

**New York City Department of Transportation  
Office of School Safety Engineering**



**School Safety Engineering Project**

**FINAL REPORT: St Michael's School, Queens**



**Prepared by  
The RBA Group/Urbitrans Associates**



**NOVEMBER 3, 2006**

**School Safety Engineering Project  
St Michael's School, Queens**

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## **1. INTRODUCTION**

### **1.1 PROJECT DESCRIPTION**

The Department of Transportation has developed school safety maps for 1,471 schools throughout the City. Schools currently in the program are primarily elementary and intermediate schools with an enrollment of at least 250 students. The safety plans include the designation of official school crosswalks, identified by prominent warning signs and roadway markings. DOT also designates curbside locations for school bus loading and unloading and other parking controls to improve conditions for students. In addition, nearly 600 speed reducers (humps) have been installed in the immediate vicinity of schools.

Under this consultant study, the School Safety Engineering Project, accident data in the vicinity of all program schools was reviewed. As a result, schools were ranked in terms of pedestrian safety, and 135 “priority” schools were identified Citywide. At each of these priority schools safety improvements are being recommended (e.g., new school crosswalks, new traffic signals and signal timing modifications, new speed reducers). In addition, 32 of these schools will receive further investigation to design physical improvements (e.g., raised center medians, widened sidewalks, “neckdowns” or “bulbouts” at intersections). St. Michael’s School in Queens is one of the 135 priority schools.

## 2. BACKGROUND—EXISTING CONDITIONS AND ANALYSIS



*Figure 1: 41<sup>st</sup> Avenue in front of St. Michael's*

### 2.2 NEIGHBORHOOD DESCRIPTION

St. Michael's School is located at 136-58 41<sup>st</sup> Avenue, in the midst of a mix of residential and commercial buildings, anchored by church and post-war townhouses. A Time Warner warehouse, which generates a large number of trucks, is located across from St. Michael's School on Barclay Avenue (see Exhibit 1 for Aerial Photograph).

In the vicinity of St. Michael's School, Kissena Boulevard and Main Street are major bus routes connecting Flushing to the rest of the borough. There are approximately 15 different bus routes utilizing these two streets within the neighborhood.

### 2.3 MEETING WITH SCHOOL REPRESENTATIVES

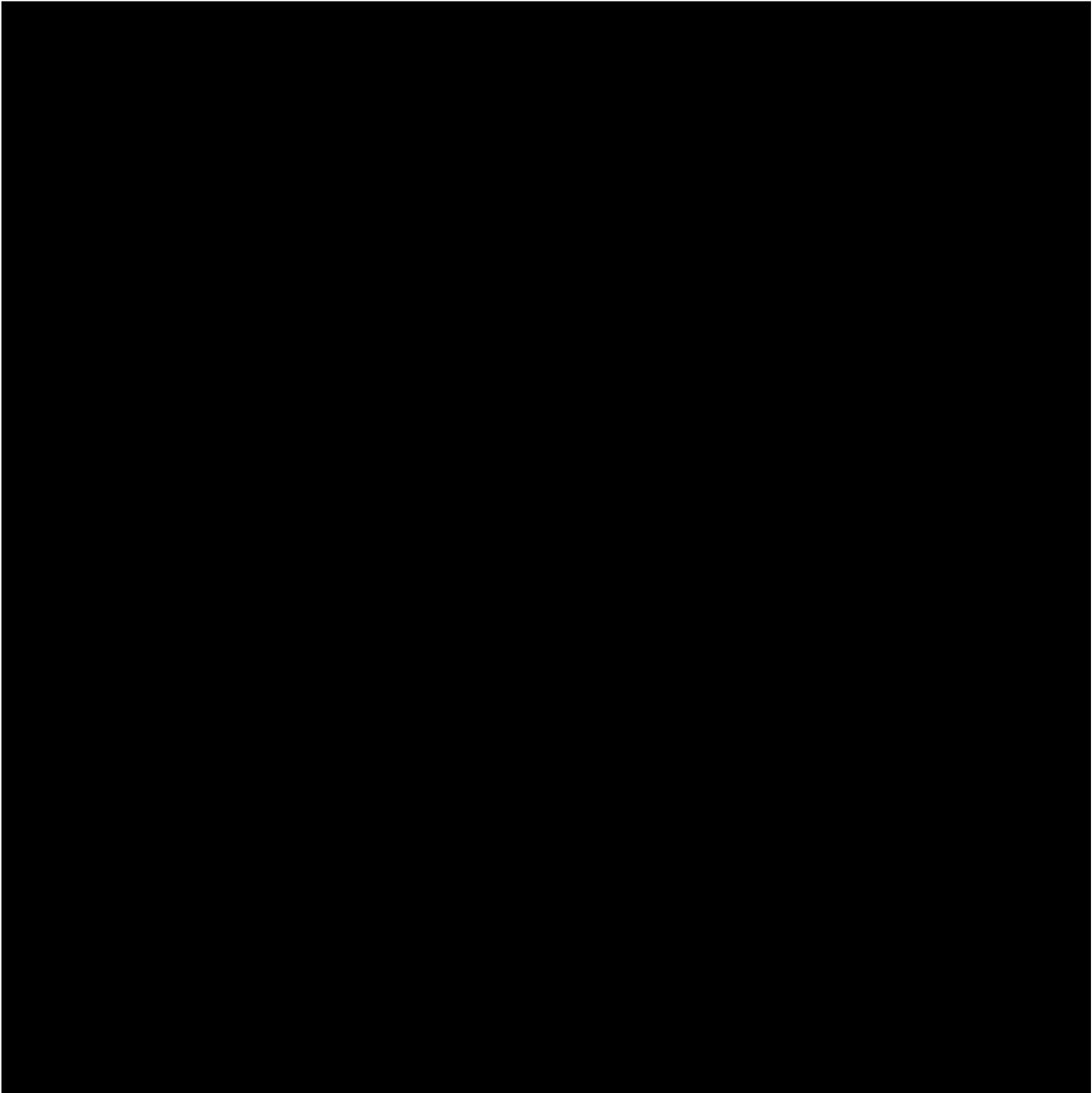
The DOT representative for Queens, the consultant team, the school principal and parent representatives met at the school on the afternoon of April 27, 2004. (See the Appendix for a list of attendees.)

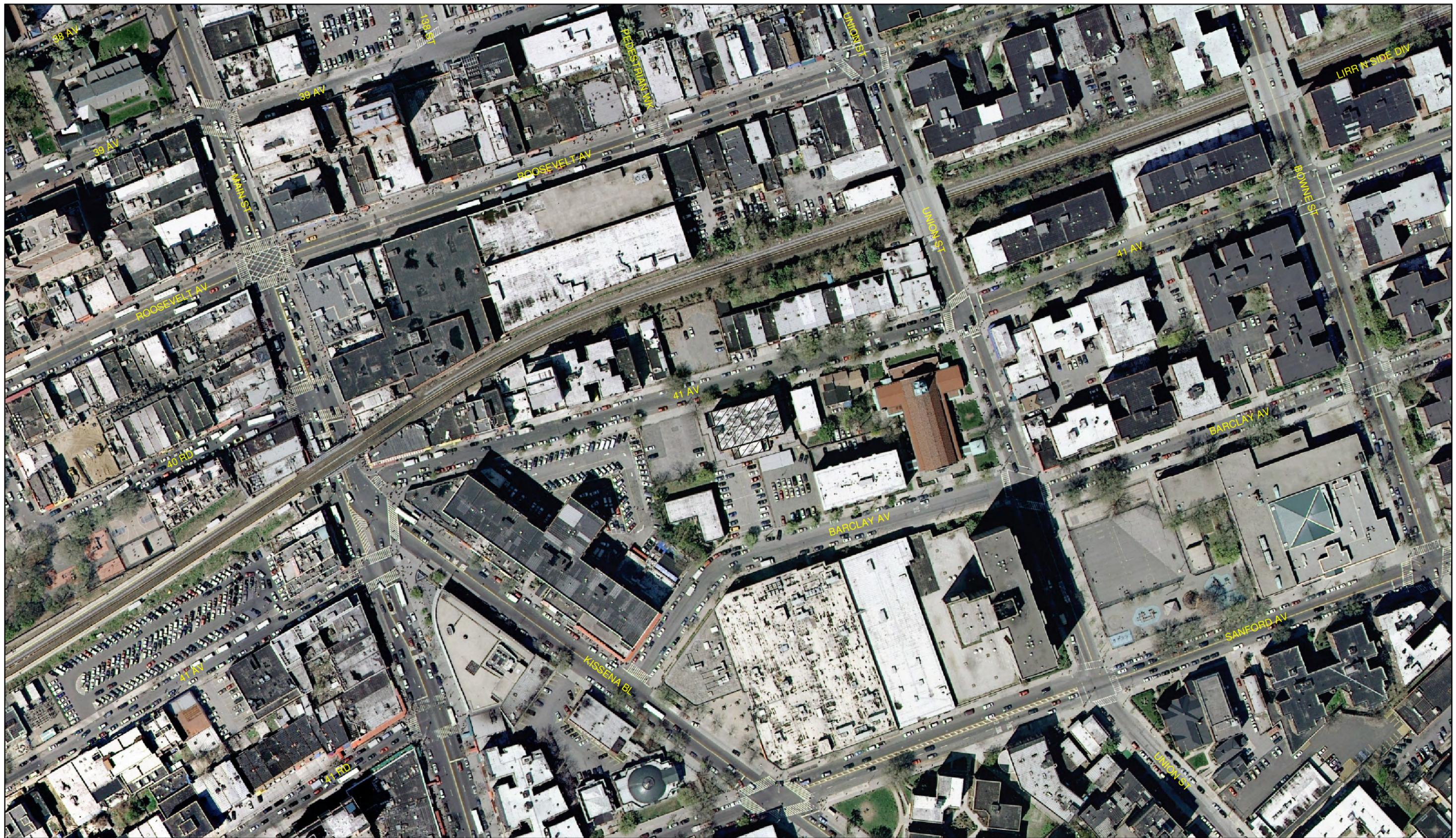
According to representatives of the school, the identifiable problems that student pedestrians encounter on a regular basis include the following:

- Vehicles speeding along 41<sup>st</sup> Avenue
- Uncontrolled intersection of Kissena Boulevard and Barclay Avenue

- Congested north sidewalks on Barclay Avenue (near Barclay Avenue/Kissena Boulevard intersection) with forklifts and food vendors that force students to walk on the street.
- Double-parked trucks loading and unloading on Barclay Avenue

(See Appendix for a summary of school concerns, and the school's survey response.)





1 inch equals 150 feet

**EXHIBIT 1  
ST MICHAEL'S SCHOOL  
QUEENS  
AERIAL PHOTOGRAPH**

**2.6 PRIMARY MODES OF TRANSPORT TO AND FROM SCHOOL**

According to school officials, approximately 66% of students walk to St. Michael’s School, 15% arrive via public transportation, 17% are driven by a parent or guardian, and the remaining 2% are transported by school buses. See Table 1 for the school’s estimate of the modes of travel.

<b>TABLE 1: MODES OF TRAVEL (AS ESTIMATED BY SCHOOL OFFICIALS)</b>	
Description	Percentage
Walk	66%
Driven by a parent or guardian	17%
School bus	2%
MTA bus or subway	15%
<b>TOTAL</b>	<b>100%</b>

**2.7 ADDITIONAL STUDENT PEDESTRIAN TRAFFIC GENERATORS**

There are numerous retail stores, delis, restaurants and small businesses on Union Street, Kissena Boulevard and Main Street that generate large numbers of pedestrians in the vicinity of the school. P.S. 20 is located one block east of St Michael’s School, on Barclay Avenue between Bowne Street and Union Street. The Main Street/Flushing subway stop is located on Main Street, one block north of 41<sup>st</sup> Avenue. Main Street is heavily congested with vehicular and pedestrian traffic throughout the day.

**2.8 CROSSING GUARD LOCATIONS**

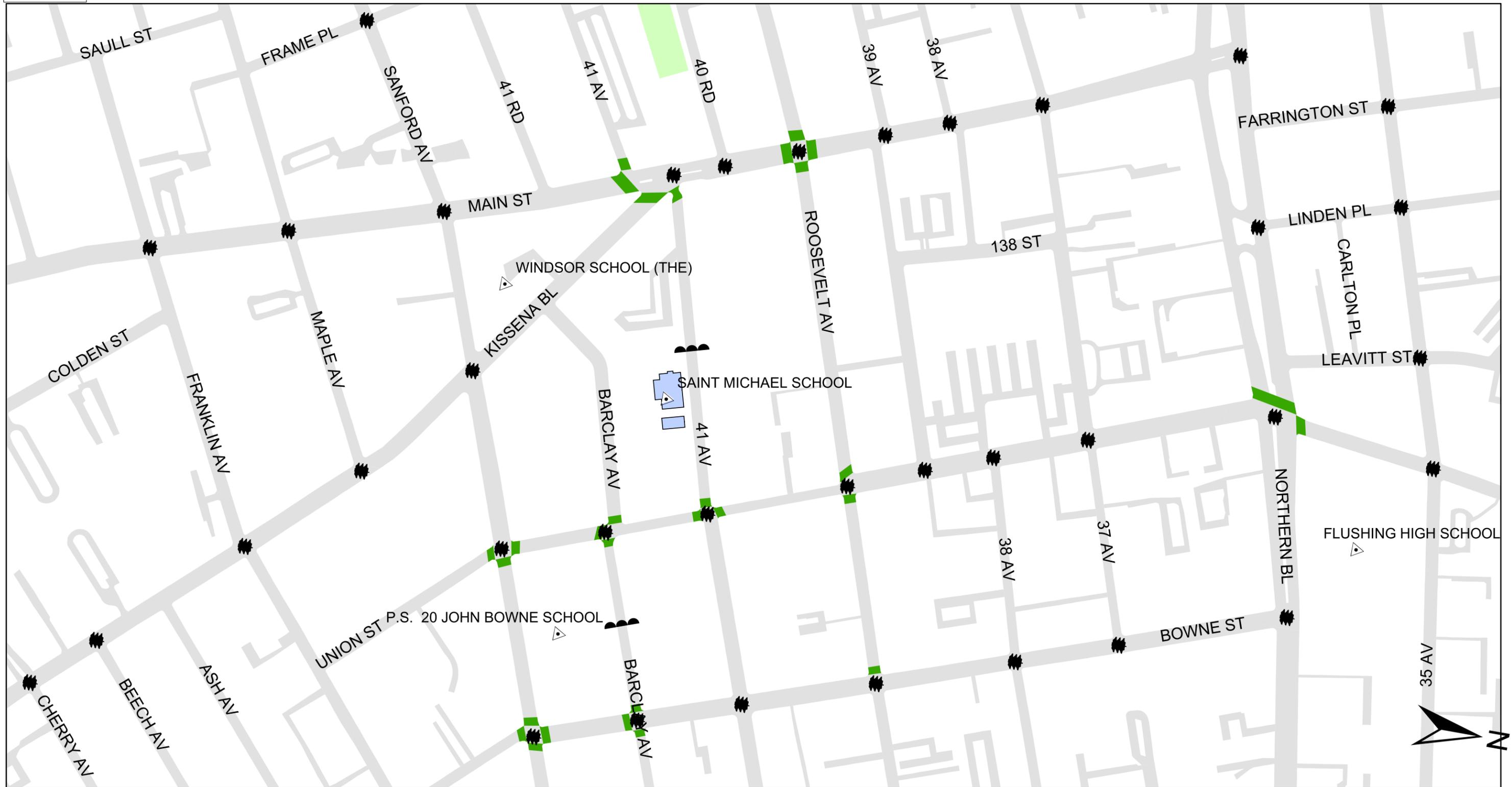
St. Michael’s has only one designated crossing guard. The crossing guard is located at the intersection of Union Street and 41<sup>st</sup> Avenue. However, according to the school principal there are crossing guards designated to other schools in the vicinity of St. Michael’s School that routinely assist St.Michael’s students. One crossing guard is located at the Sanford Avenue and Union Street intersection and another crossing guard is located at the intersection of Sanford Avenue and Bowne Street (see Figure 3). The crossing guard locations are indicated on the map in Exhibit 3.



*Figure 3: Crossing guard at Sanford Avenue and Union Street intersection during dismissal time*



# School Traffic Safety Map



0 230 460 920 Feet

The School Traffic Safety Map was established to help provide the maximum degree of safety for children going to and from school - by indicating the location of speed reducers, school crosswalks and some traffic control devices. (While virtually all intersections in NYC benefit from traffic control devices - such as stop signs, traffic signals, yield signs, and all way stop signs - this map shows only traffic signals and all way stop signs.) The school crosswalks that are shown are ladder striped and make the crosswalk more visible to drivers and help make the intersection safer. These crosswalks are where school children are recommended to cross.

Note: Every attempt has been made to provide complete and accurate information that is updated regularly. The City's streets are constantly changing and it is not always possible to present information without error.

**LEGEND:**

- SCHOOL LOCATION
- SCHOOL CROSSWALK
- TRAFFIC SIGNAL
- ALL - WAY STOP
- SPEED REDUCER

**Queens**  
**SAINT MICHAEL SCHOOL**

Prepared by the NEW YORK CITY DEPARTMENT OF TRANSPORTATION, Iris Weinsall, COMMISSIONER.

Map created on 11/17/2006

**EXHIBIT 2**

COMM. BOARD: 407  
 PRECINCT: 109

N

39 AV

39 AV

138 ST

PEDESTRIAN W/K

UNION ST

BOWNE ST

NO NAME

ROOSEVELT AV

ROOSEVELT AV

40 RD

LIRR N SIDE DIV

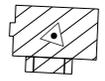
MAIN ST

41 AV

UNION ST

41 AV

41 AV



BARCLAY AV

BARCLAY AV

41 RD

KISENA BL



SANFORD AV



SANFORD AV

UNION ST

BOWNE ST

1 inch equals 250 feet



CROSSING GUARD ASSIGNED TO ST MICHAEL SCHOOL



CROSSING GUARD ASSIGNED TO ANOTHER SCHOOL

EXHIBIT 3

ST MICHAEL'S SCHOOL  
(27), QUEENS

CROSSING GUARD

### 3. TRAFFIC OPERATIONS

#### 3.1 SCHOOL BUS OPERATIONS

There are no school buses assigned to St. Michael's School, and only three students come to school by bus. The drop-off site for these students is on 41<sup>st</sup> Avenue, in front of the school.

#### 3.2 PARENT DROP-OFF OPERATIONS

School officials have indicated that approximately 17% of St. Michael's students are driven to and from school by parents or guardians. Field observations indicated that parents use Barclay Avenue as the student pick-up and drop-off point. Barclay Avenue is at times reduced to a one-lane roadway, due to vehicles double-parking during dismissal (see Figures 3 and 4).



*Figure 4 – A typical crossing at an uncontrolled mid-block location on Barclay Avenue at dismissal time*



*Figure 5 – Double-parked vehicles on Barclay Avenue waiting for students at dismissal time*

### **3.3 PARKING REGULATIONS**

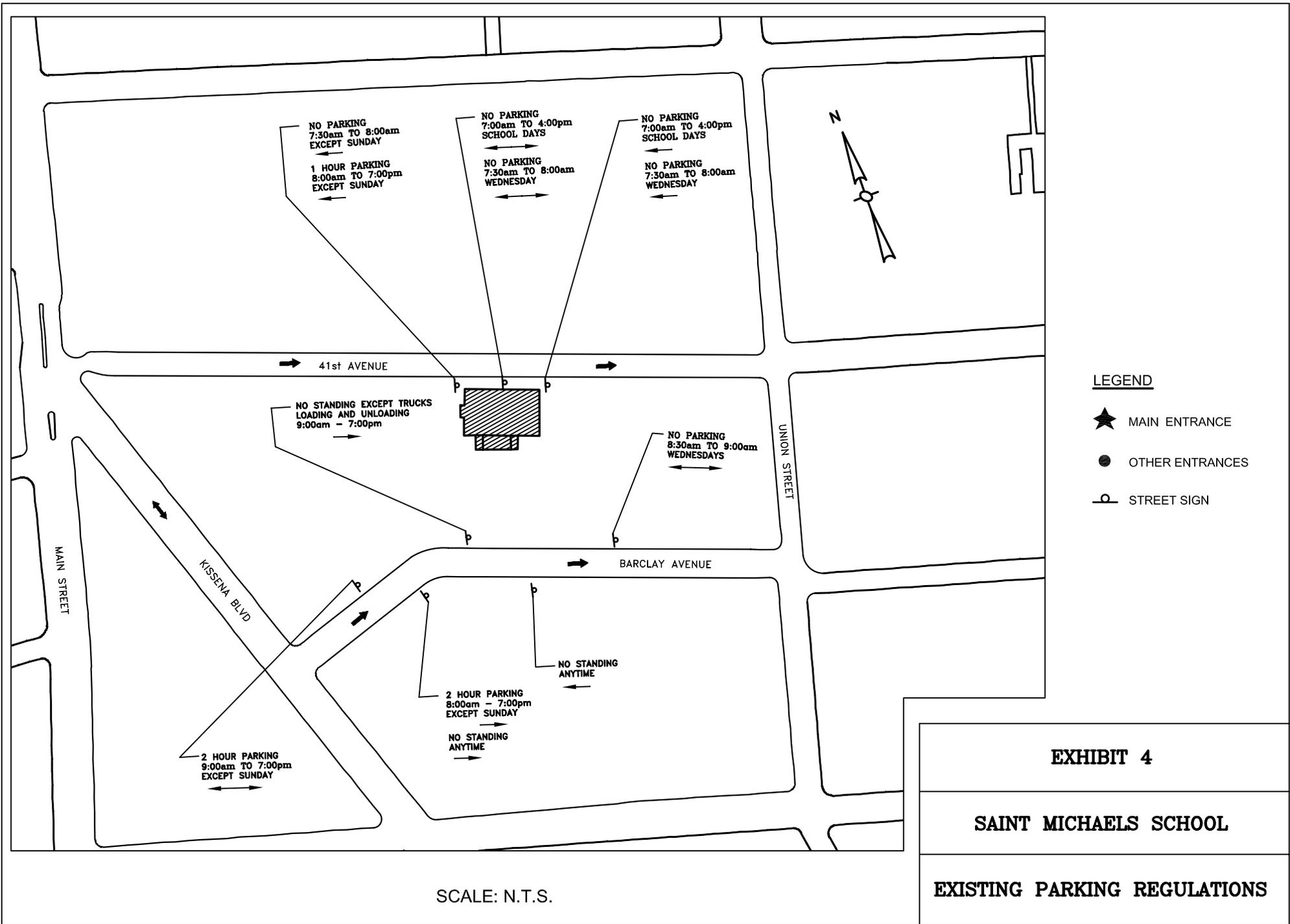
Metered parking is provided on both sides of 41<sup>st</sup> Avenue except in front of the school where “NO PARKING 7AM- 4PM, SCHOOL DAYS” and “NO PARKING, 7:30AM TO 8:00AM, MONDAY AND THURSDAY” for street cleaning signs are posted. Metered parking is provided east and west of the school where “1 HOUR PARKING, 9AM-7PM, EXCEPT SUNDAYS” parking signs are posted. On the northern side of 41<sup>st</sup> Avenue there are numerous driveways in front of businesses that restrict parking.

Parking regulation signs for “2 HOUR PARKING, 9:00 AM – 7:00 PM, EXCEPT SUNDAYS” are posted on Barclay Avenue, from the corner with Kissena Boulevard. Immediately to the east a “NO STANDING ANYTIME EXCEPT TRUCK LOADING AND UNLOADING, 9:00 AM – 7:00 PM” parking regulation sign is posted. The total length of this parking restriction is 100’ in front of a food storage facility.

See Exhibit 4 for a map of the parking restrictions.

### **3.4 EXISTING SCHOOL SIGNS AND MARKINGS**

The Traffic Safety Map, Exhibit 3, shows existing signals and school crosswalk pavement markings. It is noted that a citywide signage program is currently underway to upgrade school signage to current Federal Manual of Uniform Traffic Control Devices (MUTCD) standards of fluorescent yellow-green signs accompanied by downward pointing arrows. Signs scheduled to be installed under this program are shown as “existing” on Exhibit 7.



### 3.5 ACCIDENT SUMMARY

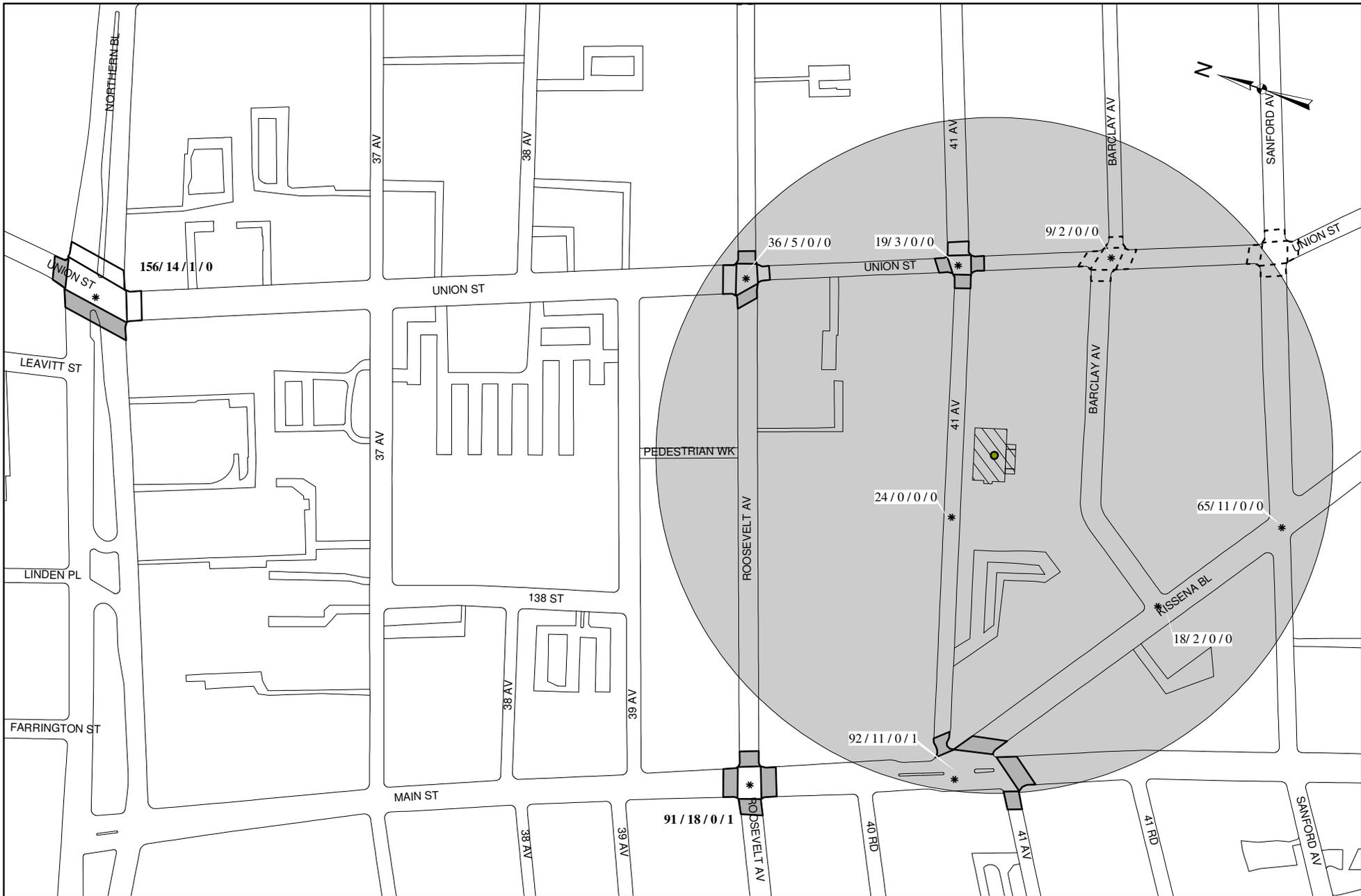
Exhibit 5 and Table 2 show a summary of accidents, as obtained from the New York State Department of Motor Vehicles (DMV), in the vicinity of St. Michael's for the three-year period from January 1, 1998 through December 31, 2000. The DMV data provides some detail relating to the circumstances and cause of the accidents. Table 3 is a summary of more recent accident data obtained from the NYC Police Department (NYPD). Though current through 2004, the NYPD data does not provide the same level of detail as the DMV data.

This report targets intersections closest to the school where the highest concentration of student pedestrians occurs. Intersections farther from the school and locations for which detailed data was not available at the time of this study will be addressed with the ongoing work of DOT's School Safety Engineering Program. DMV accident data is discussed in Section 3.6, Traffic Operations and Issues.

<b>TABLE 2: DMV THREE-YEAR ACCIDENT SUMMARY (1998-2000)</b>				
<b>INTERSECTION</b>	<b>TOTAL ACCIDENTS</b>	<b>PEDESTRIAN ACCIDENTS</b>	<b>PEDESTRIAN FATALITIES</b>	<b>SCHOOL-RELATED* ACCIDENTS</b>
Union Street and 41 <sup>st</sup> Avenue	19	3	0	0
Union Street and Roosevelt Avenue	36	5	0	0
Northern Blvd and Union Street	156	14	1	0
Main St / Kissena Blvd and 41 <sup>st</sup> Ave	92	11	0	1
Main Street and Roosevelt Avenue	91	18	0	1
Barclay Avenue and Kissena Blvd	18	2	0	0
<b>TOTAL</b>	<b>412</b>	<b>52</b>	<b>1</b>	<b>2</b>

<b>TABLE 3: NYPD FOUR-YEAR ACCIDENT SUMMARY (2001-2004)</b>				
<b>INTERSECTION</b>	<b>TOTAL ACCIDENTS</b>	<b>PEDESTRIAN ACCIDENTS</b>	<b>PEDESTRIAN FATALITIES</b>	<b>SCHOOL-RELATED* ACCIDENTS</b>
Union Street and 41 <sup>st</sup> Avenue	34	9	0	0
Union Street and Roosevelt Avenue	77	15	0	0
Northern Blvd and Union Street	239	39	0	1
Main St / Kissena Blvd and 41 <sup>st</sup> Ave	237	36	1	2
Main Street and Roosevelt Avenue	124	40	0	2
Barclay Avenue and Kissena Blvd	42	5	0	0
<b>TOTAL</b>	<b>753</b>	<b>144</b>	<b>1</b>	<b>5</b>

\* School-Related Accidents are defined as accidents involving school-age pedestrians (age 4 – 14), occurring weekdays during the school year.



ACCIDENT LOCATION \*

SCHOOL CROSSWALK ASSIGNED TO ST MICHAEL SCHOOL

SCHOOL CROSSWALK ASSIGNED TO ANOTHER SCHOOL

CROSSWALK

X/X/X/X

TOTAL ACCIDENTS	PED ACCIDENTS	PED FATAL	SCHOOL PED ACCIDENTS
X	X	X	X

1 inch equals 275 feet

**EXHIBIT 5**

**ST MICHAEL'S SCHOOL  
QUEENS**

**ACCIDENT SUMMARY  
THREE YEAR PERIOD  
(1998-2000)**

### **3.6 TRAFFIC OPERATIONS AND ISSUES**

The following describes traffic accidents and operational issues at intersections in the vicinity of St. Michael's.

#### 3.6.1 41<sup>st</sup> Avenue at Union Street

West of Union Street, 41<sup>st</sup> Avenue is a 32-foot wide, one-way (eastbound) roadway with one 14-foot wide travel lane and parking on both sides. East of Union Street, 41<sup>st</sup> Avenue is a 43-foot wide two-way street with one travel lane in each direction and parking on both sides. Union Street is a 30-foot wide two-way street with one moving lane in each direction. No parking is allowed on Union Street between Roosevelt Avenue and Barclay Avenue. This is a signalized intersection. There are school crosswalks on the north, south and west legs of the intersection.

There were 19 accidents at this intersection during the 1998-2000 study period. Three accidents involved pedestrians. According to the accident data, one pedestrian was struck by a northbound vehicle while crossing Union Street against the signal. The second pedestrian was struck while crossing with the signal at a marked crosswalk. This accident was attributed to driver error. A southbound vehicle struck the third pedestrian. No further information is available.

#### 3.6.2 Union Street at Roosevelt Avenue

Roosevelt Avenue is a 40-foot wide street west of Union Street and a 36-foot wide east of Union Street. Roosevelt Avenue has one travel lane in each direction and parking is allowed on both sides of the roadway with the exception of bus stops in the vicinity of the intersection. Union Street is 60 feet wide north of Roosevelt Avenue and 30 feet wide south of Roosevelt Avenue. North of Roosevelt Avenue Union Street has parking along both sides of the street. This is a signalized intersection. There are school crosswalks on the east and west legs of this intersection.

There were 36 accidents at this intersection during the 1998-2000 study period. Five accidents involved pedestrians. According to the accident data three pedestrians were struck while crossing with the signal at a marked crosswalk. All three accidents were attributed to driver errors due to failure to yield to crossing pedestrians. No information was provided on the other two pedestrian accidents.

#### 3.6.3 Union Street at Northern Boulevard

This intersection is located 5 blocks north of St. Michael's School. However, it has been identified as a school crossing for St. Michael's School by the Traffic Safety Plan (TSP) as well as the school administrators. Northern Boulevard is a multilane major east-west arterial with very high traffic volumes in both morning and afternoon peak hours. At the intersection with Union Street, Northern Boulevard has medians of various widths separating the eastbound and westbound traffic flows. The west crosswalk is 140 feet long, and the east crosswalk is 125 feet long. Union Street is a 60-foot wide roadway south of Northern Boulevard and a 45-foot wide roadway north of Northern Boulevard. There are school crosswalks on the west and north legs of the intersection (see Figure 5).



*Figure 6 – The intersection of Northern Boulevard and Union Street (looking north)*

One hundred and fifty six accidents occurred at this intersection during the 1998-2000 study period. Fourteen pedestrians were struck during this time at this intersection including one fatality. The fatal accident occurred on April 17, 1998 when a vehicle traveling westbound struck a pedestrian who was crossing Northern Boulevard with the signal. Nine more pedestrians were struck while having the right of way and crossing both with the signal and within the crosswalks. All these accidents were attributed to driver error and failure to yield to pedestrians. Four pedestrians were struck while crossing against the signal. No information was provided for one pedestrian accident.

#### 3.6.4 Main Street at Kissena Boulevard and 41<sup>st</sup> Avenue

This is a very busy five-leg, offset, signalized intersection. Main Street is a major north-south roadway utilized by large numbers of vehicles, buses and trucks. The land use along Main Street is heavily commercial, which is the primary reason for the heavy pedestrian traffic crossing at this location. Main Street is a 60-foot wide, two-way roadway with two travel lanes in both directions. Parking is prohibited in the vicinity of this intersection. Kissena Boulevard is a 50-foot wide two-way roadway with one 17-foot travel lane in each direction and parking on both sides of the street. Due to frequent bus stops and driveways, parking is not allowed in the vicinity of the intersection. 41<sup>st</sup> Avenue is a 30-foot wide one-way (westbound) roadway west of Main Street, and a 34-foot wide one-way (eastbound) roadway east of Main Street.

Field observations at the intersection revealed that jaywalking and failure to adhere to traffic rules by pedestrians is quite widespread. There is no striped crosswalk on the north leg of this intersection. In order for pedestrians to cross Main Street, utilizing crosswalks, they must first cross 41<sup>st</sup> Avenue, then Kissena Boulevard, and finally the southern leg of Main Street. This is a much longer route and many pedestrians were observed crossing Main Street on the northern leg without any crosswalks to save time.

There were 92 accidents at this location during the 1998-2000 study period. There were eleven pedestrian accidents, one of which was a school related accident. Five pedestrian accidents were attributed to driver error due to failure to yield to pedestrians crossing

with the signal at a marked pedestrian crosswalk. All other accidents occurred due to pedestrians crossing against the signal or crossing at a location outside of a crosswalk.



*Figure 7 - The intersection of Kissena Boulevard at Main Street (looking south)*

### 3.6.5 Main Street at Roosevelt Avenue

This is a signalized intersection with very high vehicular and pedestrian volumes in all directions and approaches. Turning vehicles and pedestrians routinely compete for space. Vehicles spill back into the middle of the intersection or obstruct crosswalks as they try to beat the light, and before they can clear the intersection, pedestrians begin to cross. The middle of the intersection is striped as a “gridlock box” to alert motorists not to block the middle of the intersection.

Main Street is a 60-foot wide, two-way (north-south) roadway with two travel lanes in each direction. Roosevelt Avenue is a two-way (east-west) roadway that varies in width from 44 feet west of Main Street, to 40 feet wide east of Main Street. Parking is prohibited on both Main Street and Roosevelt Avenue in the vicinity of the intersection.

There were 91 accidents at this intersection during the 1998-2000 study period. 18 accidents involved pedestrians. According to the accident data records, 10 accidents occurred as a result of driver errors due to failure to yield to pedestrians crossing with the signal at a marked pedestrian crosswalk. Three accidents were attributed to pedestrian error due to crossing against the signal and/or crossing outside the marked crosswalks. There is no information provided for the other five pedestrian accidents.

### 3.6.6 Kissena Boulevard and Barclay Avenue

This is an un-controlled T-intersection (see Figures 7, 8, and 9). It was observed that a high percentage of the vehicular volumes are trucks and buses. School officials stated that this intersection and Barclay Avenue immediately next to the intersection are the primary concern for St. Michael’s students. They stated that northbound right turning trucks coming from Kissena Boulevard onto Barclay Avenue conflict with pedestrians crossing Barclay Avenue.

Additionally, pedestrians consistently cross Kissena Boulevard in the east-west direction, although there are no pedestrian crosswalks, or traffic control at this intersection.

In addition, trucks loading and unloading on the north side of Barclay Avenue, as well as people shopping at the corner store, force students to cross Barclay Avenue in the mid-block to avoid the congested walking route.

According to school officials, some type of traffic control should be applied at this intersection.

One-hour traffic counts were performed at this intersection on Tuesday, October 18, 2005 between 2:30 pm and 3:30 pm (see Exhibit 6). The results show that 708 vehicles and 906 pedestrians utilized this unsignalized intersection during this hour in all directions. A total of 180 (54+126) vehicles per hour turned onto Barclay Avenue and conflicted with 845 pedestrians crossing Barclay Avenue. Approximately 61 pedestrians per hour crossed Kissena Boulevard although there are no pedestrian crosswalks on Kissena Boulevard. The gap study performed on August 10, 2006 shows that more than 60 gaps of 18 seconds (the time required to cross a 43-foot wide street at three feet per second plus three seconds of reaction time) were available for pedestrians to cross Barclay Avenue during one hour. Therefore, the existing conditions do not meet warrants for the installation of a traffic signal or all-way stop control at this time.

This intersection has been the site of 18 accidents during the 1998-2000 study period. One of the accidents involved a pedestrian, but it was not school related. There are no further details provided for these accidents.



*Figure 8 - The intersection of Kissena Boulevard at Barclay Avenue (looking south)*

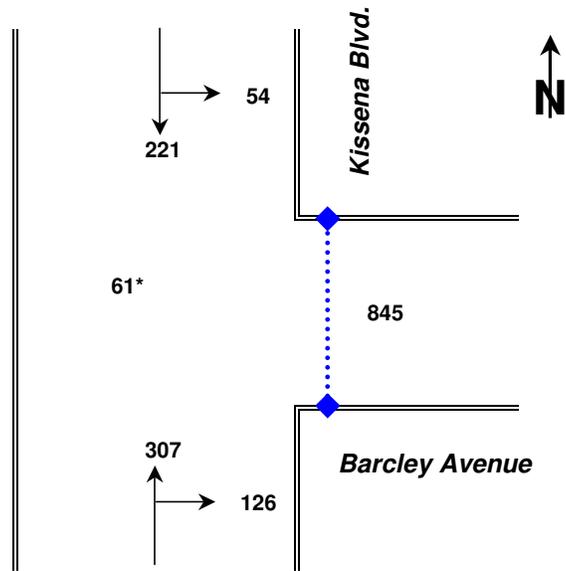


*Figure 9 – North sidewalk on Barclay Avenue ( looking west towards Kissena Boulevard)*



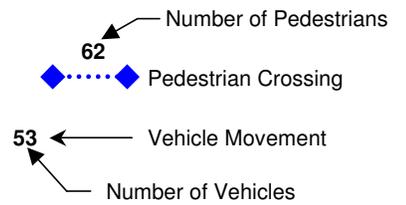
*Figure 10 – North sidewalk on Barclay Avenue in the vicinity of Kissena Boulevard*

**One Hour Traffic Count Volumes**  
 (2:30 PM - 3:30 PM October 18, 2005)



**Intersection of Kissena Boulevard and Barclay Avenue**

\* Number of pedestrians/hour jaywalking across Kissena Boulevard



<b>EXHIBIT 6</b>
<b>ST MICHAEL'S SCHOOL QUEENS</b>
<b>TRAFFIC COUNTS</b>

### 3.7 SIGNAL TIMING: PEDESTRIAN PHASE

Pedestrian crossing time was field verified at all signalized intersections in the vicinity of St. Michael's School, and found to be adequate for a child pedestrian walking rate of three feet per second plus three second reaction time in all directions and approaches (see Table 4).

<b>TABLE 4: PEDESTRIAN CROSSING TIME AT SIGNALIZED INTERSECTIONS</b>				
Intersection Name	Crosswalk Length (Feet)	Ped. Phase (Seconds)	Ped. Phase Red'd (Seconds)	Timina (Yes/No)
<b>41<sup>st</sup> Avenue and Union St.</b>				
Crossing 41 <sup>st</sup> Avenue	33	30	14	NO
Crossing Union St.	30	30	13	NO
<b>Union Street and Roosevelt Ave.</b>				
Crossing Union Street	60	45	23	NO
Crossing Roosevelt Ave	50	45	20	NO
<b>Northern Blvd and Union Street</b>				
Crossing Northern Blvd	70/70	35/35	27/27	NO*
Crossing Union Street	60	43	23	NO
<b>Main St./Kissena Blvd and 41<sup>st</sup> Ave</b>				
Crossing Main St.	60	24	23	NO
Crossing Kissena Blvd	65	36	25	NO
Crossing 41 <sup>st</sup> Avenue	30	24	13	NO
<b>Main St. and Roosevelt</b>				
Crossing Main St.	60	55	23	NO
Crossing Roosevelt Ave	44	55	18	NO

*Note – A rate of 3 ft/sec plus 3 seconds reaction time was utilized as the child pedestrian walking rate*

*\* - Pedestrians are expected to utilize the center medians on Northern Boulevard to wait between signal cycles.*

### 3.8 PHYSICAL CONDITIONS (ROADWAYS AND SIDEWALKS)

The roadways and sidewalks in the vicinity of the school were generally observed to be in good condition.

#### 4. POTENTIAL MEASURES TO IMPROVE STUDENT PEDESTRIAN SAFETY

This section describes potential countermeasures. Recommendations are divided into short-term and long-term measures. Short-term measures are those that potentially can be performed in-house, long term measures are capital improvements.

##### 4.1 SHORT-TERM MEASURES

- Upgrade No Parking to No Standing Zone on 41st Avenue

Existing parking regulations “NO PARKING 7:00 AM – 4:00 PM, SCHOOL DAYS” on 41<sup>st</sup> Avenue should be upgraded to “NO STANDING 7:00 AM – 4:00 PM, SCHOOL DAYS” in front of St. Michael’s School.

- Administer student pedestrian safety education program

It is recommended that the NYCDOT, Safety Education Program work with the school to educate the students on pedestrian safety including crossing the street with the WALK phase, and the meaning of WALK - FLASHING DON’T WALK - DON’T WALK pedestrian signal sequence. The school should also dedicate a staff member to help facilitate the quick and orderly drop-off and pick-up of students in front of the school.

- Install graphic “Yield to Pedestrian Sign”

A “YIELD TO PEDESTRIAN SIGN” should be installed at the intersection of Barclay Avenue and Kissena Boulevard (northbound approach on Kissena Boulevard).

- Install pedestrian information sign that explains the signal phases

The safety of pedestrians at the wide intersections of Northern Boulevard at Union Street is a concern. Installation of a pedestrian information sign adjacent to each school crosswalk that explains the signal phases is recommended. During a consultant field visit, it was noted that students and others attempted to cross Northern Boulevard in one pedestrian signal phase. The pedestrian should be informed to wait at the refuge island between signal cycles. Pedestrians will benefit from informational signage even though they are provided with sufficient time to cross at these intersections.

- Install school crosswalks at the following intersections:

- Union Street and 39<sup>th</sup> Avenue – west leg
- Union Street and 37<sup>th</sup> Avenue – west leg

Based on feedback from school officials these intersections are utilized by students of St. Michael’s School en route to school. Therefore, it is recommended that new school crosswalks be installed at these two locations (see Exhibit 7 for details).

- Install speed reducer (hump)/striped median

Spot speed surveys were conducted on both 41<sup>st</sup> Avenue between Main Street and Union Street, and on Barclay Avenue between Kissena Boulevard and Union Street on October 4, 2005. The objective of the survey was to determine if there is speeding on these sections of 41<sup>st</sup> Avenue and Barclay Avenue, as school officials have reported.

The speed study results are shown in Table 5 and in the Appendix. The 85<sup>th</sup> percentile speed is 31 mph on both 41<sup>st</sup> Avenue and Barclay Avenue. Therefore, to reduce speeding in the vicinity of St. Michael's School, a speed reducer (hump) should be installed on:

- 41<sup>st</sup> Avenue, between Main Street and Union Street

The actual number and location of speed reducers (humps) will be determined by the NYCDOT.

On Barclay Avenue, a speed reducer is not feasible to be installed due to the curve of the roadway and width (43 feet) of the street. As an alternative, painted buffer pavement markings should be installed as shown in Exhibit 7. The buffer pavement markings will reduce the effective width of the roadway and should help to reduce speeds on Barclay Avenue.

<b>TABLE 5: SPOT SPEED STUDIES</b>		
<b>LOCATION</b>	<b>MEDIAN SPEED (MPH)</b>	<b>85TH PERCENTILE SPEED (MPH)</b>
41 <sup>st</sup> Avenue between Main Street and Union Street	25	31
Barclay Avenue between Kissena Boulevard and Union Street	25	31

- Place stop bars ten feet in advance of school crosswalks.

The MUTCD and New York City DOT standard for placement of a stop bar is four feet in advance of a marked crosswalk. At signalized (or stop controlled) crosswalks, the vehicle stop line can be placed farther back from the crosswalk in order to maximize visibility of pedestrians and to minimize the potential for pedestrian/vehicle conflicts. Therefore, it is recommended that stop bars be placed ten feet in advance of all school crosswalks.

## 4.2 LONG-TERM MEASURES

- Install curb extensions at the following intersections:

Consideration should be given to installing curb extensions at the following locations, provided that the Final Design confirms that construction of the recommended curb extension would be feasible and would not interfere with traffic operations. Final details pertaining to the number, location and geometry of curb extensions will be developed during the Final Design/Contract Document preparation.

- 41<sup>st</sup> Avenue and Union Street (northwest corner)
- Northern Boulevard and Union Street (northwest and southwest corners)
- Kissena Boulevard and Barclay Avenue (northeast and northwest corners)

Curb extensions should be installed at the corners as shown in Exhibit 7.

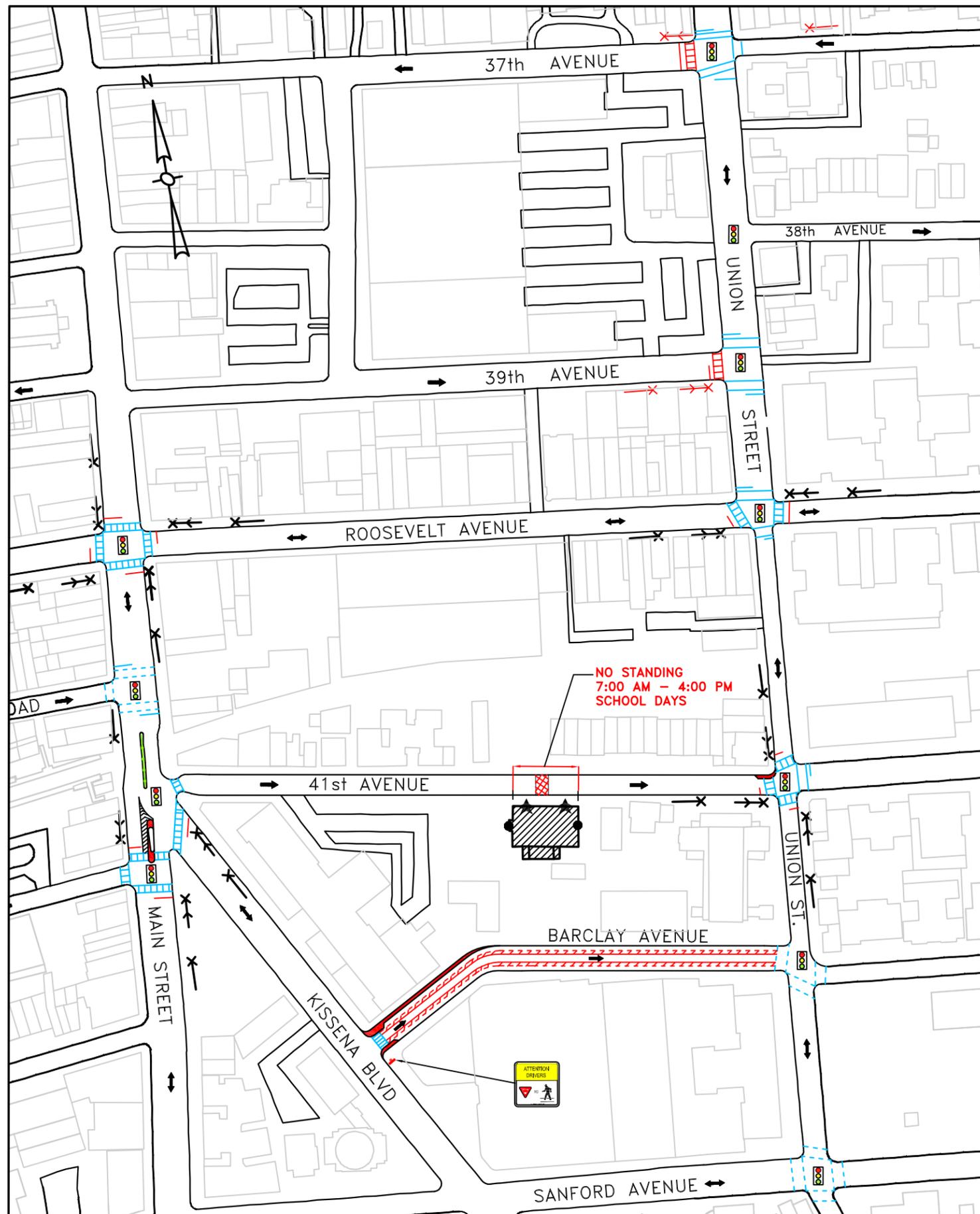
The purpose of the curb extensions is to shorten the crossing distance for pedestrians, and to reduce speeds of vehicles approaching and turning at these heavily utilized school crosswalks (or intersections). These curb extensions would not eliminate or reduce the width of any moving lanes.

- Consider widening the north sidewalk on Barclay Avenue

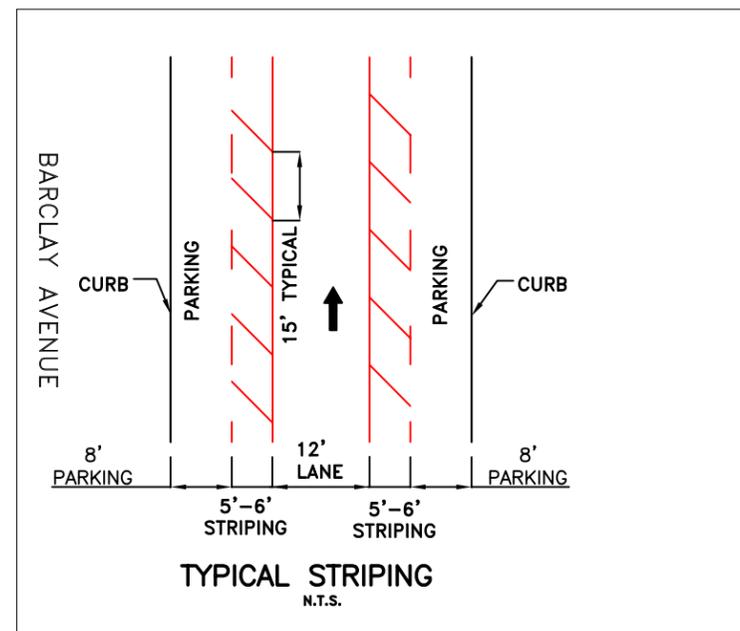
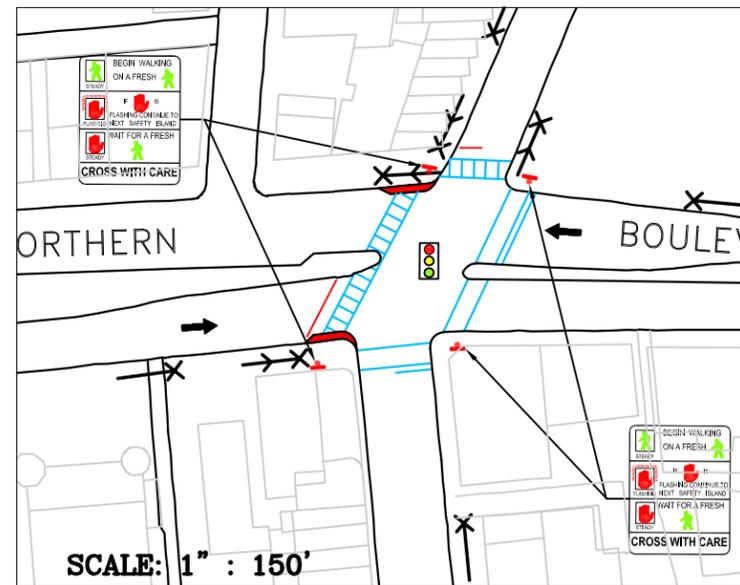
As described in the Section 3.6 the north sidewalk on Barclay Avenue between the St. Michael's School driveway and Kissena Boulevard becomes crowded with people shopping at the corner store, and parked and double-parked trucks loading and unloading. In addition, loading equipment is often left on the sidewalk, which narrows the pedestrian walking area (see Figures 9 and 10). Therefore, widening the sidewalk by five feet between the intersection of Barclay Avenue and Kissena Boulevard and St. Michael's driveway should be considered (see Exhibit 7).

- Extend raised concrete median on the north side of the intersection of Main Street and Kissena Boulevard

Consideration should be given to extending the raised concrete median through the existing pedestrian crosswalk to provide refuge for pedestrians. The median should have an ADA compliant at-grade cut-through. Final details pertaining to the raised median will be developed during the Final Design/Contract Document preparation. In addition, a pedestrian fence should be installed on the raised median south of this intersection (adjacent to the left-turn bay) as shown on Exhibit 7 to discourage pedestrians from crossing mid-block.



SCALE: 1" : 200'



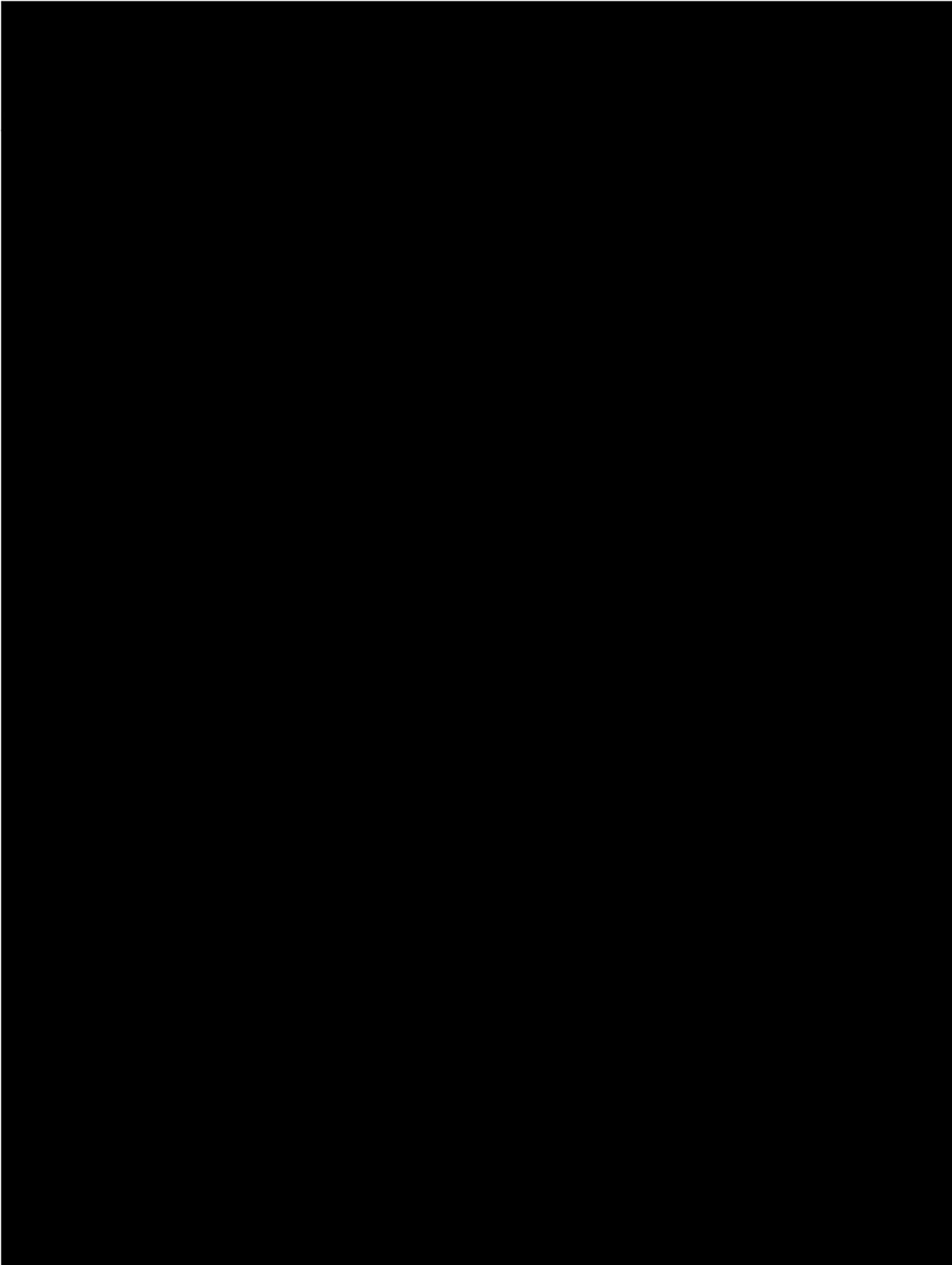
- LEGEND**
- ★ MAIN ENTRANCE
  - OTHER ENTRANCES
  - X EXISTING ADVANCE WARNING SIGN WITH ARROW
  - X EXISTING ADVANCE WARNING SIGN
  - ↔ EXISTING TRAVEL DIRECTION
  - 🚦 SIGNALIZED INTERSECTION
  - ▬ EXISTING SCHOOL CROSSWALK
  - ▬ EXISTING STANDARD (NON-SCHOOL) CROSSWALK
  - - - EXISTING SCHOOL CROSSWALK ASSOC. WITH OTHER SCHOOL
  - X PROPOSED ADVANCE WARNING SIGN WITH ARROW
  - X PROPOSED ADVANCE WARNING SIGN
  - PROPOSED STOP LINE
  - ▬ PROPOSED SCHOOL CROSSWALK
  - PROPOSED TRAFFIC SIGN
  - ⤵ PROPOSED CURB EXTENSION (NECKDOWN)
  - ▨ PROPOSED SPEED REDUCER (HUMP)
  - ▬ PROPOSED MEDIAN EXTENSION
  - ↔ PROPOSED PARKING REGULATIONS
  - - - PROPOSED STRIPING
  - PROPOSED PEDESTRIAN FENCE

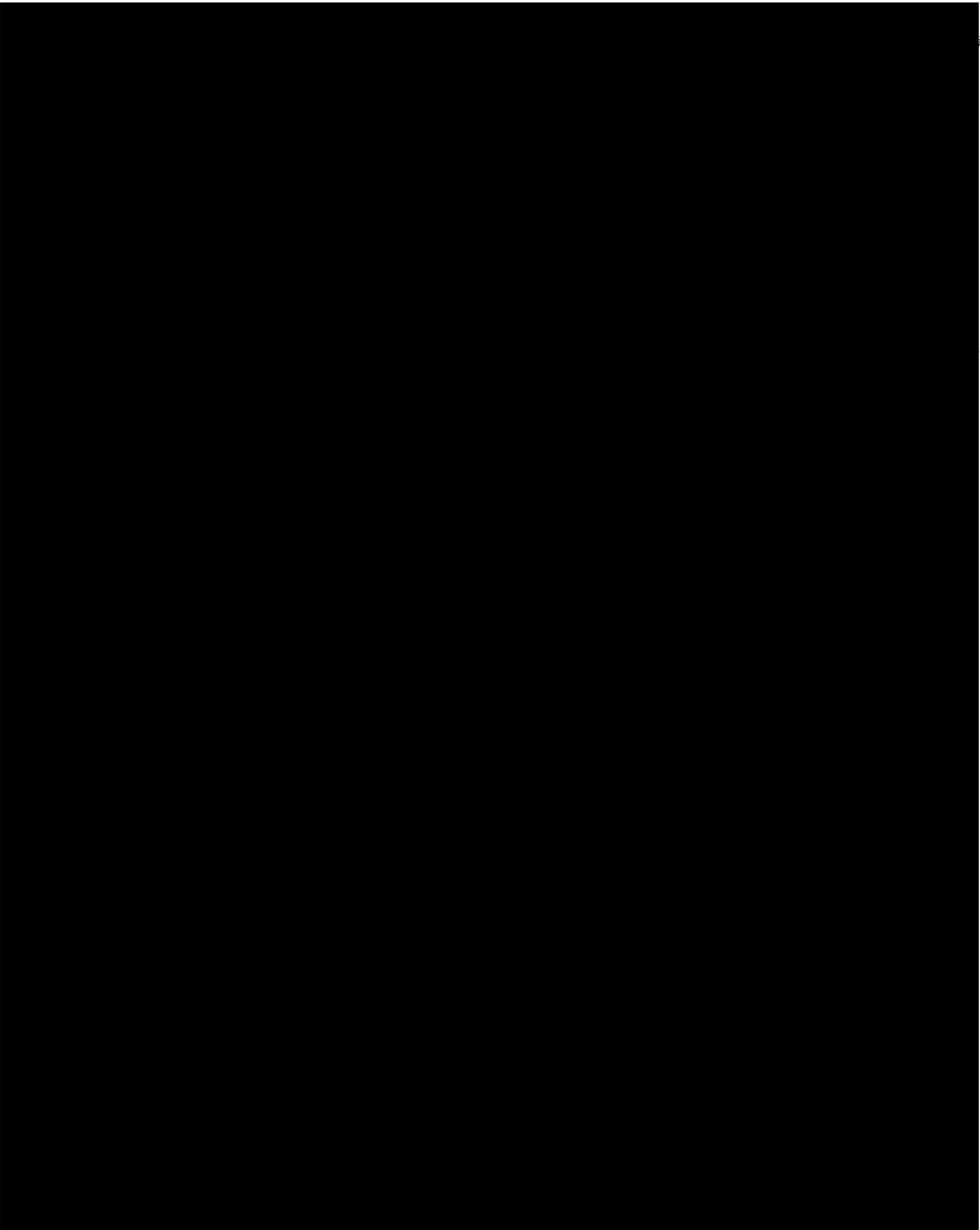
**EXHIBIT 7**

**SAINT MICHAEL'S SCHOOL  
QUEENS**

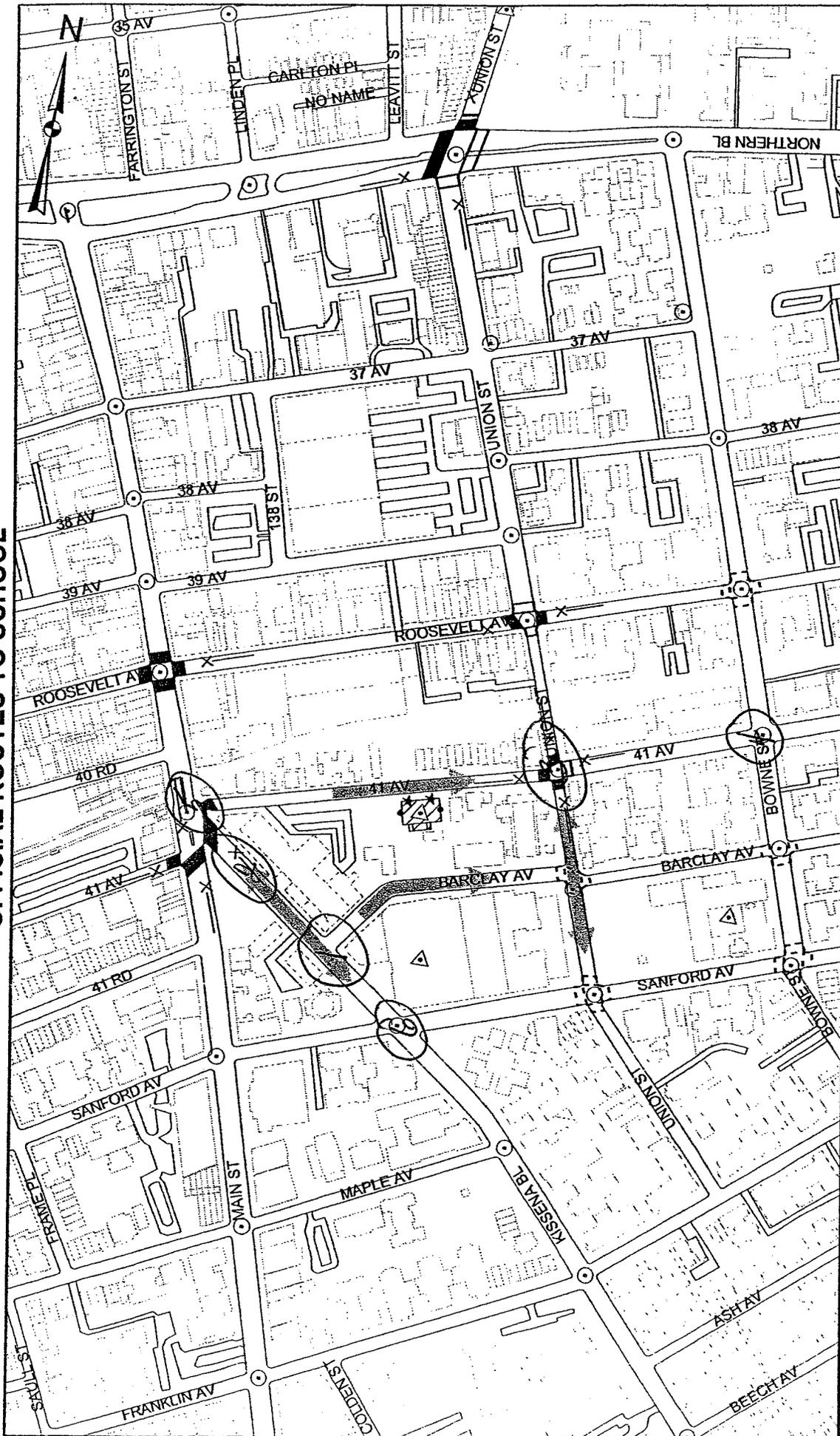
**PROPOSED MEASURES TO  
IMPROVE STUDENT PEDESTRIAN SAFETY**

# APPENDIX





**TRAFFIC SAFETY PLAN  
OFFICIAL ROUTES TO SCHOOL**



The TRAFFIC SAFETY PLAN shown on this map was established to provide the maximum degree of safety for children going to and from school. It is required that all children follow the prescribed routes and use the designated crosswalks.

**LEGEND:**

- TRAFFIC FLOW
- ROUTE TO SCHOOL
- ADV. WARNING SIGN
- SCHOOL LOCATION
- MAIN SCHOOL ENTRANCE
- OTHER SCHOOL ENTRANCES
- SCHOOL X-WALK
- PED. X-WALK
- STOP LINE
- X-WALKS ASSOCIATED WITH OTHER SCHOOLS
- SPEED HUMP
- TRAFFIC SIGNAL
- ALL-WAY STOP
- 2-WAY STOP

**ST MICHAEL SCHOOL  
(27)**

Prepared by the NEW YORK CITY DEPARTMENT OF TRANSPORTATION,  
Iris Weinshall, COMMISSIONER, in cooperation with SCHOOL, and  
POLICE OFFICIALS.

ORIG. DATE: 09/05/1988  
GIS CONVRT: 04/2002  
REVISIONS:

COMM. BOARD:  
BOROUGH: QUEENS  
PRECINCT: 109

DRAWING NO.  
CC-1928  
MS-4373

## SPOT SPEED STUDY

Date: **October 4, 2005**                      Time:  
 Location: **Barclay Avenue between Kissena Boulevard and Union Street**  
 Surveyor: **Eyad Yousef**

School: **Saint Michael's School**  
 Direction: **EW**  
 Comments: **Sunny and Dry**

Speed S (mph)	No. of Vehicles in Group n	% of Vehicles in Group	% Cumulative Vehicles	nS	nS <sup>2</sup>
8	0	0.0%	0.0%	0	0
9	0	0.0%	0.0%	0	0
10	0	0.0%	0.0%	0	0
11	0	0.0%	0.0%	0	0
12	0	0.0%	0.0%	0	0
13	0	0.0%	0.0%	0	0
14	0	0.0%	0.0%	0	0
15	3	4.4%	4.4%	45	675
16	1	1.5%	5.9%	16	256
17	3	4.4%	10.3%	51	867
18	0	0.0%	10.3%	0	0
19	1	1.5%	11.8%	19	361
20	5	7.4%	19.1%	100	2000
21	3	4.4%	23.5%	63	1323
22	7	10.3%	33.8%	154	3388
23	6	8.8%	42.6%	138	3174
24	9	13.2%	55.9%	216	5184
25	8	11.8%	67.6%	200	5000
26	3	4.4%	72.1%	78	2028
27	3	4.4%	76.5%	81	2187
28	0	0.0%	76.5%	0	0
29	0	0.0%	76.5%	0	0
30	1	1.5%	77.9%	30	900
31	2	2.9%	80.9%	62	1922
32	0	0.0%	80.9%	0	0
33	2	2.9%	83.8%	66	2178
34	4	5.9%	89.7%	136	4624
35	1	1.5%	91.2%	35	1225
36	3	4.4%	95.6%	108	3888
37	2	2.9%	98.5%	74	2738
38	1	1.5%	100.0%	38	1444
39	0	0.0%	100.0%	0	0
40	0	0.0%	100.0%	0	0
41	0	0.0%	100.0%	0	0
42	0	0.0%	100.0%	0	0
43	0	0.0%	100.0%	0	0
44	0	0.0%	100.0%	0	0
45	0	0.0%	100.0%	0	0
46	0	0.0%	100.0%	0	0
47	0	0.0%	100.0%	0	0
48	0	0.0%	100.0%	0	0
49	0	0.0%	100.0%	0	0
50	0	0.0%	100.0%	0	0
51	0	0.0%	100.0%	0	0
52	0	0.0%	100.0%	0	0
53	0	0.0%	100.0%	0	0
54	0	0.0%	100.0%	0	0
55	0	0.0%	100.0%	0	0
56	0	0.0%	100.0%	0	0
	<b>68</b>	<b>100.0%</b>		<b>1710</b>	<b>45362</b>

Mean Speed = 25.1 mph  
 Standard Deviation = 5.9 mph  
 Margin of Error (95% Confidence) = ± 1.4 mph

Median Speed = 25.1 mph  
 15th Percentile Speed = 19.0 mph  
 85th Percentile Speed = 31.3 mph

# SPOT SPEED STUDY

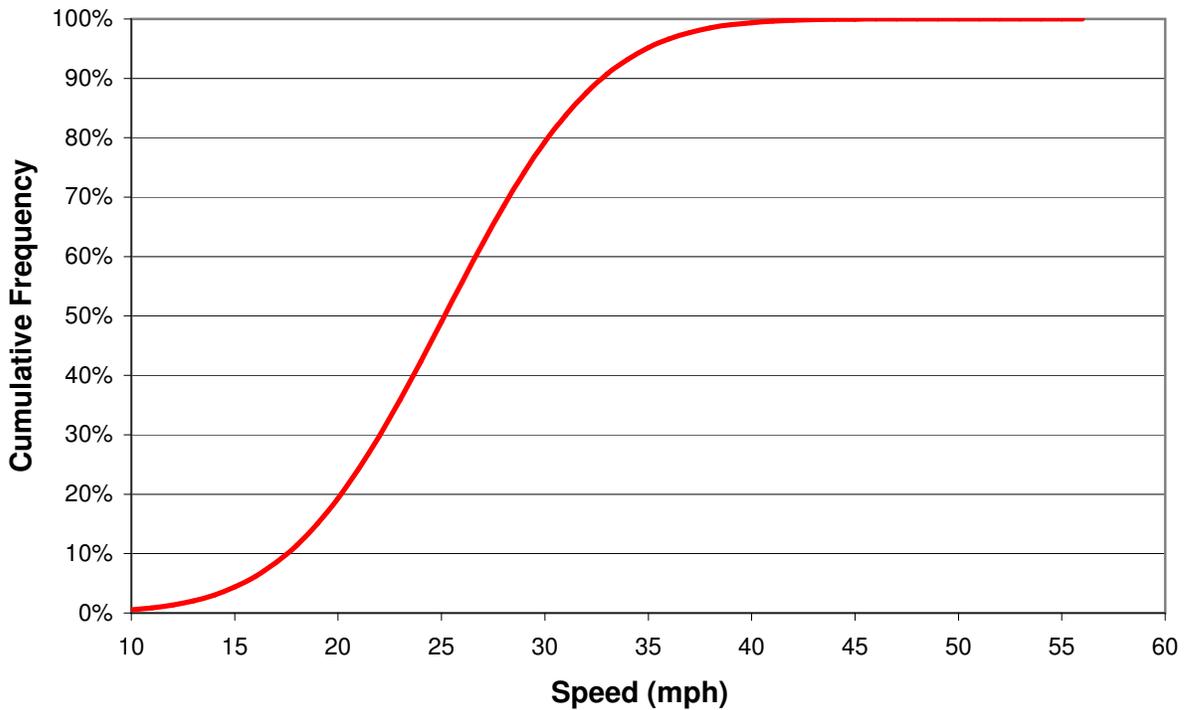
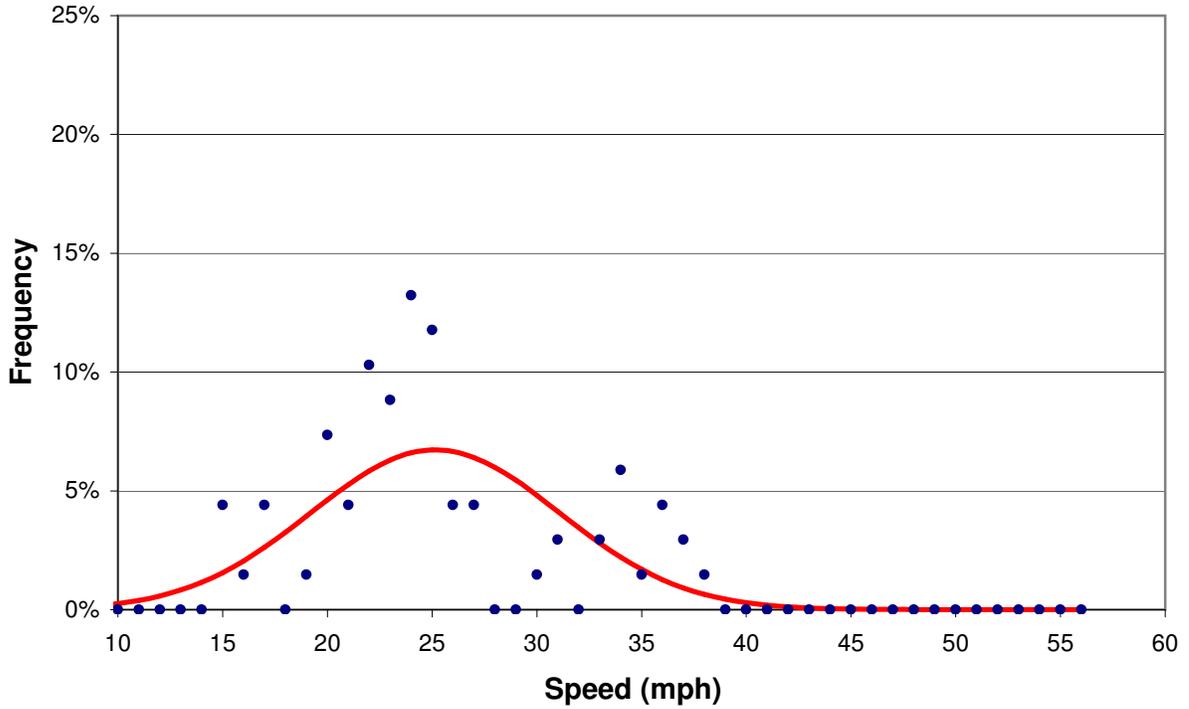
Date: **October 4, 2005**  
Location: **Barclay Avenue between Kissena Boulevard and Union Street**  
Surveyor: **Eyad Yousef**

Time:

School: **Saint Michael's School**  
Direction: **EW**  
Comments: **Sunny and Dry**

Mean Speed = 25.1 mph  
Standard Deviation = 5.9 mph  
Margin of Error (95% Confidence) =  $\pm 1.4$  mph

Median Speed = 25.1 mph  
15th Percentile Speed = 19.0 mph  
85th Percentile Speed = 31.3 mph



## SPOT SPEED STUDY

Date: **October 4, 2005**  
 Location: **41st Avenue between Main Street and Union Street**  
 Surveyor: **Eyad Yousef**

Time:  
 School: **Saint Michael School**  
 Direction: **EW**  
 Comments: **Sunny and Dry**

Speed S (mph)	No. of Vehicles in Group n	% of Vehicles in Group	% Cumulative Vehicles	nS	nS <sup>2</sup>
8	0	0.0%	0.0%	0	0
9	0	0.0%	0.0%	0	0
10	0	0.0%	0.0%	0	0
11	0	0.0%	0.0%	0	0
12	0	0.0%	0.0%	0	0
13	0	0.0%	0.0%	0	0
14	0	0.0%	0.0%	0	0
15	0	0.0%	0.0%	0	0
16	0	0.0%	0.0%	0	0
17	3	4.2%	4.2%	51	867
18	2	2.8%	6.9%	36	648
19	3	4.2%	11.1%	57	1083
20	6	8.3%	19.4%	120	2400
21	3	4.2%	23.6%	63	1323
22	3	4.2%	27.8%	66	1452
23	8	11.1%	38.9%	184	4232
24	14	19.4%	58.3%	336	8064
25	3	4.2%	62.5%	75	1875
26	3	4.2%	66.7%	78	2028
27	2	2.8%	69.4%	54	1458
28	4	5.6%	75.0%	112	3136
29	4	5.6%	80.6%	116	3364
30	0	0.0%	80.6%	0	0
31	3	4.2%	84.7%	93	2883
32	2	2.8%	87.5%	64	2048
33	1	1.4%	88.9%	33	1089
34	1	1.4%	90.3%	34	1156
35	1	1.4%	91.7%	35	1225
36	3	4.2%	95.8%	108	3888
37	1	1.4%	97.2%	37	1369
38	2	2.8%	100.0%	76	2888
39	0	0.0%	100.0%	0	0
40	0	0.0%	100.0%	0	0
41	0	0.0%	100.0%	0	0
42	0	0.0%	100.0%	0	0
43	0	0.0%	100.0%	0	0
44	0	0.0%	100.0%	0	0
45	0	0.0%	100.0%	0	0
46	0	0.0%	100.0%	0	0
47	0	0.0%	100.0%	0	0
48	0	0.0%	100.0%	0	0
49	0	0.0%	100.0%	0	0
50	0	0.0%	100.0%	0	0
51	0	0.0%	100.0%	0	0
52	0	0.0%	100.0%	0	0
53	0	0.0%	100.0%	0	0
54	0	0.0%	100.0%	0	0
55	0	0.0%	100.0%	0	0
56	0	0.0%	100.0%	0	0
	72	100.0%		1828	48476

Mean Speed = 25.4 mph  
 Standard Deviation = 5.4 mph  
 Margin of Error (95% Confidence) = ± 1.2 mph

Median Speed = 25.4 mph  
 15th Percentile Speed = 19.8 mph  
 85th Percentile Speed = 31.0 mph

# SPOT SPEED STUDY

Date: **October 4, 2005**  
 Location: **41st Avenue between Main Street and Union Street**  
 Surveyor: **Eyad Yousef**

Time:  
 School: **Saint Michael School**  
 Direction: **EW**  
 Comments: **Sunny and Dry**

Mean Speed = 25.4 mph  
 Standard Deviation = 5.4 mph  
 Margin of Error (95% Confidence) =  $\pm 1.2$  mph

Median Speed = 25.4 mph  
 15th Percentile Speed = 19.8 mph  
 85th Percentile Speed = 31.0 mph

