Wilmington
Cross Street Analysis

Community Transportation Technical Assistance Program

Prepared for:
Town of Wilmington

Fall 2013

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Project Description

The Town of Wilmington and its residents place a high importance on recreational open spaces since they contribute to town character and provide recreational opportunities. Accordingly, the Town of Wilmington has recently purchased the vacant Yentile farm site, located on the east side of Cross Street between Lowell Street and Main Street, and is interested in creating a master plan for use of the site as a multi-purpose destination.. Although plans for the park are still in the initial phases, playing fields, a dog walking park, picnic area, play areas, informal recreation spaces and walking paths are being considered for the site.

Wilmington recognizes the importance of safe and efficient access to recreational open space for all users – pedestrians, bicyclists, and vehicles. In view of this, Wilmington has asked the Metropolitan Area Planning Council (MAPC) to prepare a Technical Memorandum that will give preliminary recommendations regarding the treatment of Cross Street, parking locations for visitors at or near the site, as well as access for pedestrians and bicyclists in the immediate area. The recommendations in this Technical Memorandum should be taken into consideration as conceptual park designs are prepared.

The location and short length of Cross Street allows consideration for a variety of alternative treatments to the roadway. In view of this, MAPC and the Central Transportation Planning Staff (CTPS) identified and analyzed 6 alternatives for the section of Cross Street between Lowell Street and Main Street:

1. Maintain Cross Street as a Two-Way Roadway (Existing Condition)
2. Discontinue Vehicular Access
3. Allow One-Way Southbound Access
4. Allow One-Way Northbound Access
5. Restrict Vehicular Access during Certain Times of the Day or Days of the Week
6. Retrofit Cross Street with Traffic Calming Measures

Project Study Area

Located slightly over a mile southeast of Wilmington's Town Center, the parcel of land along Cross Street between Lowell Street and Main Street is mostly undeveloped. Surrounding the site are residential homes to the north and a small retail and business establishment to the south, Webber Terrace, located at the corner of Cross Street and Main Street. Land uses in the surrounding area of Cross Street are a mix of residential, commercial, retail, and open space. A map of the study area is shown in **Figure 1**, *Study Area*.

The entire limit of Cross Street extends between Muse Avenue in the north and Main Street (Route 38) in the south, totaling approximately 1,026 feet. MAPC's study focuses on the section of Cross Street between Lowell Street (Route 129) and Main Street. Between Lowell Street and Main Street, Cross Street is a two lane Rural Minor Collector that extends in a north-south direction for approximately 750 feet. South of Main Street, Cross Street continues as Butters Row. Roadway ownership in the study area varies, as Cross Street and Lowell Street are under Town jurisdiction, and Main Street is under MassDOT jurisdiction.

Figure 1. Study Area

The Cross Street intersections with Main Street and Lowell Street are both unsignalized and demarcated with stop signs on the Cross Street approach. The stop bar striping at Cross and Lowell Street is faded and there is no stop bar at Cross and Main Street. The pavement width of Cross Street varies between 18-22 feet with a right-of-way of 40 feet. There is a double yellow center line and faded edge striping. Within the study area, there are no sidewalks or bicycle lanes on either side of Cross Street. A crosswalk is available at the intersection of Cross Street and Lowell Street, to provide a crossing along the existing sidewalks on Lowell Street. No sidewalks or crosswalks are available at the intersection of Cross Street and Main Street. There are no MBTA bus routes or stops along Cross Street or in the study area.

Cross Street approach at Lowell Street

Cross Street approach at Main Street

Due to the close proximity of the Cross Street intersections to the intersection of Main Street and Lowell Street, all three intersections were analyzed to determine the impacts of the various alternatives. Posted at 35 MPH and 45 MPH respectively, Main Street and Lowell Street are classified as Rural Minor Arterials and extend east-west with one lane in each direction.

Existing Conditions

Vehicle Volumes

In order to assess existing traffic volumes on Cross Street, the Wilmington Police Department collected two 24-hour traffic counts using an Automated Traffic Recorder (ATR) on May 6-7 and May 9-10, 2013. A total of 2,734 vehicles were recorded using Cross Street. Of these trips, 62% traveled northbound (from Main Street to Lowell Street) and 38% traveled southbound (from Lowell Street to Main Street). While the speed limit on Cross Street is 30 MPH, the 85th percentile speed[1] was 35 MPH. The relatively high vehicle speed is noteworthy, especially given the short distance of Cross Street. Traffic count data collected for Cross Street by the Wilmington Police Department is contained in **Appendix A**, *Cross Street-Traffic Counts*.

The Central Transportation Planning Staff (CTPS) conducted manual Turning Movement Counts (TMCs) on Wednesday, May 1, 2013 for the three study-area intersections ((1) Cross

[1] 85th percentile speed is the speed at or below 85 percent of vehicles travel.

Street and Lowell Street, (2) Cross Street and Main Street, and (3) Main Street and Lowell Street) during the weekday morning and the weekday evening peak periods. Vehicular turning movement volumes for existing conditions are illustrated in **Figure 2**, *Existing Conditions - Turning Movement Counts*.

Delay Analysis

In addition to performing the traffic counts, CTPS calculated level of service[2] (LOS), delay[3], and 95th percentile vehicle queues[4] for the three study-area intersections. Level of Service, average delay and queue lengths are shown in **Appendix B**, *Level of Service Analysis*. Under existing conditions, traffic flows continuously along Main and Lowell Streets in both directions for both the AM and PM peak periods. Conversely, Cross Street experiences traffic delays (LOS E and LOS F) at both the Main Street and Lowell Street intersections in the morning and evening peak periods, as there are minimal gaps in vehicular flow on the major roadways to make a turn from Cross Street.

Parking

Currently, there are no designated on-street parking spaces along either side of Cross Street, and parking is not available along Main and Lowell Streets within the study area. Webber Terrace, a small retail and business establishment with approximately 90 off-street surface parking spaces, is located at the intersection of Cross Street and Main Street. During field observations it was noted that parking spaces within Webber Terrace are underutilized, as generally less than half of the spaces were occupied during business hours.

Crash Data

Motor Vehicle crash data of the project study area from 2008-2010 was obtained from the Massachusetts Department of Transportation. Over this three year period, there were 69 crashes in the study area (including mid-block crashes). Most of the crashes involved property damage and none of the crashes had fatalities. **Table 1**, *Vehicle Crash Summary*, summarizes the motor vehicle crashes by location, year, collision type, crash severity, time of day, pavement conditions, and lighting conditions. A map of the 69 motor vehicle crashes locations along with a companion table summarizing the specifics of each accident is contained in **Appendix C**, *Study Area Crash Map and Summary Table.*

Of the crashes within the study area, the intersection of Main Street and Cross Street experienced the highest number. The intersection had 19 crashes (28% of the total crashes in the study area), and 8 crashes (42%) that involved injuries. Although Lowell Street experiences 40% higher volumes than Main Street, and thus a higher likelihood of crashes, only 4 crashes were recorded at the Lowell and Cross Street intersection, including one injury.

Of the 19 crashes at the Main and Cross Street intersection, 11 were angle collisions and one crash involved a pedestrian. The majority of these crashes took place on weekdays under dry pavement conditions. Of the 4 crashes at the Lowell and Cross Street intersection, two were angle and two were rear-end collisions.

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[2] Level of Service. A qualitative measure of control delay at an intersection. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

[3] Additional travel time due to traffic conditions.

[4] The queue length that has only a 5 percent probability of being exceeded.

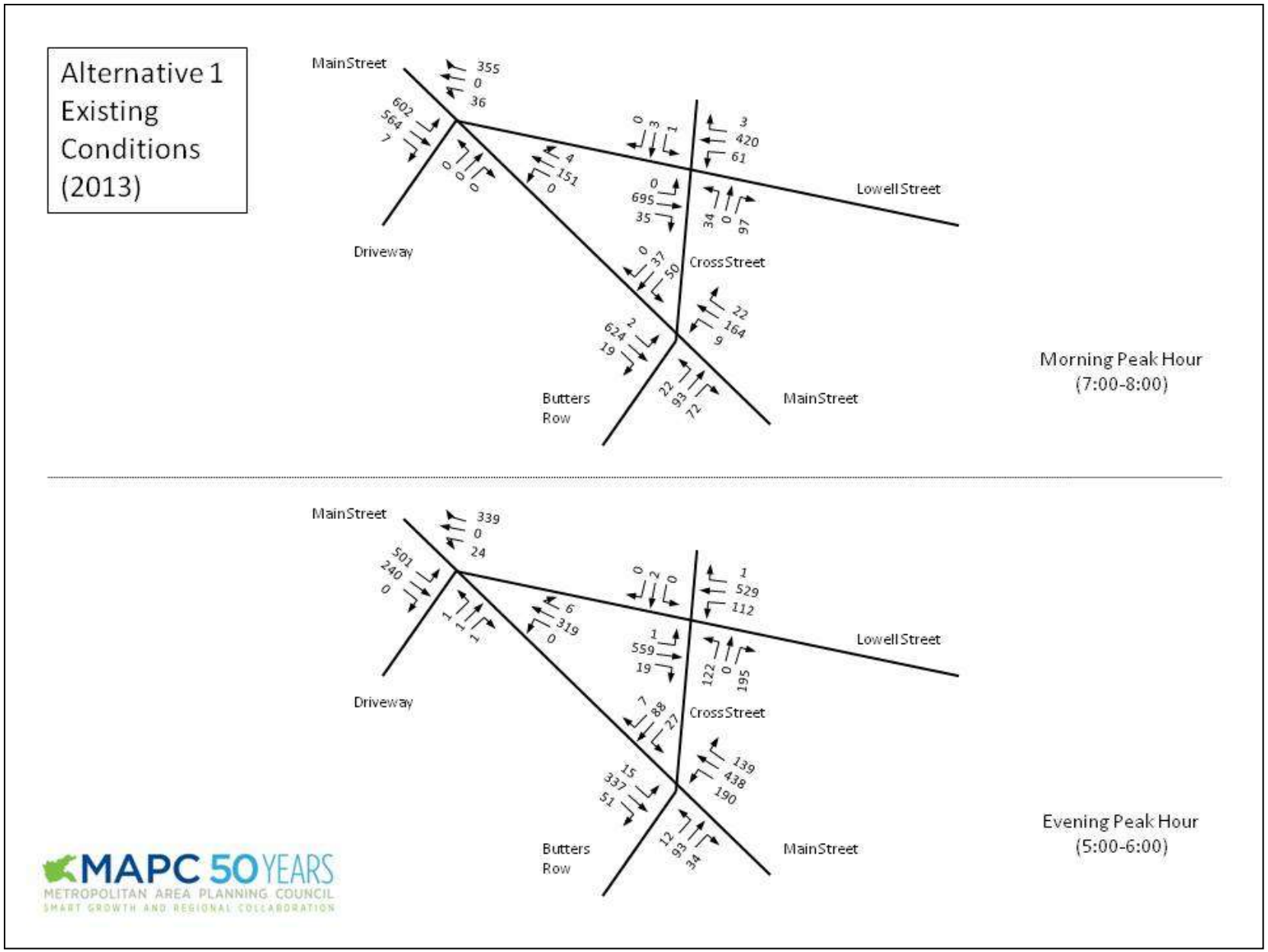


Figure 2. Existing Conditions - Turning Movement Counts

Table 1. Study Area Crash Summary

	Main Street at						Lowell Street at		
	Cross Street	Hayden Printing Driveway	Driveway btwn Hayden Printing & Salvation Army	Bryant Glass Co. Driveway	Between Kieman Avenue and Ranch Road	Lowell Street	Parker Street	Cross Street	Molloy Road
Year									
2008	5	0	0	1	8	2	2	2	0
2009	6	0	0	2	5	0	5	0	1
2010	8	1	1	3	6	2	6	2	1
Total	**19**	**1**	**1**	**6**	**19**	**4**	**13**	**4**	**2**
Average per year	6	0	0	2	6	1	4	1	1
Collision Type									
Angle	11	0	1	3	7	2	5	2	0
Head-On	1	0	0	0	1	0	0	0	1
Rear-End	3	1	0	3	9	2	3	1	1
Sideswipe, opposite direction	0	0	0	0	0	0	2	0	0
Sideswipe, same direction	1	0	0	0	0	0	2	0	0
Single Vehicle Crash	1	0	0	0	1	0	0	0	0
Not Reported/Unknown	2	0	0	0	1	0	1	1	0
Crash Severity									
Fatal Injury	0	0	0	0	0	0	0	0	0
Non-Fatal Injury	8	1	0	2	5	1	1	2	1
Property Damage Only (none injured)	11	0	1	4	13	3	12	2	1
Not Reported/Unknown	0	0	0	0	1	0	0	0	0
Time of Day									
Weekday, 7:00AM-9:00AM	1	0	0	0	1	0	4	2	0
Weekday, 4:00PM-6:00PM	6	0	1	0	0	1	1	0	1
Saturday, 11:00AM-2:00PM	1	0	0	0	3	1	1	0	0
Weekday, Other Time	8	1	0	5	6	2	6	2	0
Weekend, Other Time	3	0	0	1	9	0	1	0	1
Pavement Conditions									
Dry	16	0	1	4	18	3	10	4	2
Wet	3	1	0	2	1	1	3	0	0
Snow	0	0	0	0	0	0	0	0	0
Ice	0	0	0	0	0	0	0	0	0
Lighting Conditions									
Daylight	16	1	1	6	16	4	9	4	2
Dawn/Dusk	1	0	0	0	0	0	1	0	0
Dark-Lighted Roadway	1	0	0	0	2	0	2	0	0
Dark-Roadway not Lighted	1	0	0	0	1	0	1	0	0
Non Motorist (Bike, Pedestrian)	1	0	0	0	0	0	0	0	0

Source: MassDOT crash database records (2008-2010), compiled by MAPC

The high number of crashes at the intersection of Cross Street and Main Street is most likely attributable to an obstructed sightline for drivers at the southbound Cross Street approach due to the significant grade change and curvature of the roadway. A 45 MPH posted speed limit on Main Street is also a contributing factor.

Sight Distance Survey

Due to the high number of crashes at the Cross Street and Main Street intersection, MAPC staff conducted an intersection sight distance survey on September 26, 2013. An intersection sight distance survey is a measurement of how far a driver can see at an approach.

The drivers of vehicles approaching an intersection should have unobstructed views to see conflicting vehicles in adequate time to avoid a potential crash. The required sight distance for safe operation at an intersection is directly related to vehicle speed and the distances traveled during perception, reaction, and braking times. At 45 MPH, the speed limit of Main Street, the minimum sight distance criteria is significantly higher than 30 MPH roadways due to the additional time required for a driver to come to a stop. **Table 2**, *Recommended and Observed Sight Distances for Cross Street*, details the national standard (AASHTO)[5] sight distance recommendations for vehicles waiting to turn onto 45 MPH roadways, as well as the observed sight distances at the Cross Street approach at Main Street. This table includes the sight distance measurement from both the stop sign location (in general, the required location for a vehicle to stop) as well as measurements from the edge line of Main Street, where many vehicles approaching the intersection were observed to stop.

Table 2. Recommended and Observed Sight Distances for Cross Street

	Minimum Recommended Intersection Sight Distance for Passenger Cars (feet)	Cross Street observed sight distance from stop line (feet)	Cross Street observed sight distance from edge line (feet)
Right Turn From Stop	430	186	522
Left Turn From Stop	500	106	186

RED numbers illustrate an observed sight distance that is less than the recommended sight distance.
Source: American Association of State Highway and Transportation Officials (AASHTO), 2001 – A Policy on Geometric Design of Highways and Streets (Green Book), 4th edition.

The sight distance survey indicated that there are significant sight distance issues for the Cross Street approach at Main Street. It is necessary for vehicles turning right from Cross Street to move up to the Main Street roadway edge line, well beyond the stop sign location, to have enough visibility to make a left or right turn. Vehicles turning left from Cross Street to Main Street encounter significant grade and road curvature issues. In addition, there are large rocks lining the roadway in front of the Webber Terrace shops that obstruct visibility. Even when advancing toward the edge line of the roadway, left turning vehicles do not even have *half* of the recommended sight distance to safely make a turn, as the recommended sight distance is 500' and only 186' of distance is available from the edge line of Main Street.

[5] American Association of State Highway and Transportation Officials

Vehicles on Cross Street stop at Main Street edge line (well beyond stop sign) for improved visibility

Based on comparing the national standard for recommended sight distances to the observed sight distances it was determined that the Cross Street approach to Main Street, especially for left turns, is unsafe due to limited sight distance. In order to address this safety issue the alternatives can include:

- Signalizing the intersection (if warranted)
- Reconstructing the roadway to reduce vertical and horizontal curvature
- Restricting left turns from Cross Street onto Main Street
- Discontinuing southbound access along Cross Street

Reducing the speeds along Main Street is also an option; however, speeds would have to be reduced under 20 MPH for adequate left-turn sight distance.[6] The results from the sight distance study were strongly considered in our alternatives analysis.


Limited sight distance for Cross Street looking left onto Main Street

[6] Recommended left-turn sight distances for various MPH: 445' for 40 MPH, 335' for 30 MPH, 225' for 20 MPH. The Cross Street left-turn approach currently has 186' of sight distance from the edge line.

Cross Street Alternatives Analysis

As designs for the town park are being considered, the treatment of Cross Street is an important consideration given its location adjacent to the site. Six various alternatives for Cross Street were considered:

1. Maintain Cross Street as a Two-Way Roadway (Existing Condition)
2. Discontinue Vehicular Access
3. Allow One-Way Southbound Access
4. Allow One-Way Northbound Access
5. Restrict Vehicular Access during Certain Times of the Day or Days of the Week
6. Retrofit Cross Street with Traffic Calming Measures

As part of this analysis, vehicle volumes for each alternative were adjusted to account for the various restrictions for Cross Street. To be conservative, it was assumed that all re-routed vehicles would travel through the Main Street at Lowell Street intersection. Figures showing the vehicle volumes for each alternative are depicted in **Appendix D**, *Alternative Turning Movement Figures*.

The level-of-service (LOS), delay, and 95th- percentile vehicle queues were analyzed for each alternative and the projected impacts for each are summarized below. Detailed information for each alternative is presented in **Appendix B**, *Level of Service Analysis*.

Alternative 1. Maintain Cross Street as a Two-Way Roadway (Existing Condition)

As described in more detail in the Existing Conditions section on page 5, traffic flows continuously along Main Street and Lowell Street in both directions for both the AM and PM peak periods. Cross Street, with stop control, experiences traffic delays at both the Main and Lowell Street intersections in the morning and evening peak periods.

Given the sight distance issue at the Cross Street approach at Main Street, *the existing condition is considered a safety hazard*. In order to improve the sight distance issue, alternatives include signalizing the intersection (if warranted), reconstructing the roadway to reduce vertical and horizontal curvature, significantly reducing speeds on Main Street to less than 20 MPH, restricting left turns from Cross Street onto Main Street, or discontinuing southbound access along Cross Street. Given the small volume of vehicles turning left from Cross Street to Main Street, it is recommended that an immediate and low-cost recommendation be implemented if existing conditions are to remain, such as restricting left-turns from Cross Street onto Main Street or discontinuing southbound access along Cross Street between Lowell Street and Main Street.

Alternative 2. Discontinue Vehicular Access

If all vehicular traffic on Cross Street were discontinued, eastbound and westbound traffic along Lowell and Main Streets would continue to operate at free-flow conditions for both the AM and PM peak periods. However, the recently reconstructed Main and Lowell Street intersection would experience an increase in delays and queuing which would require the signals to be optimized and the pavement striping to be updated to account for the changes. With the optimized signals, the Route 129 westbound left-turn approach would experience

an increase in delays from LOS C to LOS E in the morning and evening peak hours, and queues would exceed capacity, blocking the through lane, especially in the evening peak hour. All other approaches are expected to operate at acceptable levels of service.

Given the potential disruption to local traffic patterns, as well as the expected increase in vehicular delay with this alternative, it is not recommended to discontinue this road for all vehicular access. Cross Street serves as a north-south connection for local traffic wishing to bypass the Main Street and Lowell Street intersection, and it is not essential or advisable to close it completely, unless the Town wishes to utilize it as additional park space or designate it as a large parking area for the proposed park.

Alternative 3. Allow One-Way Southbound Access

If Cross Street were to be altered to allow for one-way southbound access only, eastbound and westbound traffic on Lowell and Main Streets would continue to operate at free-flow conditions. Vehicles turning onto Cross Street from both Lowell and Main Streets would not experience significant delays. However, traffic on Cross Street would continue to experience congestion and delay.

MAPC strongly advises against one-way southbound access on Cross Street, due to the sight distance issues for drivers turning from Cross Street onto Main Street, especially those making left-hand turns. Additionally, the Cross and Main Street intersection has a high crash rate with a significant number of injuries. A one-way southbound Cross Street would only exacerbate an already dangerous intersection.

Alternative 4. Allow One-Way Northbound Access

If Cross Street were to be altered to allow for one-way northbound access only, eastbound and westbound traffic along Lowell and Main Streets would continue to operate at free-flow conditions for both the AM and PM peak periods. The recently reconstructed Main and Lowell Street intersection would experience an increase in delays and queuing for the westbound left-turn lane which would require the signals to be optimized and the pavement striping to be updated to account for the additional left-turn volume. Northbound traffic on Cross Street at the intersection of Lowell Street is projected to experience delays similar to existing conditions due to the stop approach.

Allowing one-way access on Cross Street would free up space on the roadway and allow for a few amenities for the park, including bicycle lanes on the roadway, on-street parking, and slower vehicle speeds.

Alternative 5. Restrict Vehicular Access during Certain Times of the Day/Days of the Week

As the plans continue for the proposed park, considering closure of the roadway may be appropriate for certain days, but would not be recommended during peak morning or evening weekday commute hours, as the impacts on the Main Street at Lowell Street intersection would be significant. In general, restricting vehicular access during certain times of the day or days of the week may result in driver confusion, so signage and advance notice to local residents would be necessary if this alternative were implemented.

Alternative 6. Retrofit Cross Street with Traffic Calming Measures

Traffic calming measures, intended to slow and reduce traffic, could potentially lead to more attentive driving and reduced crashes. The following traffic calming measures are recommended:

- Pavement Markings – By guiding movement and promoting safety, pavement markings play a critical role in roadway safety. It is important to ensure that crosswalks, shoulders, stopbars, and other pavement markings are clearly painted. Clearly painted pavement markings can also increase driver awareness of bicyclists using the roadway network.

- Speed Limit Signs – Install speed limit signs to clearly inform drivers of their travel speeds and increase awareness of their surroundings.

- Speed Humps – A speed hump is an asphalt ridge placed laterally across the traveled portion of the road which is about a foot wide and 3 to 4 inches high. It is a physical and visual change that could potentially lead to more attentive driving, reduced crashes and an increased tendency for vehicles to yield to pedestrians and bicyclists. The feasibility of installing a speed hump to be sited across the middle of Cross Street should be further explored to potentially reduce vehicle speeds and discourage its use as a cut-through roadway. It is important to note that the presence of speed humps presents a significant concern for having a negative impact to the blades of snow removal vehicles and to the maintenance of the speed hump itself.

Parking

There are multiple parking opportunities near Cross Street, if the Yentile site is converted to an all-purpose recreational open space:

- The Town of Wilmington should engage the owners of Webber Terrace to determine if the existing underutilized parking can be shared prior to the construction of any new parking. Webber Terrace is accessible from two driveways, one on Cross Street and the other on Main Street. This option should be explored regardless of the selected alternative for Cross Street.

- If Cross Street is discontinued completely (Alternative 2), all traffic currently utilizing Cross Street would be rerouted to the Main Street at Lowell Street intersection, causing significant delay and queues at the intersection. With the discontinued roadway, a parking lot could be installed for the park space, with an access and egress point at the Cross Street and Lowell Street intersection.

- If Cross Street is limited to northbound travel (Alternative 4), vehicles currently utilizing Cross Street to travel southbound would be required to reroute their trip to the Main Street at Lowell Street intersection, transferring additional demand on that newly reconstructed intersection. With the additional space available on Cross Street

due to the removal of a travel lane, approximately 20 spaces of on-street parking can be added to the roadway.

- Another alternative is to explore purchasing land on the opposite side of Cross Street from the park, and utilizing that space for parking.

Pedestrian and Bicycle access to Surrounding Open Space and Recreation Facilities

To encourage area residents to access the proposed park site by bicycle, it should also be a priority to include bicycle parking spaces as part of the park's design. The feasibility of adding bicycle parking spaces in close proximity to the recreational space should also be considered (i.e., the Webber Terrace parking lot and other nearby retail, restaurant, and commercial spaces).

According to Wilmington's 2001 Master Plan, nearby Town Park is approximately 52 acres and contains softball fields, a playground, and natural wooded areas and is a popular gathering place for sledding in the winter. Town Park is almost a mile from the intersection of Cross Street and Main Street and is located off of Main Street. If the Yentile site is converted to an all-purpose field, it is highly recommended that pedestrian and bicycle access be provided along one side of Main Street in order to encourage access to/from the existing Town Park. Specifically, access can be promoted by adding a sidewalk and/or a bicycle lane.

Additionally, Textron Systems Corporation owns athletic fields north of the Yentile property on Lowell Street, approximately 600 feet east of the Cross Street and Lowell Street instersection. This recreational area, which contains one baseball field and four tennis courts, is currently not open to the public. As park designs advance for the Yentile site, coordination with potential integration with Textron's recreational facility is recommended.

An additional consideration is to explore the installation of bicycle lanes on Lowell Street. Currently there are wide striped shoulders on the roadway, and they appear to provide adequate space for a bicycle lane. By providing bicycle access on surrounding roadways, the Town would further encourage bicycle access to the proposed park, which could further the park use among school-age children. Bicycle lanes or shared lanes (sharrows) could be considered on Main Street when sight line and speed issues are further addressed.

Conclusion

As mentioned previously, regardless of plans for advancing the Yentile site, it is highly recommended that the Town address the southbound approach on Cross Street at Main Street as soon as possible. Given that Main Street is under MassDOT jurisdiction, changes to this intersection will have to be coordinated with the state. Changes to the roadway to increase safety should be prioritized. Short term alternatives include restricting left turns at the southbound approach or limiting southbound traffic completely. Longer term alternatives include reconfiguring the intersection's geometry so that Cross Street meets Main Street at a right angle and away from the vertical curve. Given the relatively low southbound volumes

on the roadway (1,000 vehicles per weekday), short-term restrictions on southbound travel should not impact a significant amount of local residents.

Although the plans for the park are not yet finalized, based on an initial review of available information about the plans for the park, technical information, and numerous site visits, MAPC recommends that the Town of Wilmington explore the possibility of reconfiguring Cross Street for one-way northbound access only. A review of traffic volumes, crash data, the sight distance survey, and the desire to improve accessibility for bicyclists and pedestrians all support this recommendation. In order to thoroughly prepare for the change in configuration, signal and striping improvements would be required at the Main and Lowell Street intersection in order to accommodate the additional queuing of vehicles at that intersection.

A conceptual plan of what Cross Street could look like if it were modified for northbound access is illustrated in Figure 3, *Cross Street - One-Way Northbound Access*. Specifically, the current northbound travel lane would be converted to a parking lane and the existing southbound lane used as the new northbound lane. The concept also shows a new bicycle lane on Cross Street, as well as 20 new on-street parking spaces to be sited along the east side of Cross Street. Parking on the east side of Cross Street will provide direct access to the park and minimize and pedestrian and vehicle conflicts as no pedestrians would need to cross the roadway. These new parking spaces would be publically available for users of the new recreational open space. It is important to note that parallel parking along Cross Street can also function as a traffic calming measure. A parking demand analysis should be performed when the park layout is finalized, but it is likely that the parking spaces along Cross Street, and/or the parking lot at Webber Terrace would be adequate for the users of the new recreational space.

Converting Cross Street to one-way northbound access supports the users of all modes, since side street parking and traffic calming will promote a safer environment for pedestrians and bicyclists who will be attracted to use the new recreational facility. It is important to note, however, it is expected that the alternative would increase idling, delay, and queuing as vehicles would be shifted from unsignalized Cross Street to the signalized intersection of Main Street and Lowell Street.

It is recommended that the Town consider Alternatives 5 and 6 in conjunction with any changes to Cross Street. These alternatives could be implemented simultaneously with the one-way northbound alternative, or could be initiated with a two-way Cross Street alternative if the Main Street at Cross Street intersection is reconstructed to allow for appropriate sight distance.

Once the sight distance issues are resolved at the intersection of Cross Street and Main Street, a new crosswalk should be installed at this location. The existing crosswalk at the intersection of Cross Street and Lowell Street should be repainted and redesigned to include a new crosswalk across Lowell Street on the east side of the intersection with Cross Street. A sidewalk extending the length of the east side of Cross Street should also be installed. It is important to note that these recommendations were developed prior to a final design for the park. As the park design is finalized and utilization determined, the Town of Wilmington should revisit this report and implement the recommendations which are most suitable.

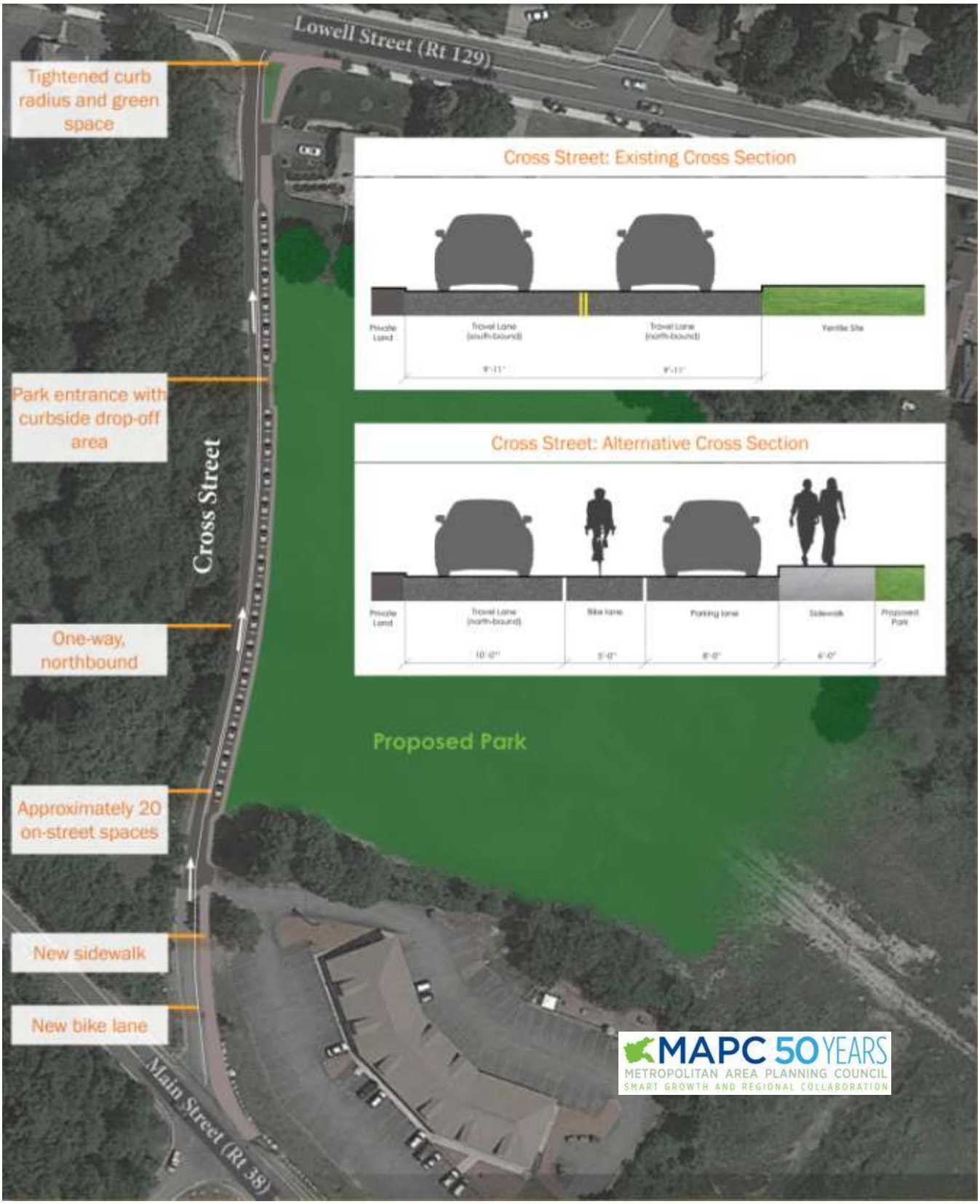


Figure 3. Cross Street - One-Way Northbound Access (Alternative 4)

Appendix A.

Cross Street Traffic Counts*

*For the May 9-10 counts, the northbound traffic was mislabeled as southbound. The correction is reflected in the analysis. For more information, please contact Brian Moon, Town of Wilmington Police.

05/09/13
11:15:13

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

*** Special Speed Study (#203) ***

Site ID : 2 CROSS ST
Info 1 : LOWELL ST. — North within St.
Info 2 : MAIN ST — From Vickers St.
Data Starts : 12:00 on 05/06/13
Data Ends : 11:00 on 05/07/13
Adj. Factor : 1.000%

Lane #1 Info : NORTH.
Modes : AXLE,SPEED
Sensors : Axle-Axle Sensor Spacing: 10.0'

********** Lane 1 Special Speed Study **********

Date	Time	#1 0-19.9	#2 20-24.9	#3 25-29.9	#4 30-34.9	#5 35-39.9	#6 40-44.9	#7 45-49.9	#8 50-54.9	#9 55-59.9	#10 60-64.9	#11 65-69.9	#12 70-74.9	#13 75-79.9	#14 80-84.9	#15 85-89.9	#16 Other	Error	Total
05/06/13	12:00	0	4	24	18	2	0	0	0	0	0	0	0	0	0	0	0	0	48
Mon	13:00	0	6	19	35	5	0	0	0	0	0	0	0	0	0	0	0	0	65
	14:00	0	5	28	16	5	0	0	0	0	0	0	0	0	0	0	0	0	54
	15:00	2	9	25	37	8	0	0	0	0	0	0	0	0	0	0	1	0	82
	16:00	3	10	32	32	6	1	0	0	0	0	0	0	0	0	0	0	0	84
	17:00	0	11	35	54	6	2	0	0	0	0	0	0	0	0	0	1	0	109
	18:00	1	3	31	31	5	0	0	0	0	0	0	0	0	0	0	0	0	71
	19:00	1	3	18	33	5	0	1	0	0	0	0	0	0	0	0	0	0	61
	20:00	0	2	12	13	5	0	0	0	0	0	0	0	0	0	0	0	0	32
	21:00	0	2	9	7	5	0	0	0	0	0	0	0	0	0	0	0	0	23
	22:00	0	1	4	12	1	1	0	0	0	0	0	0	0	0	0	0	0	19
	23:00	0	0	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	8
Daily Total #1		7	56	240	293	54	4	1	0	0	0	0	0	0	0	0	2	0	656
Percent		1%	9%	37%	45%	8%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		1%	9%	46%	90%	98%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%		
Average Hour		0	4	20	24	4	0	0	0	0	0	0	0	0	0	0	0	0	54

Avg Speed: 30.0mph 50% Speed: 30.6mph 67% Speed: 32.4mph 85% Speed: 34.2mph

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

********** Lane 1 Special Speed Study **********

Date	Time	#1 0-19.9	#2 20-24.9	#3 25-29.9	#4 30-34.9	#5 35-39.9	#6 40-44.9	#7 45-49.9	#8 50-54.9	#9 55-59.9	#10 60-64.9	#11 65-69.9	#12 70-74.9	#13 75-79.9	#14 80-84.9	#15 85-89.9	#16 Other	Error	Total
05/07/13	00:00	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Tue	01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02:00	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3
	03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	04:00	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	5
	05:00	0	2	4	6	3	0	0	0	0	0	0	0	0	0	0	0	0	15
	06:00	0	1	14	19	9	1	0	0	0	0	0	0	0	0	0	0	0	44
	07:00	1	9	23	31	10	2	0	0	0	0	0	0	0	0	0	0	0	76
	08:00	1	3	24	28	4	1	0	0	0	0	0	0	0	0	0	0	0	61
	09:00	0	5	23	30	5	1	0	0	0	0	0	0	0	0	0	0	0	64
	10:00	0	4	19	15	7	0	0	0	0	0	0	0	0	0	0	0	0	45
	11:00	1	2	15	23	3	1	0	0	0	0	0	0	0	0	0	0	0	45
Daily Total #1		3	28	127	156	42	6	0	0	0	0	0	0	0	0	0	0	0	362
Percent		1%	8%	35%	43%	12%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		0%	8%	43%	86%	98%	100%												
Average Hour		0	2	10	13	3	0	0	0	0	0	0	0	0	0	0	0	0	30

Avg Speed: 30.5mph 50% Speed: 30.8mph 67% Speed: 32.7mph 85% Speed: 34.7mph

05/09/13
11:15:13

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

Page: 3

Lane #9 Info : SOUTH
Modes : AXLE,SPEED
Sensors : Axle-Axle Sensor Spacing: 10.0'

Lane 9 Special Speed Study

Date	Time	#1 0-19.9	#2 20-24.9	#3 25-29.9	#4 30-34.9	#5 35-39.9	#6 40-44.9	#7 45-49.9	#8 50-54.9	#9 55-59.9	#10 60-64.9	#11 65-69.9	#12 70-74.9	#13 75-79.9	#14 80-84.9	#15 85-89.9	#16 Other	Error	Total
05/06/13	12:00	0	3	32	29	5	0	0	0	0	0	0	0	0	0	0	0	0	69
Mon	13:00	3	8	33	33	3	2	0	0	0	0	0	0	0	0	0	0	0	82
	14:00	3	7	33	33	12	0	0	1	0	0	0	0	0	0	0	0	0	89
	15:00	1	7	44	48	13	2	1	0	0	0	0	0	1	0	0	0	0	117
	16:00	1	21	56	90	23	2	0	0	0	0	0	0	0	0	0	1	0	194
	17:00	7	9	94	141	29	5	0	0	0	0	1	0	0	0	0	0	0	286
	18:00	2	14	65	85	20	3	0	1	0	0	0	0	0	0	0	0	0	190
	19:00	1	2	20	33	5	1	0	0	0	0	0	0	0	0	0	0	0	62
	20:00	0	2	15	22	2	0	0	0	0	0	0	0	0	0	0	0	0	41
	21:00	0	2	8	10	1	0	0	0	0	0	0	0	0	0	0	0	0	21
	22:00	0	0	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12
	23:00	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	5
Daily Total #9		18	75	410	529	115	15	1	2	0	0	1	0	1	0	0	1	0	1168
Percent		2%	6%	35%	45%	10%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		1%	7%	43%	88%	98%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%		
Average Hour		1	6	34	44	9	1	0	0	0	0	0	0	0	0	0	0	0	97

Avg Speed: 30.4mph 50% Speed: 30.9mph 67% Speed: 32.7mph 85% Speed: 34.6mph

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

********** Lane 9 Special Speed Study **********

Date	Time	#1 0-19.9	#2 20-24.9	#3 25-29.9	#4 30-34.9	#5 35-39.9	#6 40-44.9	#7 45-49.9	#8 50-54.9	#9 55-59.9	#10 60-64.9	#11 65-69.9	#12 70-74.9	#13 75-79.9	#14 80-84.9	#15 85-89.9	#16 Other	Error	Total
05/07/13	00:00	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
Tue	01:00	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	02:00	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
	03:00	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	04:00	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	05:00	1	3	16	11	5	0	0	0	0	0	0	0	0	0	0	0	0	36
	06:00	2	4	12	23	9	2	1	0	0	0	0	0	0	0	0	0	0	53
	07:00	0	2	31	67	12	6	0	0	0	0	0	0	0	0	0	0	0	118
	08:00	0	4	17	45	16	3	0	0	0	0	0	0	0	0	0	0	0	85
	09:00	0	6	26	30	6	1	0	0	0	0	0	0	0	0	0	0	0	69
	10:00	3	7	13	16	7	1	0	0	0	0	0	0	0	0	0	0	0	47
	11:00	0	8	24	41	11	1	0	0	0	0	0	0	0	0	0	0	0	85
Daily Total	#9	6	36	146	235	67	15	1	0	0	0	0	0	0	0	0	0	0	506
	Percent	1%	7%	29%	46%	13%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Cum. Percent	1%	8%	37%	83%	96%	99%	100%											
Average Hour		0	3	12	19	5	1	0	0	0	0	0	0	0	0	0	0	0	42

Avg Speed: 31.0mph 50% Speed: 31.4mph 67% Speed: 33.2mph 85% Speed: 35.9mph

05/09/13
11:15:13

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

Special Speed Study Final Report

Site ID : 2 CROSS ST
Info 1 : LOWELL ST
Info 2 : MAIN ST

Data Starts : 12:00 on 05/0
Data Ends : 11:00 on 05/0
Adj. Factor : 1.000%

Date	Time	#1 0- 19.9	#2 20- 24.9	#3 25- 29.9	#4 30- 34.9	#5 35- 39.9	#6 40- 44.9	#7 45- 49.9	#8 50- 54.9	#9 55- 59.9	#10 60- 64.9	#11 65- 69.9	#12 70- 74.9	#13 75- 79.9	#14 80- 84.9	#15 85- 89.9	#16 Other	Error	Total
Grand Total #1		10	84	367	448	96	10	1	0	0	0	0	0	0	0	0	2	0	1018
Percent		1%	8%	36%	44%	9%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		0%	9%	45%	89%	98%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%		
Average Hour		0	3	15	18	4	0	0	0	0	0	0	0	0	0	0	0	0	12
ADT: 1018	Avg Speed: 30.1mph				50% Speed: 30.7mph					67% Speed: 32.5mph					85% Speed: 34.5mph				
Grand Total #9		24	111	556	766	182	30	3	2	0	0	1	0	1	0	0	1	0	1677
Percent		1%	7%	33%	46%	11%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		1%	8%	41%	86%	97%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%		
Average Hour		1	4	23	31	7	1	0	0	0	0	0	0	0	0	0	0	0	69
ADT: 1674	Avg Speed: 30.6mph				50% Speed: 31.1mph					67% Speed: 32.9mph					85% Speed: 34.8mph				
Combined Total		34	195	923	1212	278	40	3	2	0	0	1	0	1	0	0	3	0	2692
Percent		1%	7%	34%	45%	10%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		1%	8%	42%	87%	98%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%		
Average Hour		1	8	38	50	11	1	0	0	0	0	0	0	0	0	0	0	0	112
ADT: 2692	Avg Speed: 30.4mph				50% Speed: 30.9mph					67% Speed: 32.7mph					85% Speed: 34.7mph				

South = Lowell St to Main St 1018 Veh 38%

North = Main St to Lowell St 1674 Veh 62%

2692 Total Veh.

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

***** Special Speed Study (#203) *****

Site ID : 3 CROSS ST
Info 1 : LOWELL ST -
Info 2 : MAIN ST -

Data Starts : 12:00 on 05/09/13
Data Ends : 11:00 on 05/10/13
Adj. Factor : 1.000%

Lane #1 Info : NORTH
Modes : AXLE,SPEED
Sensors : Axle-Axle Sensor Spacing: 10.0'

**************************** Lane 1 Special Speed Study ***************************

Date	Time	#1 0- 19.9	#2 20- 24.9	#3 25- 29.9	#4 30- 34.9	#5 35- 39.9	#6 40- 44.9	#7 45- 49.9	#8 50- 54.9	#9 55- 59.9	#10 60- 64.9	#11 65- 69.9	#12 70- 74.9	#13 75- 79.9	#14 80- 84.9	#15 85- 89.9	#16 Other	Error	Total
05/09/13	12:00	0	20	73	46	6	0	0	0	0	0	0	0	0	0	0	0	0	145
Thu	13:00	4	4	33	28	5	0	0	0	0	0	0	0	0	0	0	0	0	74
	14:00	3	10	26	36	7	0	0	1	0	0	0	0	0	0	0	1	0	84
	15:00	1	10	44	57	15	2	1	0	0	0	0	0	0	0	0	0	0	130
	16:00	2	9	74	90	22	0	0	0	0	0	0	0	0	0	0	0	0	197
	17:00	17	37	114	82	10	1	1	0	0	0	0	0	1	0	0	0	0	263
	18:00	0	15	88	84	22	0	0	0	0	0	0	0	0	0	0	0	0	209
	19:00	0	5	29	25	8	0	0	0	0	0	0	0	0	1	0	0	0	68
	20:00	0	8	14	8	1	1	0	0	0	0	0	0	0	0	0	0	0	32
	21:00	0	2	8	6	4	0	0	0	0	0	0	0	0	0	0	0	0	20
	22:00	0	1	9	3	2	0	0	0	0	0	0	0	0	0	0	0	0	15
	23:00	0	1	3	5	2	0	0	0	0	0	0	0	0	0	0	0	0	11
Daily Total	#1	27	122	515	470	104	4	2	1	0	0	0	0	1	1	0	1	0	1248
	Percent	2%	10%	41%	38%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Cum. Percent	2%	11%	53%	90%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%		
	Average Hour	2	10	42	39	8	0	0	0	0	0	0	0	0	0	0	0	0	104

Avg Speed: 29.5mph 50% Speed: 29.6mph 67% Speed: 31.9mph 85% Speed: 34.2mph

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

********** Lane 1 Special Speed Study **********

Date	Time	#1 0-19.9	#2 20-24.9	#3 25-29.9	#4 30-34.9	#5 35-39.9	#6 40-44.9	#7 45-49.9	#8 50-54.9	#9 55-59.9	#10 60-64.9	#11 65-69.9	#12 70-74.9	#13 75-79.9	#14 80-84.9	#15 85-89.9	#16 Other	Error	Total
05/10/13	08:00	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Fri	01:00	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	02:00	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	3
	03:00	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	04:00	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
	05:00	0	0	7	14	4	0	0	0	0	0	0	0	0	0	0	0	0	25
	06:00	0	2	18	14	6	1	0	0	0	0	0	0	0	0	0	0	0	41
	07:00	0	2	37	48	9	0	1	0	0	0	0	0	0	0	0	0	0	97
	08:00	2	9	26	35	7	0	0	0	0	0	0	0	0	0	0	0	0	79
	09:00	0	7	26	29	11	1	0	0	0	0	0	0	0	0	0	0	0	74
	10:00	1	4	24	30	8	0	1	0	0	0	0	0	0	0	0	0	0	68
	11:00	1	6	21	36	10	1	0	1	0	0	0	0	0	0	0	0	0	76
Daily Total #1		4	31	168	209	57	4	2	1	0	0	0	0	0	0	0	0	0	476
Percent		1%	7%	35%	44%	12%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		0%	7%	42%	86%	98%	99%	99%	100%										
Average Hour		0	2	14	17	4	0	0	0	0	0	0	0	0	0	0	0	0	39

Avg Speed: 30.6mph 50% Speed: 31.1mph 67% Speed: 32.7mph 85% Speed: 34.7mph

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

Lane #9 Info : SOUTH
Modes : AXLE,SPEED
Sensors : Axle-Axle Sensor Spacing: 10.0'

Lane 9 Special Speed Study

Date	Time	#1 0-19.9	#2 20-24.9	#3 25-29.9	#4 30-34.9	#5 35-39.9	#6 40-44.9	#7 45-49.9	#8 50-54.9	#9 55-59.9	#10 60-64.9	#11 65-69.9	#12 70-74.9	#13 75-79.9	#14 80-84.9	#15 85-89.9	#16 Other	Error	Total
05/09/13	12:00	0	11	41	31	11	2	0	0	0	0	0	0	0	0	0	0	0	96
Thu	13:00	0	1	17	27	10	1	1	0	0	0	0	0	0	0	0	0	0	57
	14:00	0	4	22	28	12	0	0	0	0	0	0	0	0	0	0	0	0	66
	15:00	1	8	34	37	8	1	0	0	0	0	0	0	0	0	0	0	0	89
	16:00	0	8	31	40	6	0	0	0	0	0	0	0	0	0	0	0	0	85
	17:00	2	6	34	36	14	2	0	0	0	0	0	0	0	0	0	0	0	94
	18:00	1	6	20	38	18	9	4	0	0	0	0	0	0	0	0	0	0	96
	19:00	0	1	17	29	4	1	0	0	0	0	0	0	0	0	0	0	0	52
	20:00	0	2	13	16	2	0	0	0	0	0	0	0	0	0	0	0	0	33
	21:00	0	3	8	12	1	0	0	0	0	0	0	0	0	0	0	0	0	24
	22:00	0	3	7	15	2	0	0	0	0	0	0	0	0	0	0	0	0	27
	23:00	0	2	5	3	0	1	0	0	0	0	0	0	0	0	0	0	0	10
Daily Total #9		4	53	249	311	88	17	5	0	0	0	0	0	0	0	0	0	0	727
Percent		1%	7%	34%	43%	12%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		0%	7%	42%	84%	96%	99%	100%											
Average Hour		0	4	20	25	7	1	0	0	0	0	0	0	0	0	0	0	0	60

Avg Speed: 30.8mph 50% Speed: 31.0mph 67% Speed: 32.9mph 85% Speed: 35.0mph

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

********** Lane 9 Special Speed Study **********

Date	Time	#1 0-19.9	#2 20-24.9	#3 25-29.9	#4 30-34.9	#5 35-39.9	#6 40-44.9	#7 45-49.9	#8 50-54.9	#9 55-59.9	#10 60-64.9	#11 65-69.9	#12 70-74.9	#13 75-79.9	#14 80-84.9	#15 85-89.9	#16 Other	Error	Total
05/10/13	00:00	0	0	2	5	1	0	0	0	0	0	0	0	0	0	0	0	0	8
Fri	01:00	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	3
	02:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	04:00	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	05:00	0	0	4	7	3	0	0	0	0	0	0	0	0	0	0	0	0	14
	06:00	0	2	14	17	7	1	1	0	0	0	0	0	0	0	0	0	0	42
	07:00	1	4	22	34	4	3	0	0	0	0	0	0	0	0	0	0	0	68
	08:00	2	3	10	20	5	1	2	0	0	0	0	0	0	0	0	0	0	51
	09:00	0	2	20	18	2	1	0	0	0	0	0	0	0	0	0	0	0	43
	10:00	0	7	16	20	2	0	0	0	0	0	0	0	0	0	0	0	0	45
	11:00	0	6	15	18	8	1	0	0	0	0	0	0	0	0	0	0	0	48
Daily Total #9		3	22	107	148	34	7	3	0	0	0	0	0	0	0	0	0	0	324
Percent		1%	7%	33%	46%	10%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cum. Percent		0%	7%	40%	86%	96%	99%	100%											
Average Hour		0	1	8	12	2	0	0	0	0	0	0	0	0	0	0	0	0	27

Avg Speed: 30.8mph 50% Speed: 31.2mph 67% Speed: 32.9mph 85% Speed: 34.7mph

Wilmington Police Department
1 Adelaide Street
Wilmington, Ma 01887
978-658-5071
Safety Officer Brian M. Moon

Special Speed Study Final Report

Site ID : 3 CROSS ST
Info 1 : LOWELL ST
Info 2 : MAIN ST

Data Starts : 12:00 on 05/09/13
Data Ends : 11:00 on 05/10/13
Adj. Factor : 1.000%

Data:	Time	#1 0- 19.9	#2 20- 24.9	#3 25- 29.9	#4 30- 34.9	#5 35- 39.9	#6 40- 44.9	#7 45- 49.9	#8 50- 54.9	#9 55- 59.9	#10 60- 64.9	#11 65- 69.9	#12 70- 74.9	#13 75- 79.9	#14 80- 84.9	#15 85- 89.9	#16 Other	Error	Total
Grand Total #1		31	153	683	679	161	8	4	2	0	0	0	0	1	1	0	1	0	1724
	Percent	2%	9%	40%	39%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	62%
	Cum. Percent	1%	10%	50%	89%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%		
	Average Hour	1	6	28	28	6	0	0	0	0	0	0	0	0	0	0	0	0	71
ADT: 1724		Avg Speed: 29.8mph				50% Speed: 30.0mph					67% Speed: 32.2mph				85% Speed: 34.4mph				
Grand Total #0		7	75	356	459	122	24	8	0	0	0	0	0	0	0	0	0	0	1051
	Percent	1%	7%	34%	44%	12%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	38%
	Cum. Percent	0%	7%	41%	85%	96%	99%	100%											
	Average Hour	0	3	14	19	5	1	0	0	0	0	0	0	0	0	0	0	0	43
ADT: 1051		Avg Speed: 30.8mph				50% Speed: 31.1mph					67% Speed: 32.9mph				85% Speed: 35.0mph				
Combined Total		38	228	1039	1138	283	32	12	2	0	0	0	0	1	1	0	1	0	2775
	Percent	1%	8%	37%	41%	10%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Cum. Percent	1%	9%	47%	88%	98%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%		
	Average Hour	1	9	43	47	11	1	0	0	0	0	0	0	0	0	0	0	0	115
ADT: 2775		Avg Speed: 30.2mph				50% Speed: 30.4mph					67% Speed: 32.5mph				85% Speed: 34.6mph				

North = Main St. to Lowell St. 1724 Veh. 62%

South = Lowell St. to Main St 1051 Veh. 38%

2775 total Veh.

Appendix B.

Level of Service Analysis

Intersection: Route 129 at Route 38 (Signalized Intersection) – AM Peak Hour

Approach	Movement	Alt. 1 (Existing) LOS	Alt. 1 (Existing) Delay	Alt. 1 (Existing) 95% Q[1]	Alt. 2 (Close Cross St.) LOS	Alt. 2 (Close Cross St.) Delay	Alt. 2 (Close Cross St.) 95% Q[1]	Alt. 3 (Cross St. 1-way SB) LOS	Alt. 3 (Cross St. 1-way SB) Delay	Alt. 3 (Cross St. 1-way SB) 95% Q[1]	Alt. 4 (Cross St. 1-way NB) LOS	Alt. 4 (Cross St. 1-way NB) Delay	Alt. 4 (Cross St. 1-way NB) 95% Q[1]
Route 129/38 EB	Left	A	4.3	110	B	15.8	#190	A	5.8	99	A	9.2	#149
	Thru	A	2.3	97	A	5.5	129	A	2.1	86	A	5.5	129
Route 38 WB	Thru/Right	B	11.9	84	B	13.3	116	A	9.4	121	B	15.8	81
Route 129 WB	Left	C	28.1	39	E	57.0	#138	C	31.3	39	E	57.5	#138
	Right	A	4.2	50	A	5.9	56	A	6.4	48	A	4.7	53
Shopping Center	Left/Thru/Right	*	*	*	*	*	*	*	*	*	*	*	*
	Overall	**A**	**4.8**	**-**	**B**	**13.5**	**-**	**A**	**5.8**	**-**	**B**	**11.3**	**-**

1. Queue is measured in feet.

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

* No AM Peak Hour volume.

Intersection: Route 129 at Route 38 (Signalized Intersection) – PM Peak Hour

Approach	Movement	Alt. 1 (Existing) LOS	Alt. 1 (Existing) Delay	Alt. 1 (Existing) 95% Q[1]	Alt. 2 (Close Cross St.) LOS	Alt. 2 (Close Cross St.) Delay	Alt. 2 (Close Cross St.) 95% Q[1]	Alt. 3 (Cross St. 1-way SB) LOS	Alt. 3 (Cross St. 1-way SB) Delay	Alt. 3 (Cross St. 1-way SB) 95% Q[1]	Alt. 4 (Cross St. 1-way NB) LOS	Alt. 4 (Cross St. 1-way NB) Delay	Alt. 4 (Cross St. 1-way NB) 95% Q[1]
Route 129/38 EB	Left	A	4.4	76	D	35.5	#390	B	16.9	#254	A	7.9	85
	Thru	A	0.9	31	A	3.7	58	A	1.4	30	A	2.4	31
Route 38 WB	Thru/Right	B	8.6	155	C	30.4	#472	B	18.4	#349	B	14.6	155
Route 129 WB	Left	C	24.4	28	E	76.0	#208	C	29.1	30	F	195.4	#172
	Right	A	7.5	50	A	6.2	66	A	5.2	52	A	6.0	50
Shopping Center	Left/Thru/Right	C	20.7	7	C	30.0	9	C	24.0	8	C	22.0	7
	Overall	**A**	**5.9**	**-**	**C**	**27.8**	**-**	**B**	**13.0**	**-**	**C**	**26.9**	**-**

1. Queue is measured in feet.

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

Intersection: Route 129 at Cross Street (Unsignalized Intersection) – AM Peak Hour

Approach	Movement*	Alt. 1 (Existing) LOS	Alt. 1 (Existing) Delay	Alt. 1 (Existing) 95% Q[2]	Alt. 2 (Close Cross St.) LOS	Alt. 2 (Close Cross St.) Delay	Alt. 2 (Close Cross St.) 95% Q[2]	Alt. 3 (Cross St. 1-way SB) LOS	Alt. 3 (Cross St. 1-way SB) Delay	Alt. 3 (Cross St. 1-way SB) 95% Q[2]	Alt. 4 (Cross St. 1-way NB) LOS	Alt. 4 (Cross St. 1-way NB) Delay	Alt. 4 (Cross St. 1-way NB) 95% Q[2]
Route 129 EB	Left	A	0	0	A	0	0	A	0	0	A	0	0
Route 129 WB	Left	A	9.7	0.26	A	0	0	B	10.34	.29	A	0	0
Cross St. NB	Left	E	40.1	3.44	-	-	-	-	-	-	D	31.5	2.78
Cross St. SB	Left	E	39.1	0.12	C	17.8	0.05	E	41.9	0.13	C	19.4	0.05

* Critical lane movement that unsignalized LOS is calculated for.

2. Queue is measured in vehicles

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

Intersection: Route 129 at Cross Street (Unsignalized Intersection) – PM Peak Hour

Approach	Movement*	Alt. 1 (Existing) LOS	Alt. 1 (Existing) Delay	Alt. 1 (Existing) 95% Q[2]	Alt. 2 (Close Cross St.) LOS	Alt. 2 (Close Cross St.) Delay	Alt. 2 (Close Cross St.) 95% Q[2]	Alt. 3 (Cross St. 1-way SB) LOS	Alt. 3 (Cross St. 1-way SB) Delay	Alt. 3 (Cross St. 1-way SB) 95% Q[2]	Alt. 4 (Cross St. 1-way NB) LOS	Alt. 4 (Cross St. 1-way NB) Delay	Alt. 4 (Cross St. 1-way NB) 95% Q[2]
Route 129 EB	Left	A	0	0	A	9.0	0.01	A	0	0	A	9.0	0.01
Route 129 WB	Left	A	9.3	0.44	A	0	0	B	10.8	0.56	A	0	0
Cross St. NB	Left	F	441.7	24.88	-	-	-	-	-	-	F	246.6	19.27
Cross St. SB	Left	E	39.7	0.06	B	13.2	0.01	F	61.4	0.10	B	13.2	0.02

* Critical lane movement that unsignalized LOS is calculated for.

2. Queue is measured in vehicles

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

- No volume for approach in this alternative.

Intersection: Route 38 at Cross Street (Unsignalized Intersection) – AM Peak Hour

Approach	Movement*	Alt. 1 (Existing) LOS	Alt. 1 (Existing) Delay	Alt. 1 (Existing) 95% Q[2]	Alt. 2 (Close Cross St.) LOS	Alt. 2 (Close Cross St.) Delay	Alt. 2 (Close Cross St.) 95% Q[2]	Alt. 3 (Cross St. 1-way SB) LOS	Alt. 3 (Cross St. 1-way SB) Delay	Alt. 3 (Cross St. 1-way SB) 95% Q[2]	Alt. 4 (Cross St. 1-way NB) LOS	Alt. 4 (Cross St. 1-way NB) Delay	Alt. 4 (Cross St. 1-way NB) 95% Q[2]
Route 38 EB	Left	A	7.6	0.01	A	7.6	0.01	A	0	0	A	7.6	0.01
Route 38 WB	Left	A	9.1	0.03	A	9.5	0.04	A	9.1	0.03	A	9.5	0.04
Butters Row NB	Left	E	36.7	4.34	F	56.8	6.00	F	50.0	5.51	E	49.0	5.43
Cross St. SB	Left	F	51.8	1.83	-	-	-	D	30.3	1.09	-	-	-

* Critical lane movement that unsignalized LOS is calculated for.

2. Queue is measured in vehicles

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

- No volume for approach in this alternative.

Intersection: Route 38 at Cross Street (Unsignalized Intersection) – PM Peak Hour

Approach	Movement*	Alt. 1 (Existing) LOS	Alt. 1 (Existing) Delay	Alt. 1 (Existing) 95% Q[2]	Alt. 2 (Close Cross St.) LOS	Alt. 2 (Close Cross St.) Delay	Alt. 2 (Close Cross St.) 95% Q[2]	Alt. 3 (Cross St. 1-way SB) LOS	Alt. 3 (Cross St. 1-way SB) Delay	Alt. 3 (Cross St. 1-way SB) 95% Q[2]	Alt. 4 (Cross St. 1-way NB) LOS	Alt. 4 (Cross St. 1-way NB) Delay	Alt. 4 (Cross St. 1-way NB) 95% Q[2]
Route 129 EB	Left	A	8.8	0.05	A	0	0	A	0	0	A	8.8	0.05
Route 129 WB	Left	A	8.9	0.66	A	9.5	0.77	A	8.9	0.66	A	9.5	0.77
Butters Row NB	Left	F	2357.7	18.56	F	456.7	12.53	F	~	~	F	438.1	12.35
Cross St. SB	Left	F	~	~	-	-	-	F	63.3	1.53	-	-	-

* Critical lane movement that unsignalized LOS is calculated for.

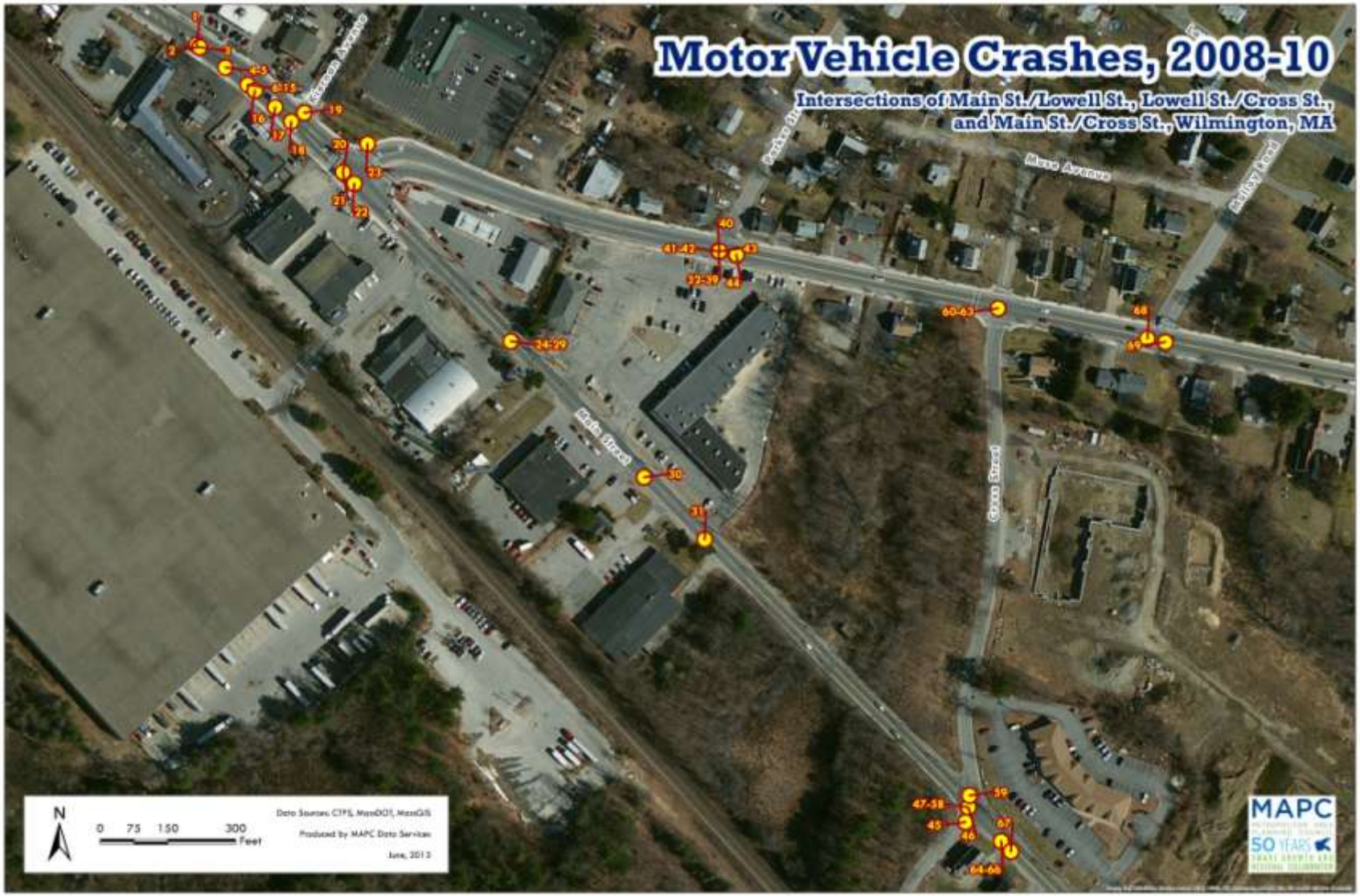
2. Queue is measured in vehicles

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

~ Volume exceeds capacity, computation not defined.

- No volume for approach in this alternative.

Appendix C.
Study Area Crash Map
and Summary Table


Motor Vehicle Crashes, 2008-10
Intersections of Main St./Lowell St., Lowell St./Cross St., and Main St./Cross St., Wilmington, MA
Main Street
Cross Street
Mason Avenue
Kenney Road
N
0 75 150 300
Feet
Data Sources: CTPS, MassDOT, MassGIS
Produced by MAPC Data Services
June, 2013
MAPC
50 YEARS

Motor Vehicle Crashes, 2008-2010

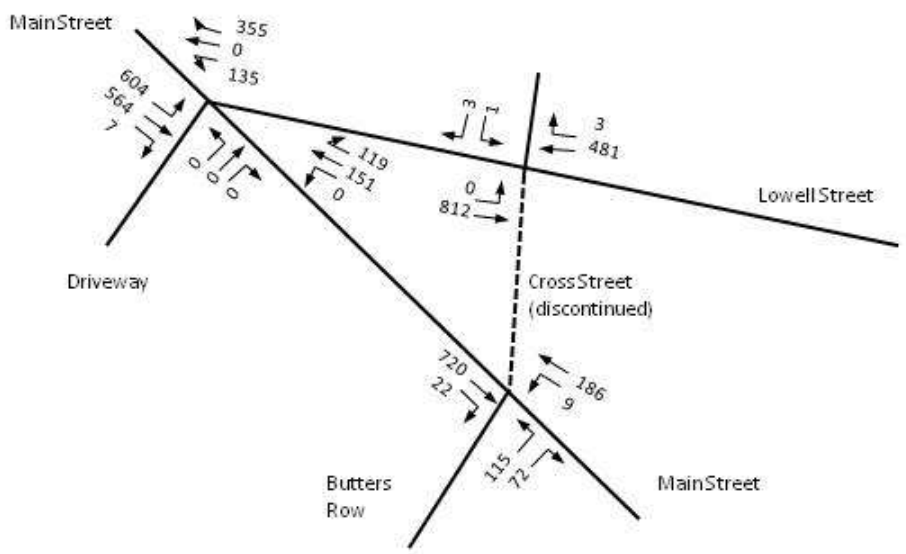
LabelID	Crash_Date	Crash_Time	Crash_Sev	Num_Veh	Collision	Road_Cond	Light	Weather
1	10-Apr-2010	3:05 PM	Non-fatal injury	2	Rear-end	Dry	Dark - lighted roadway	Cloudy
2	04-Dec-2009	2:42 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
3	23-Oct-2010	12:49 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
4	2010	2:27 AM	Property damage only (none injured)	2	Rear-end	Dry	Dark - roadway not lighted	Cloudy
5	2010	10:43 AM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Clear
6	2008	4:13 PM	Non-fatal injury	3	Rear-end	Dry	Daylight	Clear
7	2008	4:19 PM	Property damage only (none injured)	3	Rear-end	Dry	Daylight	Clear
8	2008	10:38 AM	Property damage only (none injured)	2	Rear-end	Wet	Daylight	Rain
9	2008	3:38 AM	Not Reported	2	Rear-end	Dry	Daylight	Clear
10	2008	4:41 PM	Property damage only (none injured)	2	Head-on	Dry	Daylight	Clear
11	2009	9:35 AM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Clear
12	2009	3:50 PM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Clear
13	2009	10:11 PM	Property damage only (none injured)	2	Angle	Dry	Dark - lighted roadway	Cloudy
14	2009	2:22 PM	Non-fatal injury	2	Angle	Dry	Daylight	Clear/Cloudy
15	2010	12:00 PM	Property damage only (none injured)	2	Not reported	Dry	Daylight	Clear
16	2008	4:25 PM	Non-fatal injury	1	Single vehicle crash	Dry	Daylight	Clear
17	2008	11:44 AM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
18	2010	1:48 PM	Non-fatal injury	2	Angle	Dry	Daylight	Clear
19	2008	8:22 AM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
20	2008	11:59 AM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Clear
21	2010	2:19 PM	Non-fatal injury	2	Angle	Dry	Daylight	Clear
22	2008	4:18 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
23	2010	1:25 PM	Property damage only (none injured)	2	Rear-end	Wet	Daylight	Cloudy/Rain
24	208	2:41 PM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Cloudy
25	2009	1:48 PM	Property damage only (none injured)	2	Angle	Wet	Daylight	Cloudy
26	2009	2:23 PM	Non-fatal injury	2	Rear-end	Dry	Daylight	Cloudy
27	2010	11:38 AM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
28	2010	2:26 PM	Non-fatal injury	3	Rear-end	Wet	Daylight	Cloudy
29	2010	2:42 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
30	2010	4:20 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
31	2010	9:58 AM	Non-fatal injury	2	Rear-end	Wet	Daylight	Cloudy
32	2008	8:47 AM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Snow
33	2009	10:07 AM	Property damage only (none injured)	2	Sideswipe, same direction	Dry	Daylight	Clear/Cloudy
34	2009	6:23 AM	Property damage only (none injured)	2	Unknown	Dry	Daylight	Clear
35	2009	5:55 PM	Property damage only (none injured)	3	Rear-end	Dry	Dark - lighted roadway	Clear
36	2010	7:46 AM	Non-fatal injury	2	Angle	Dry	Daylight	Clear
37	2010	1:30 PM	Property damage only (none injured)	2	Sideswipe, opposite direction	Wet	Daylight	Rain/Rain
38	2010	8:41 AM	Property damage only (none injured)	2	Angle	Wet	Daylight	Cloudy
39	2010	3:35 PM	Property damage only (none injured)	2	Angle	Wet	Dusk	Cloudy/Snow
40	208	12:05 PM	Property damage only (none injured)	1	Angle	Dry	Dark - unknown roadway lighting	Clear
41	2009	2:37 PM	Property damage only (none injured)	2	Sideswipe, opposite direction	Dry	Daylight	Clear
42	2010	9:47 PM	Property damage only (none injured)	2	Angle	Dry	Dark - lighted roadway	Clear
43	2010	3:12 PM	Property damage only (none injured)	2	Sideswipe, same direction	Dry	Daylight	Clear
44	2009	8:29 AM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Clear
45	2010	4:47 PM	Non-fatal injury	2	Head-on	Dry	Daylight	Clear
46	2008	12:55 PM	Property damage only (none injured)	1	Single vehicle crash	Dry	Daylight	Clear
47	2008	1:41 PM	Non-fatal injury	2	Angle	Dry	Daylight	Clear
48	208	3:40 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
49	2008	10:41 AM	Non-fatal injury	2	Rear-end	Dry	Daylight	Clear
50	2009	4:58 PM	Property damage only (none injured)	2	Angle	Dry	Dusk	Cloudy
51	2009	3:22 PM	Non-fatal injury	2	Unknown	Dry	Daylight	Cloudy
52	2009	4:36 PM	Non-fatal injury	2	Angle	Wet	Daylight	Cloudy/Rain
53	2010	7:46 PM	Non-fatal injury	1	Sideswipe, same direction	Wet	Dark - roadway not lighted	Cloudy/Rain
54	2010	2:30 PM	Non-fatal injury	2	Angle	Dry	Daylight	Clear
55	2010	4:50 PM	Non-fatal injury	3	Rear-end	Dry	Daylight	Clear
56	2010	9:26 AM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
57	2010	3:13 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
58	2010	5:19 PM	Property damage only (none injured)	3	Angle	Wet	Daylight	Rain/Cloudy
59	2008	9:08 AM	Property damage only (none injured)	2	Unknown	Dry	Daylight	Clear
60	2008	8:58 AM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
61	2008	9:00 AM	Property damage only (none injured)	2	Not reported	Dry	Daylight	Clear
62	2010	11:54 AM	Non-fatal injury	4	Rear-end	Dry	Daylight	Clear
63	2010	5:31 AM	Non-fatal injury	2	Angle	Dry	Daylight	Clear
64	2009	8:25 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Clear
65	2009	6:59 PM	Property damage only (none injured)	2	Angle	Dry	Dark - lighted roadway	Clear
66	2009	4:05 PM	Property damage only (none injured)	2	Angle	Dry	Daylight	Cloudy
67	2010	12:39 PM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Clear
68	2009	4:58 PM	Property damage only (none injured)	2	Rear-end	Dry	Daylight	Cloudy
69	2010	11:50 AM	Non-fatal injury	2	Head-on	Dry	Daylight	Clear

Accident 53 involved a pedestrian.

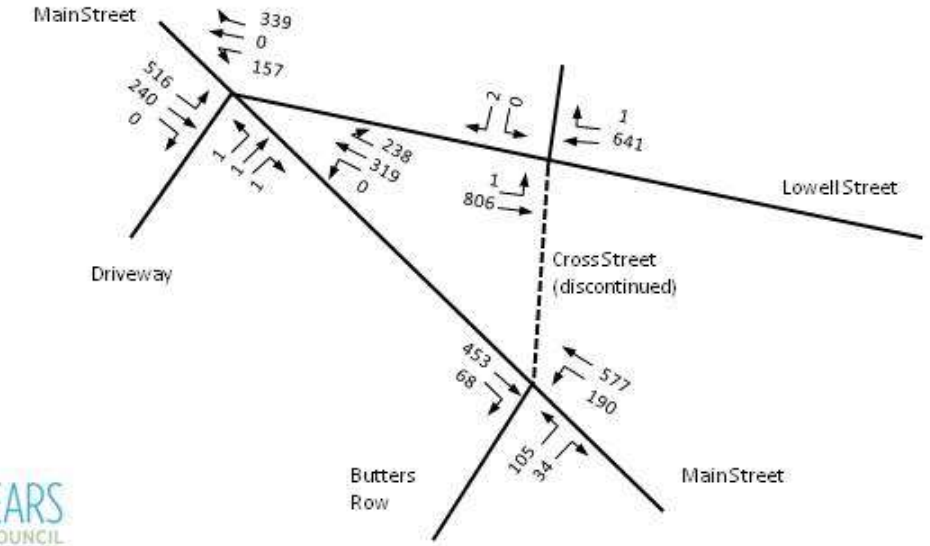
Appendix D.

Alternative Turning Movement Figures

Alternative 2
Discontinue
Cross Street
(2013)



Morning Peak Hour
(7:00-8:00)



Evening Peak Hour
(5:00-6:00)

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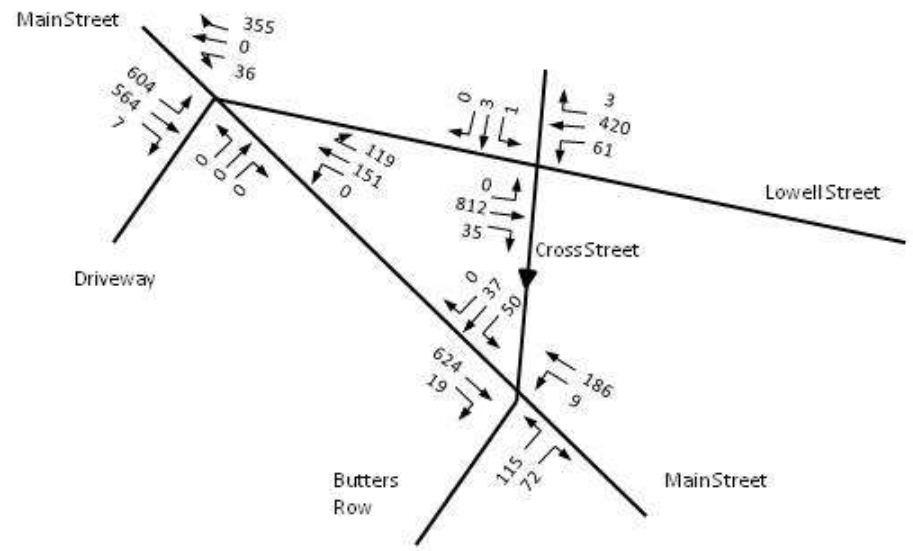
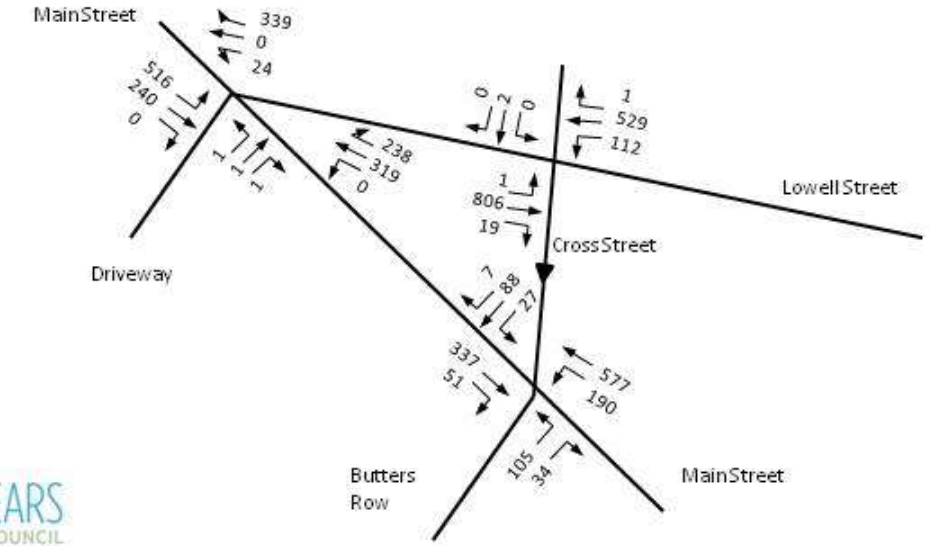
SMART GROWTH AND REGIONAL COLLABORATION

Alternative 3
Cross Street
One-Way
Southbound
(2013)



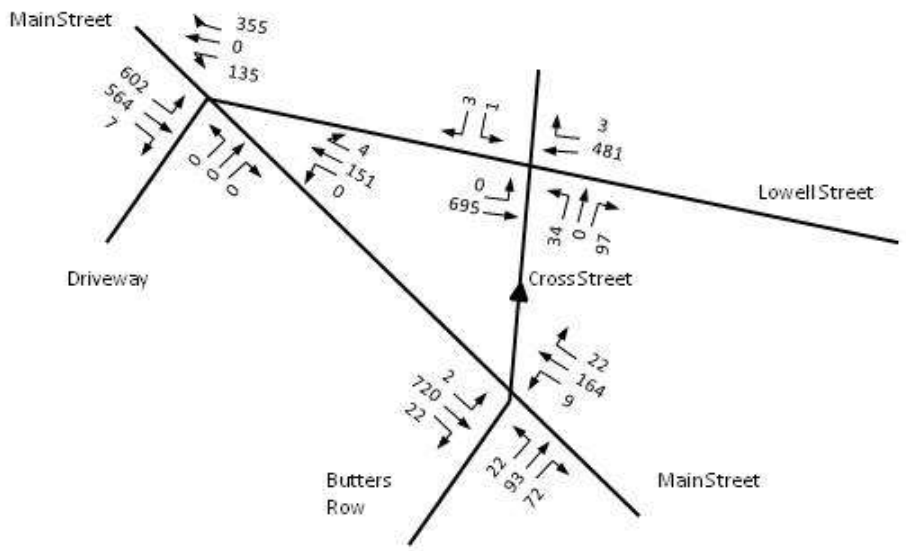
Morning Peak Hour
(7:00-8:00)



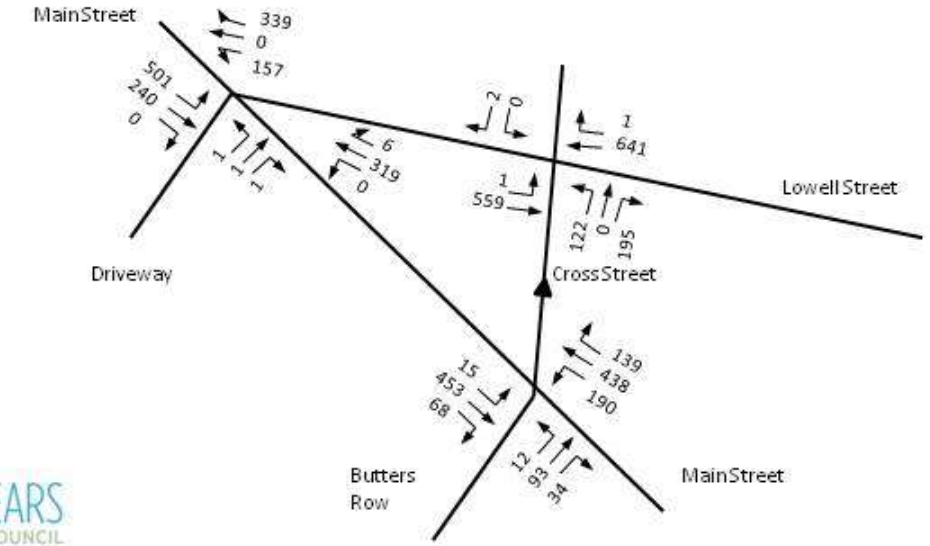
Evening Peak Hour
(5:00-6:00)

MAPC 50 YEARS
METROPOLITAN AREA PLANNING COUNCIL
SMART GROWTH AND REGIONAL COLLABORATION

Alternative 4
Cross Street
One-Way
Northbound
(2013)



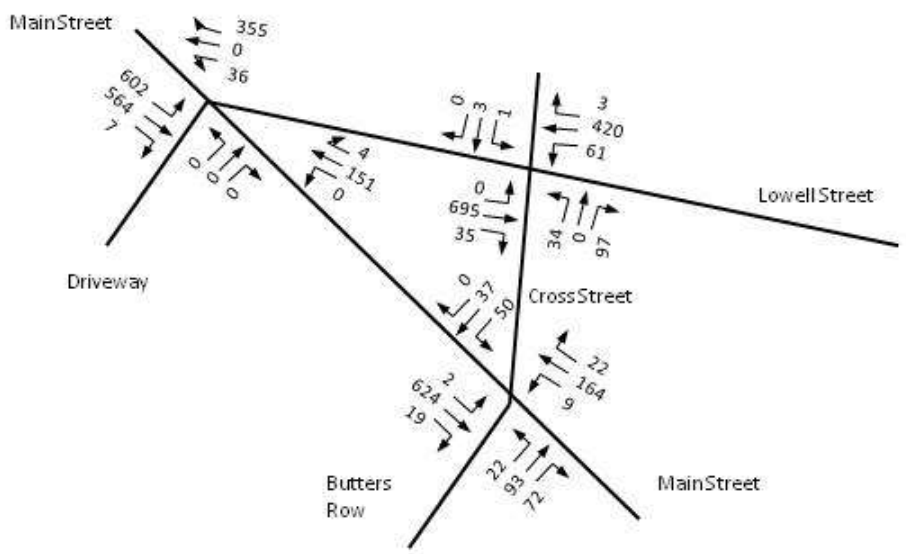
Morning Peak Hour
(7:00-8:00)



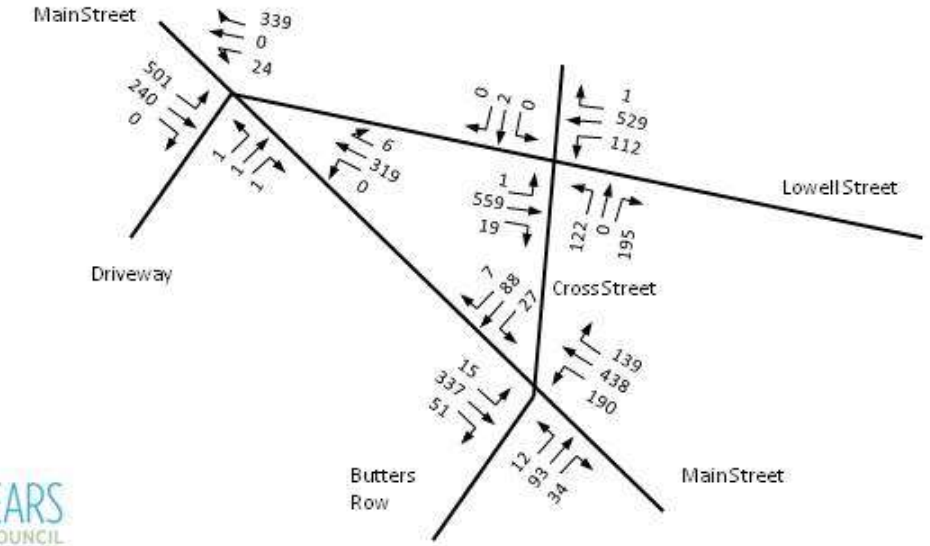
Evening Peak Hour
(5:00-6:00)

MAPC 50 YEARS
METROPOLITAN AREA PLANNING COUNCIL
SMART GROWTH AND REGIONAL COLLABORATION

Alternative 5
Restrict
Traffic during
Certain
Times
(2013)



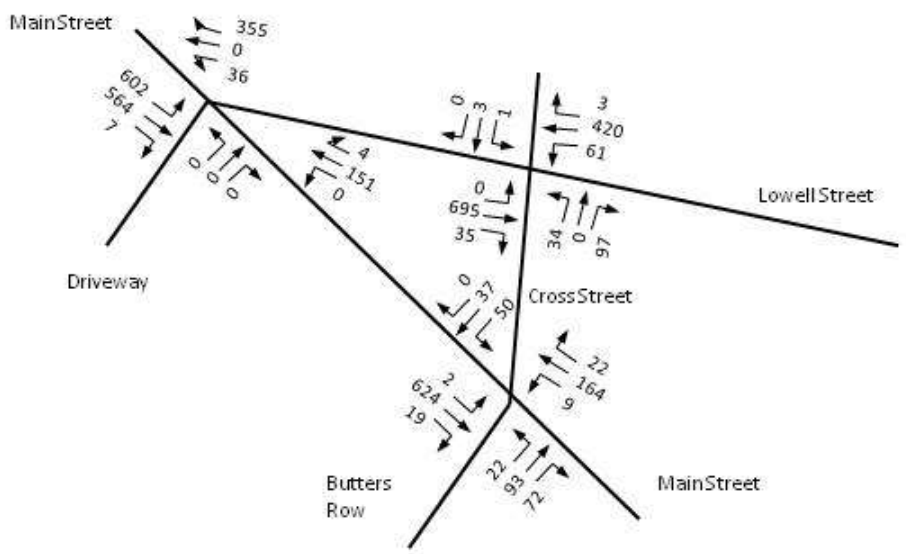
Morning Peak Hour
(7:00-8:00)



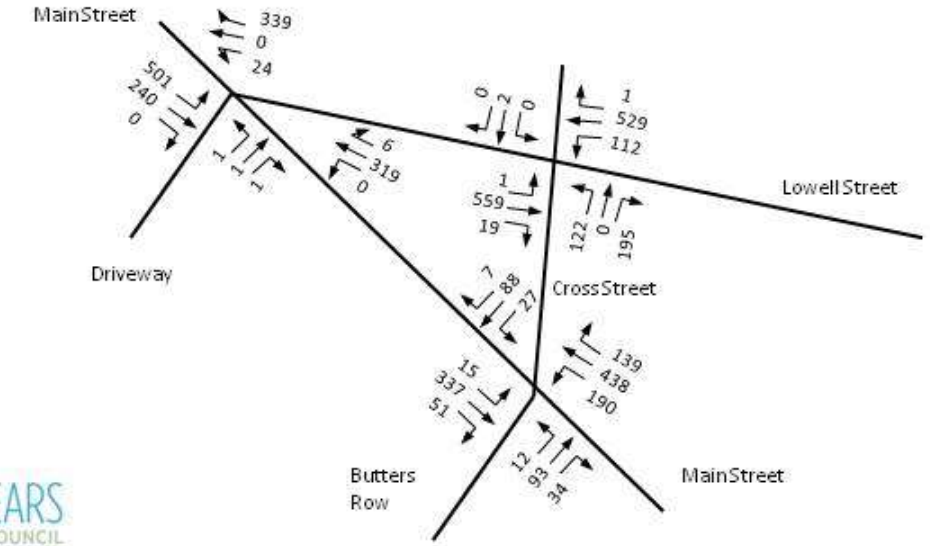
Evening Peak Hour
(5:00-6:00)

MAPC 50 YEARS
METROPOLITAN AREA PLANNING COUNCIL
SMART GROWTH AND REGIONAL COLLABORATION

Alternative 6
Retrofit with
Speed Bumps
(2013)



Morning Peak Hour
(7:00-8:00)



Evening Peak Hour
(5:00-6:00)

MAPC 50 YEARS
METROPOLITAN AREA PLANNING COUNCIL
SMART GROWTH AND REGIONAL COLLABORATION