. The Main Street SB lanes will remain as thru, thru/right. The traffic signal will remain as 3 phases to clear the Main Street segment, improve

the stacking, and shorten the vehicle queue length. The “No Turn on Red” condition will remain. The traffic signal phasing and timing is continuing to be evaluated and All Pedestrian Phase or Lead Pedestrian Phase are being considered as well.

Prohibiting the Essex Street left turn movement and the Main Street northbound left turn movement will simplify the intersection which will result in an overall benefit consisting of a safer intersection for pedestrians, more efficient traffic flow and an increased green time for Main Street.

Lackawanna Place and Glen Avenue

Currently, this intersection is controlled by a 3 way Stop. The Lackawanna Place approach provides two lanes (left, right). The Glen Avenue westbound approach provides 2 lanes (left, thru) and the Glen Avenue eastbound approach provides one wide lane that is effectively used as 2 lanes (thru, right). There is debate whether multi-way stop is optimal when the approaches provide more than one lane. Motorists were observed having a hard time applying the ROW rule due to the number of lanes/vehicles that have to be considered. The intersection becomes more complicated with the presence of pedestrians to/from the library and train station.

It is proposed to install a traffic signal at this intersection in order to effectively and safely control the increased traffic volume and pedestrian movements. The elimination of the Millburn Avenue eastbound left turn to Main Street will increase the traffic volume on Lackawanna Place northbound. A portion of those motorists will likely choose to continue along Lackawanna Place to Glen Avenue to reach destinations to the north which will increase the volume at the Glen Avenue intersection. Each approach will remain with 2 lanes and the traffic signal will likely operate with a 3 phase operation (Glen WB Lead, Glen ROW, Lackawanna ROW) coordinated with the signal at Essex Street and Lackawanna Place.

Summary

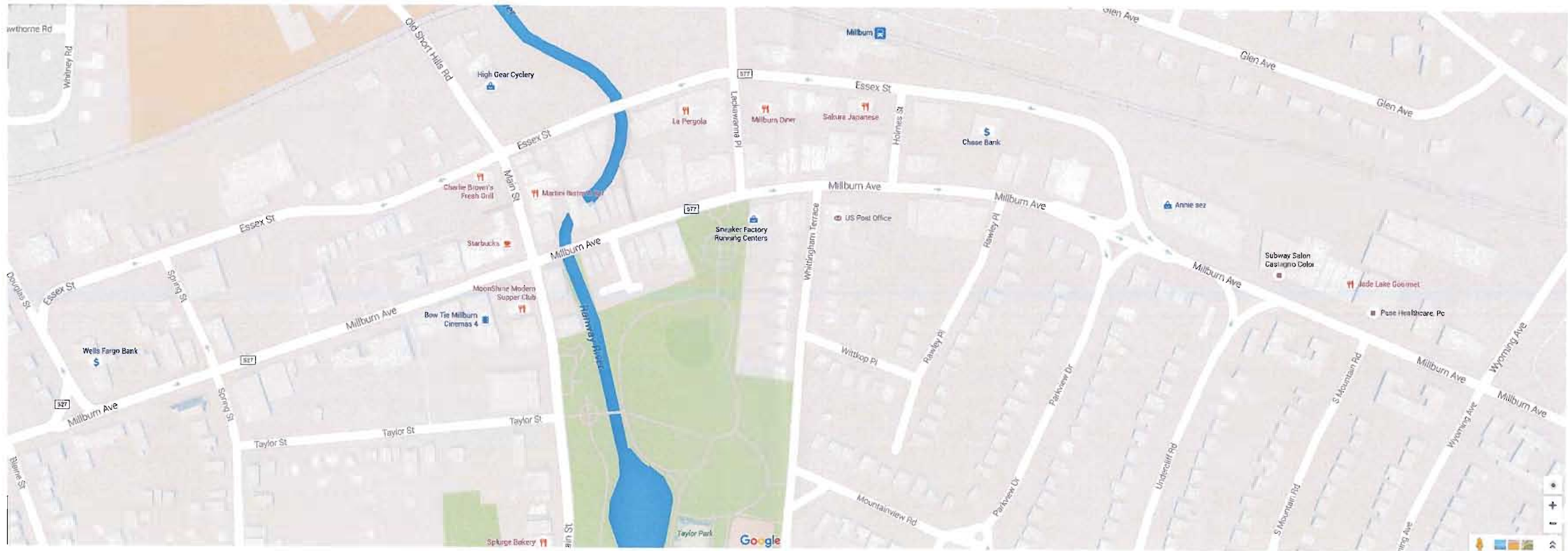
We intend to continue to refine the recommendations and analyses by continuing our work with the Township Police Department, the Township Engineering Office, the downtown stakeholder group and the County Engineering Office. We firmly believe that a balance can be achieved between traffic flow capacity, efficiency, pedestrian safety, and downtown vitality.

Please contact me with any questions.

Sincerely,

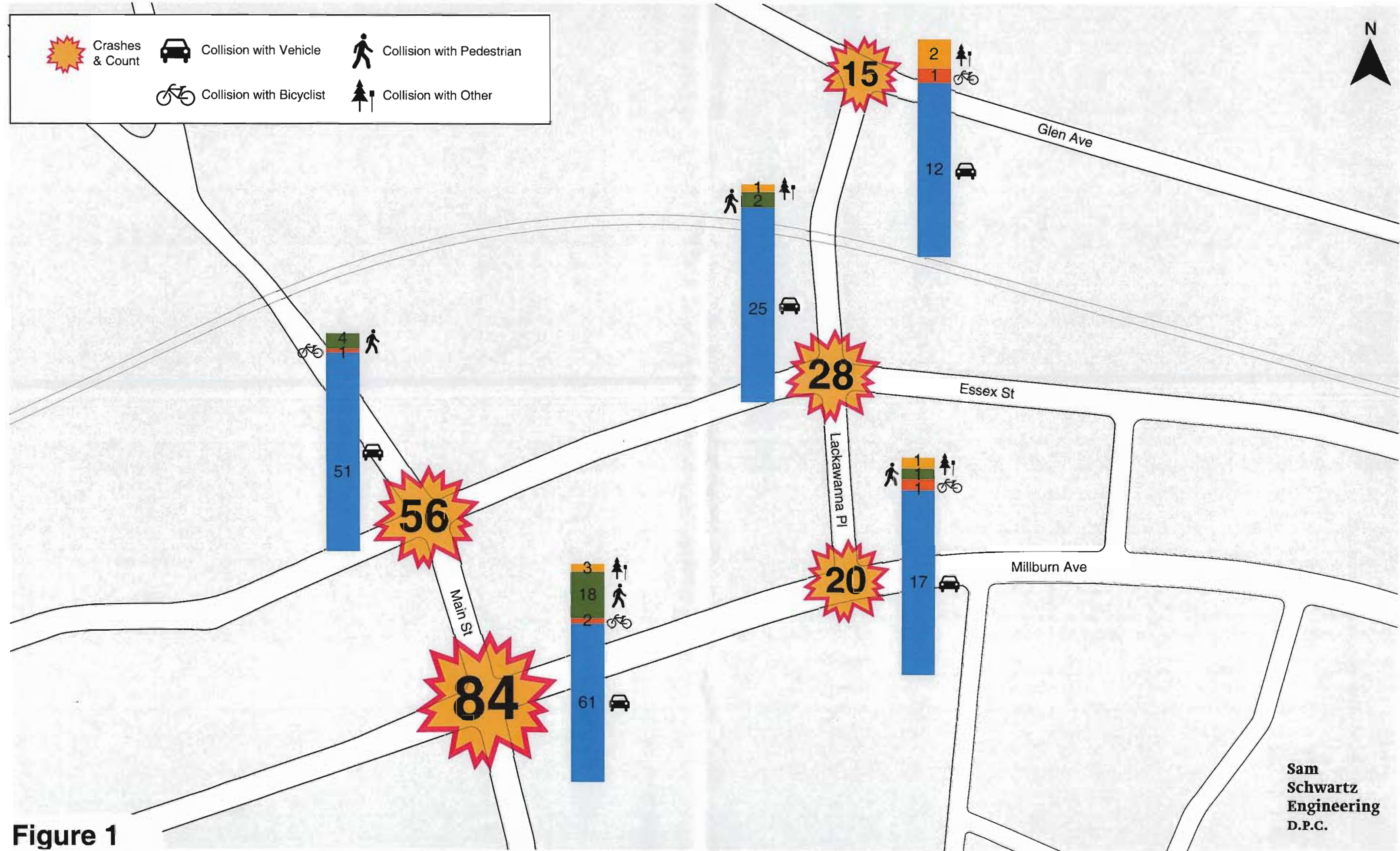
A handwritten signature in black ink, appearing to read "John M. McCormack". The signature is fluid and cursive, with the first name "John" being the most prominent.

John M. McCormack, PE, PTOE
Vice President / Director of Traffic Engineering



Study Area
Map

Millburn Downtown Traffic Study (2012 - 2015)





Ⓢ - Signalized Intersection

Existing Lane Configurations + Signals

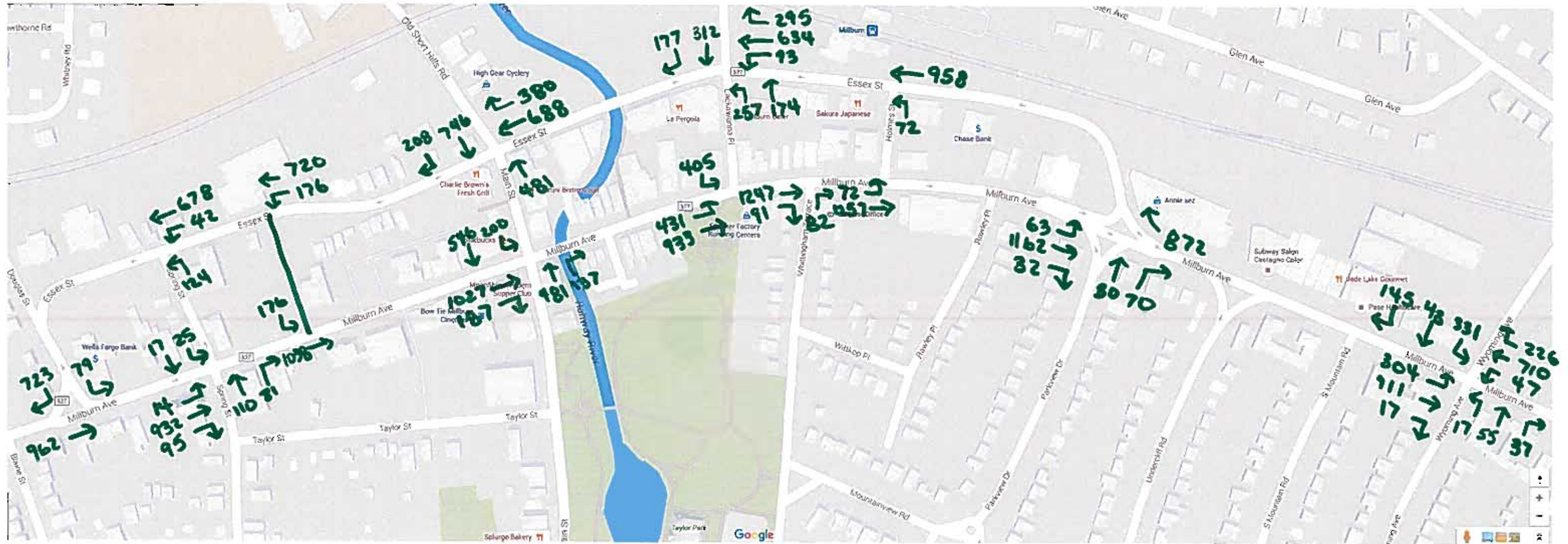


Ⓢ - Signalized Intersection

Proposed Lane
Configurations +
Signals



Existing PM Peak
Traffic Volumes
(2015 Balanced)



Build PM Peak
 Traffic Volumes
 (2035 Balanced)



Summary of
Proposed Recommendations

Existing Weekday PM Peak Hour						
Signalized Intersection	Approach	Lane Group	v/c Ratio	Delay (sec)	LOS	
3. Millburn Avenue & Wyoming Avenue	Eastbound	L	.79	30.3	C	
		TR	.55	18	B	
	Westbound	L	.13	9.5	A	
		TR	.78	30.1	C	
	Northbound	LTR	.30	27.1	C	
	Southbound	LT	.98	73.3	E	
		R	.23	5.0	A	
	Intersection			30.1	C	
	--	--	--	--	--	--
		--	--	--	--	--
--		--	--	--	--	
Intersection			--	--		
7. Millburn Avenue & Lackawanna Place	Eastbound	LT	0.40	7.0	A	
	Southbound	L	0.30	31.6	C	
Intersection			13.2	B		
8. Essex Street & Lackawanna Place	Westbound	LT	0.48	17.0	B	
		--	--	--	--	
	Northbound	R	0.35	3.6	A	
		L	0.09	17.6	B	
		T	0.10	17.5	B	
	Southbound	--	--	--	--	
		--	--	--	--	
		T	0.37	14.7	B	
		R	0.24	6.7	A	
	Intersection			13.1	B	
--	--	--	--	--	--	
	--	--	--	--	--	
	--	--	--	--	--	
	Intersection			--	--	
13. Millburn Avenue & Main Street	Eastbound	LTR	0.68	22.8	C	
		--	--	--	--	
	Northbound	T	0.89	285.1	F	
		R	0.10	3.5	A	
	Southbound	L	0.74	26.0	C	
		T	0.76	19.7	B	
Intersection			75.1	E		
14. Essex Street & Main Street/Old Short Hills Road	Westbound	LT	0.91	45.3	D	
		--	--	--	--	
	Northbound	R	0.14	0.2	A	
		L	0.21	6.9	A	
	Southbound	T	0.68	11.8	B	
		TR	0.57	212.1	F	
Intersection			91.8	F		
49. Essex Street & Mid-Block Crosswalk	Westbound	T	0.21	8.5	A	
	Intersection			8.5	A	

Notes: L = Left Turn, T= Through, R = Right Turn; LOS = Level of Service.

Proposed Weekday PM Peak Hour					
Signalized Intersection	Approach	Lane Group	v/c Ratio	Delay (sec)	LOS
3. Millburn Avenue & Wyoming Avenue	Eastbound	L	1.01	72.9	E
		TR	.57	14.9	B
	Westbound	L	.14	6.1	A
		T	.99	52.5	D
		R	.41	17.2	B
	Northbound	LTR	.79	69.1	E
	Southbound	L	.99	73	E
		TR	.55	30.6	C
	Intersection			40.4	D
	4. Millburn Avenue & Essex/Parkview ROUNDABOUT	Eastbound			
Westbound					B
Northbound					D
--		--	--	--	--
Intersection				A	
7. Millburn Avenue & Lackawanna Place	Eastbound	LT	0.73	4.6	A
	Southbound	L	1.00	71.4	E
Intersection			19.9	B	
8. Essex Street & Lackawanna Place	Westbound	LT	.58	17.1	B
		--	--	--	--
	Northbound	R	0.56	19.8	B
		L	0.68	21.6	C
		T	0.24	12.7	B
	Southbound	--	--	--	--
		--	--	--	--
		T	0.7	29.4	C
		R	0.51	24.9	C
	Intersection			20.4	C
9. Lackawanna Place & Glen Avenue	Eastbound	T	0.84	38.8	D
		R	0.85	43.5	D
	Westbound	L	0.31	12.8	B
		T	0.21	12.8	B
	Northbound	L	0.62	21.6	C
		R	0.11	13.8	B
Intersection			30.0	C	
13. Millburn Avenue & Main Street *	Eastbound	--	--	--	--
		TR	1.03	53.3	D
	Northbound	T	1.04	249.3	F
		R	0.37	26.2	C
	Southbound	L	0.65	35.0	D
		T	0.78	24.6	C
Intersection			81.0	F	
14. Essex Street & Main Street/Old Short Hills Road *	Westbound	--	--	--	--
		T	0.66	22.2	C
	Northbound	R	0.88	41.1	D
		--	--	--	--
	Southbound	T	0.62	16.4	B
		TR	0.67	102.5	F
Intersection			54.5	D	
49. Essex Street & Mid-Block Crosswalk	Westbound	T	0.43	9.2	A
	Intersection			9.2	A

Notes: L = Left Turn, T= Through, R = Right Turn; LOS = Level of Service.

Unsignalized Intersection	Approach	Existing Weekday PM Peak Hour			
		Lane Group	v/c Ratio	Delay (sec)	LOS
4. Millburn Avenue & Parkview Drive	Northbound	R	0.23	16.1	C
	Eastbound	L	0.11	12.3	B
5. Essex Street and Holmes Street	Westbound	LT	.03	1.2	A
	Northbound	L	.18	16.2	C
6. Millburn Avenue & Whittingham Terrace	Northbound	R	0.09	9.7	A
9. Lackawanna Place & Glen Avenue	Eastbound	TR	1.23	136.2	F
		L	0.17	10.4	B
	Westbound	T	0.28	11.1	B
		L	0.59	19.4	C
Northbound	R	0.10	8.6	A	
	TR	0.57	32.7	D	
21. Millburn Avenue & Spring Street	--	--	--	--	
22. Essex Street & Spring Street	Northbound	L	.17	12.8	B
23. Millburn Avenue & Essex Street	Southbound	L	0.40	26.1	D
		R	0.69	15.8	C
24. Millburn Avenue & Holmes Street	Eastbound	LT	.05	2.0	A
	Southbound	L	.08	12.4	B
--	--	--	--	--	

Notes: L = Left Turn, T= Through, R = Right Turn; LOS = Level of Service.

Unsignalized Intersection	Approach	Proposed Weekday PM Peak Hour			
		Lane Group	v/c Ratio	Delay (sec)	LOS
--	--	--	--	--	--
	--	--	--	--	--
5. Essex Street and Holmes Street	--	--	--	--	A
	Northbound	L	.18	15.2	C
6. Millburn Avenue & Whittingham Terrace	Northbound	R	0.13	11.0	B
--	--	--	--	--	--
	--	--	--	--	--
	--	--	--	--	--
	--	--	--	--	--
21. Millburn Avenue & Spring Street **	Northbound	TR	0.99	106.3	F
	Southbound	LT	0.75	159.6	F
22. Essex Street & Spring Street	Northbound	L	.29	15.8	C
23. Millburn Avenue & Essex Street	Southbound	L	0.35	27.5	D
		R	0.76	18.8	C
--	--	--	--	--	--
	--	--	--	--	--
50. Millburn Avenue & New Street **	Southbound	L	.88	79.1	F

Notes: L = Left Turn, T= Through, R = Right Turn; LOS = Level of Service.

* The turn restrictions at these intersections will simplify the vehicle movements, increase efficiency and improve pedestrian safety.

** Millburn Avenue traffic flow is platooned from an upstream traffic signal allowing the side street turns to operate more efficiently than results may indicate.

LEVEL OF SERVICE

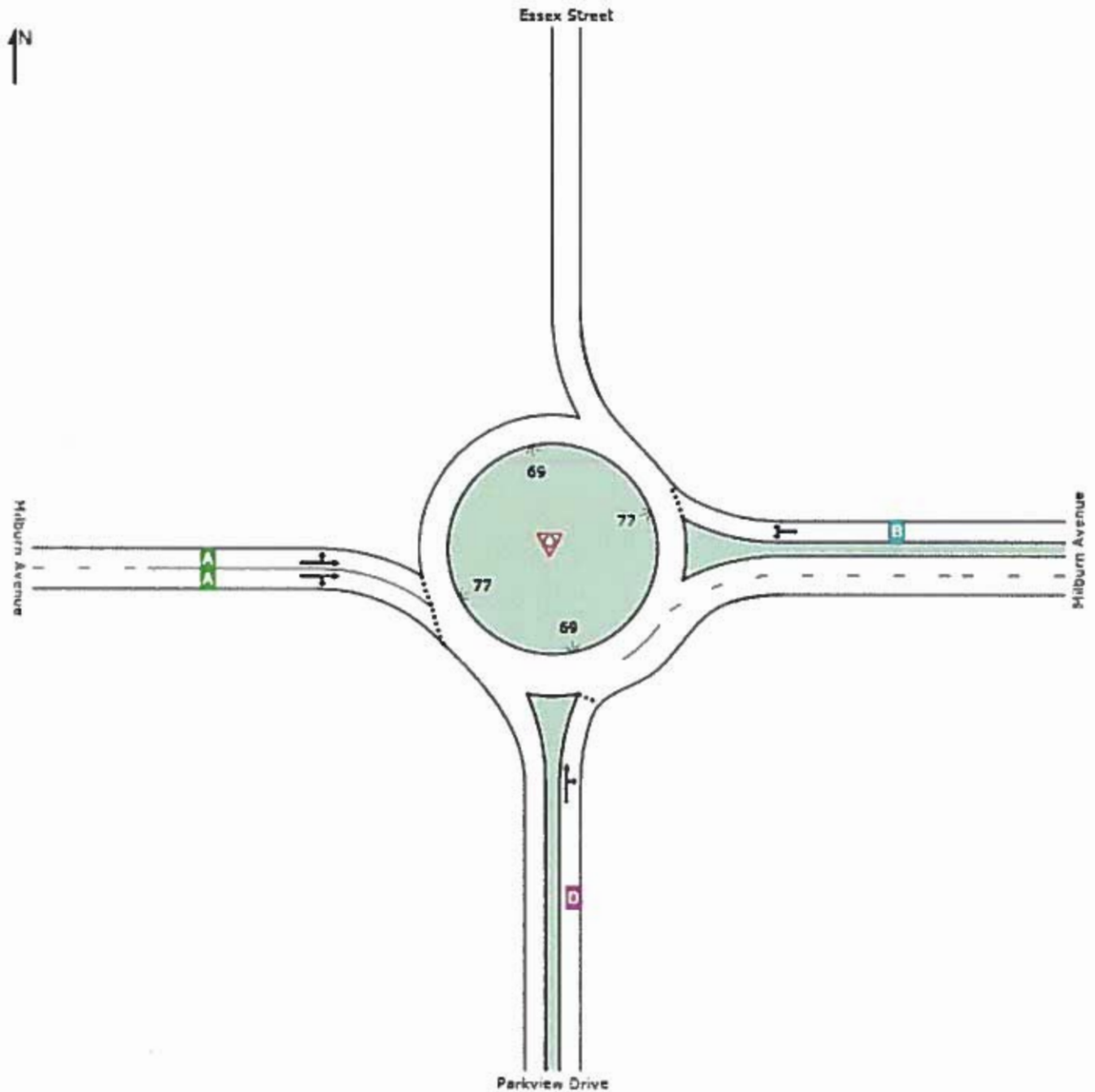
Site: Miburn Avenue and Essex Street/Parkview Drive

New Site
Roundabout

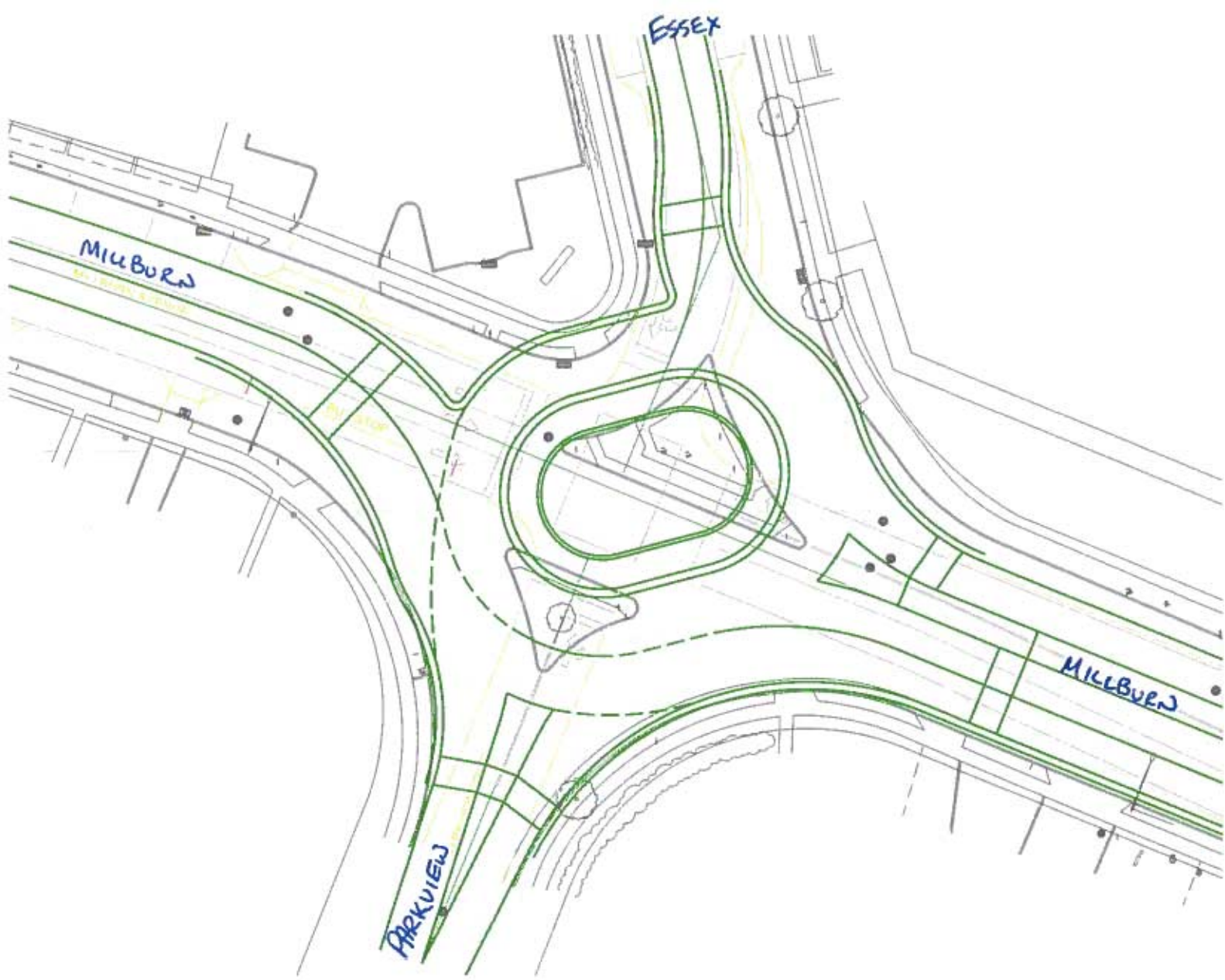
OPTION 1
MILBURN WB TO ESSEX
1 LANE

All Movement Classes

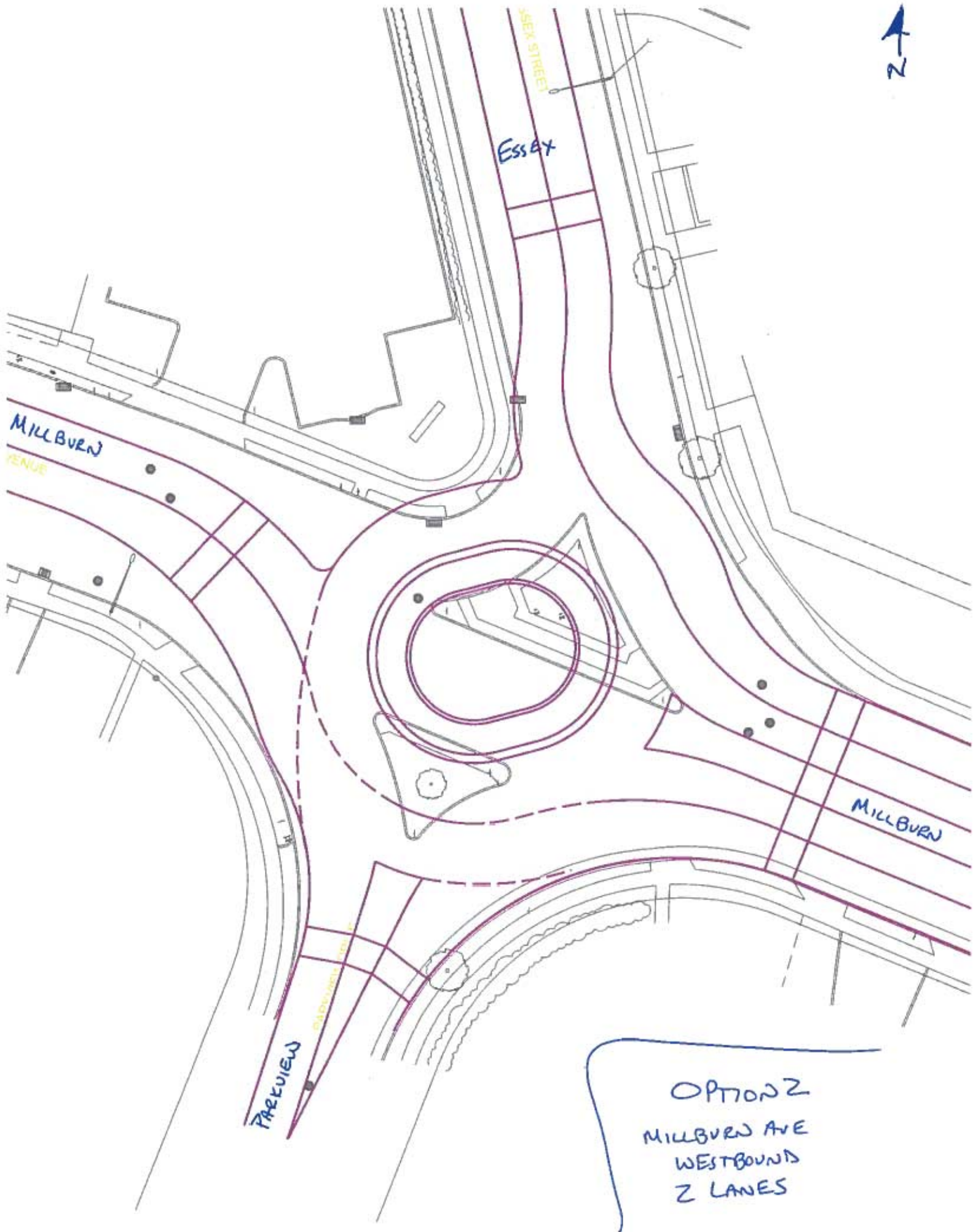
	South	East	West	Intersection
LOS	D	B	A	A



Level of Service (LOS) Method: Delay & v/c (HCM 2010).
 Roundabout LOS Method: Same as Signalised Intersections.
 Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.



OPTION 1
MILBURN WB
1 LANE



OPTION 2
MILLBURN AVE
WESTBOUND
2 LANES