

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



School Safety Engineering Project

**FINAL REPORT: C.I.S. 303 (The Leadership and Community Service Academy) /
C.I.S. 232, Bronx**



**Prepared by
The RBA Group and URBITRAN Associates Inc.**



November 17, 2006

**School Safety Engineering Project
Final Report: C.I.S. 303 / C.I.S. 232, Bronx**

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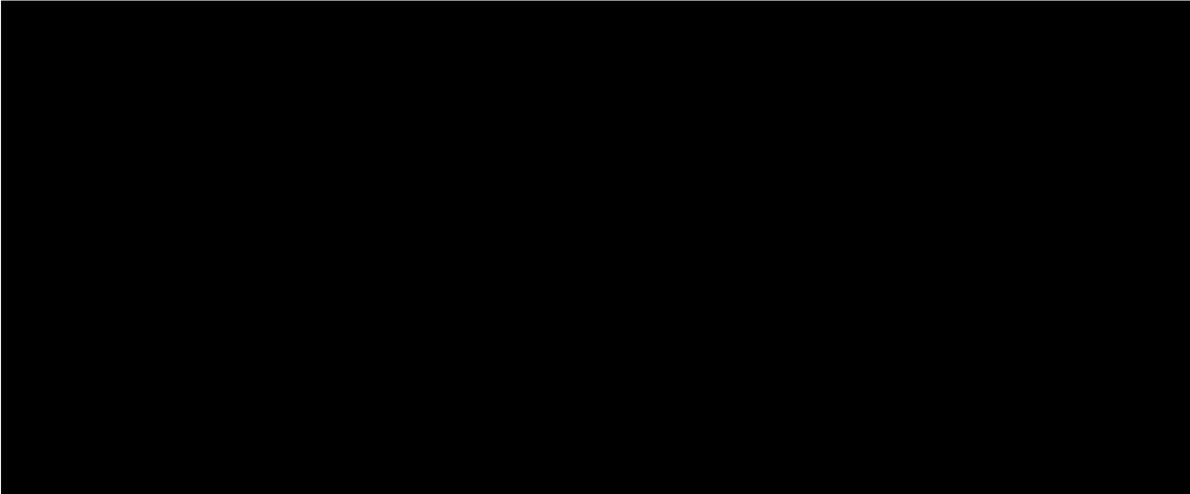
1. INTRODUCTION

1.1 PROJECT DESCRIPTION

The Department of Transportation (DOT) 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). C.I.S. 303 (The Leadership and Community Service Academy) / C.I.S. 232 in the Bronx is one of the 135 “priority” schools identified by the New York City Department of Transportation, Office of School Safety Engineering.

2. BACKGROUND—EXISTING CONDITIONS AND ANALYSIS



2.2 NEIGHBORHOOD DESCRIPTION

Exhibit 1 shows an aerial view of the neighborhood in the vicinity of the school. C.I.S. 303 / C.I.S. 232 are bounded by University Avenue (also known as Dr. Martin Luther King Jr. Boulevard) and West Tremont Avenue to the north, West 176th Street to the south, Harrison Avenue to the east, and Macombs Road to the west. The neighborhood in the vicinity of the school has many commercial uses, but includes some multi-story apartment buildings as well. The residential uses predominate over commercial uses on University Avenue and Macombs Road. Both of these roadways carry high traffic volumes. The neighborhoods east and south of the school are primarily high-density residential (Figures 1, 2 and 3 show land uses in the vicinity of the school).



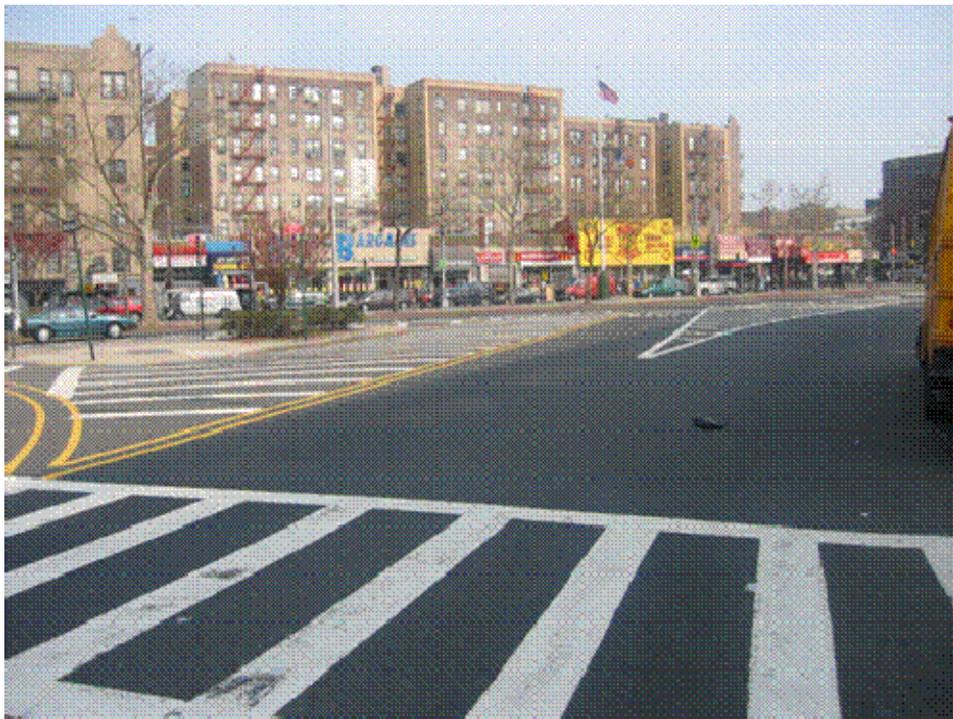
Figure 1: Looking south along Macombs Road from the intersection with University Avenue
(the school building is shown to the left)

2.3 MEETING WITH SCHOOL REPRESENTATIVES

Members of the consultant team and a representative of the NYCDOT met with the principals of both C.I.S. 303 and C.I.S. 232, and the assistant principal of C.I.S. 232, at the school on the morning of April 22, 2004. According to representatives of the school, C.I.S. 303 and C.I.S. 232 student pedestrians face the following problems:

- According to C.I.S. 303 Principal, Ms. Bentley, a child was struck at the intersection of Macombs Road and Nelsen Avenue during this past school year, and according to C.I.S. 232 Principal, Mr. Williams, two students were struck at the intersection of Macombs Road and West 176th Street in two separate incidents (*Note: These would not appear on our accident lists which include January 1998 through December 2000*).
- The schools have no crossing guards, since they are “Junior Highs”.
- Principal Williams stated that a traffic signal at Macombs Road and West 176th Street is needed and might make the intersection safer for the students to cross, and possibly slow traffic down on Macombs Road.
- All C.I.S. 303 students enter and exit the building using the Macombs Road entrance closest to West 176th Street, and all C.I.S. 232 students enter and exit the building using the entrance in the back of the school accessing the school yard.
- According to both principals, the most significant problem faced by C.I.S. 303 and C.I.S. 232 is the lack of sufficient parking for teachers.
- Students were observed, by the consultant team, crossing mid-block on Macombs Road with little regard for the vehicular traffic or designated crosswalks.

(See Appendix for a summary of school concerns.)



*Figure 2: Looking north along Macombs Road to the intersection with University Boulevard
(note the expansive pavement in this area, south of University Boulevard)*

2.6 PRIMARY MODES OF TRANSPORT TO AND FROM SCHOOL

The school's "catchment area," as defined by the Department of Education, is shown in Exhibit 2. The school's catchment area is bounded by West Tremont Avenue to the north, 170th Street to the south, Jerome Avenue to the east, and the Edward L. Grant Highway and University Avenue to the west. However, it should be noted that school representatives reported some students coming from neighborhoods east of Jerome Avenue.

Table 1 presents the modes of travel for C.I.S. 303 / C.I.S. 232 as identified by school representatives.

TABLE 1: MODES OF TRAVEL (AS ESTIMATED BY SCHOOL OFFICIALS)	STUDENTS (Percentage)
Walk	60%
Driven by car	10%
School bus	3%
Bus/Subway	27%
Bicycle	0%
TOTAL	100%



Figure 3: Looking east along West 176th Street from the intersection with Macombs Road (the school is shown to the left)

2.7 ADDITIONAL STUDENT PEDESTRIAN TRAFFIC GENERATORS

There are various commercial uses along University Avenue (see Figures 2 and 4) that generate significant pedestrian activity and vehicular traffic in the vicinity of the school.



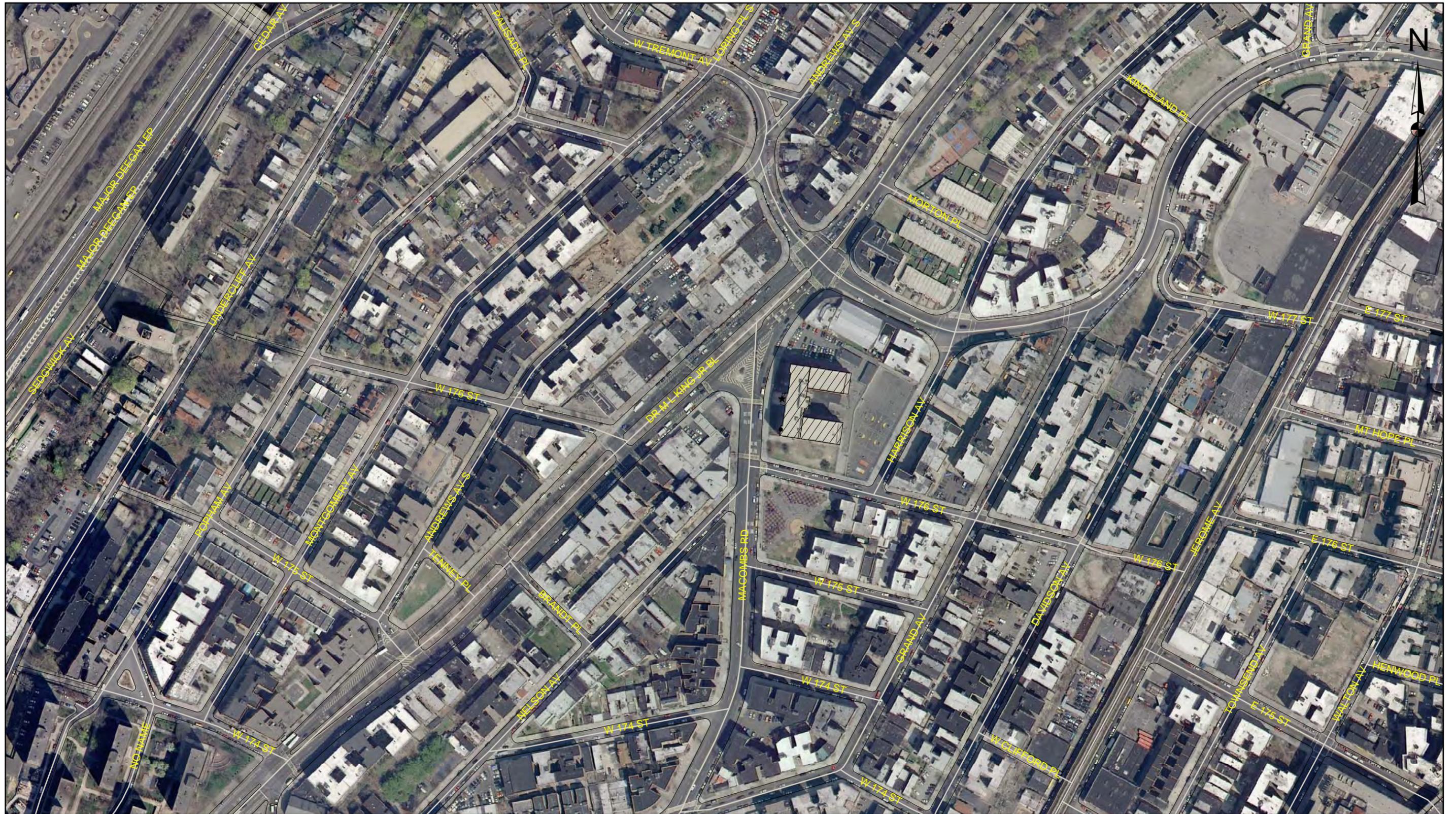
Figure 4: Commercial uses along University Avenue opposite the school



Figure 5: Looking north on Macombs Road at truck loading and unloading activity in the vicinity of a school crosswalk (the school is shown to the right)

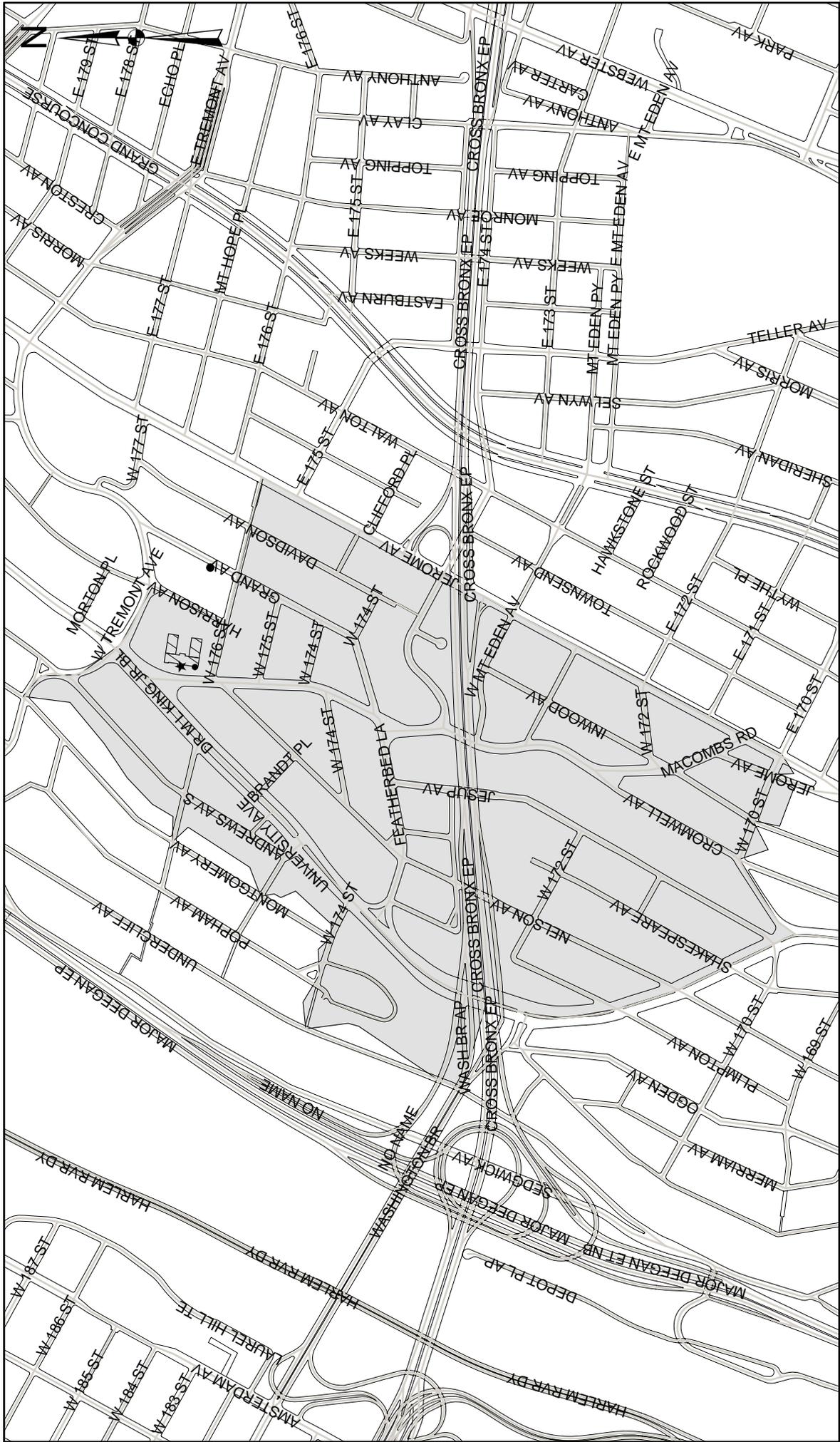
2.8 CROSSING GUARD LOCATION

There are no crossing guards assigned to C.I.S. 303 / C.I.S. 232.



0 250 500 1,000 Feet

EXHIBIT 1
C.I.S. 303/232 BRONX
THE LEADERSHIP AND COMMUNITY SERVICE ACADEMY
AERIAL PHOTOGRAPH



LEGEND:

CATCHMENT AREA, (DEPARTMENT OF EDUCATION DESIGNATED AREA FROM WITHIN WHICH STUDENTS ARE ENTITLED TO ATTEND C.I.S. 303/232)



EXHIBIT 2

C.I.S. 303/232 BRONX

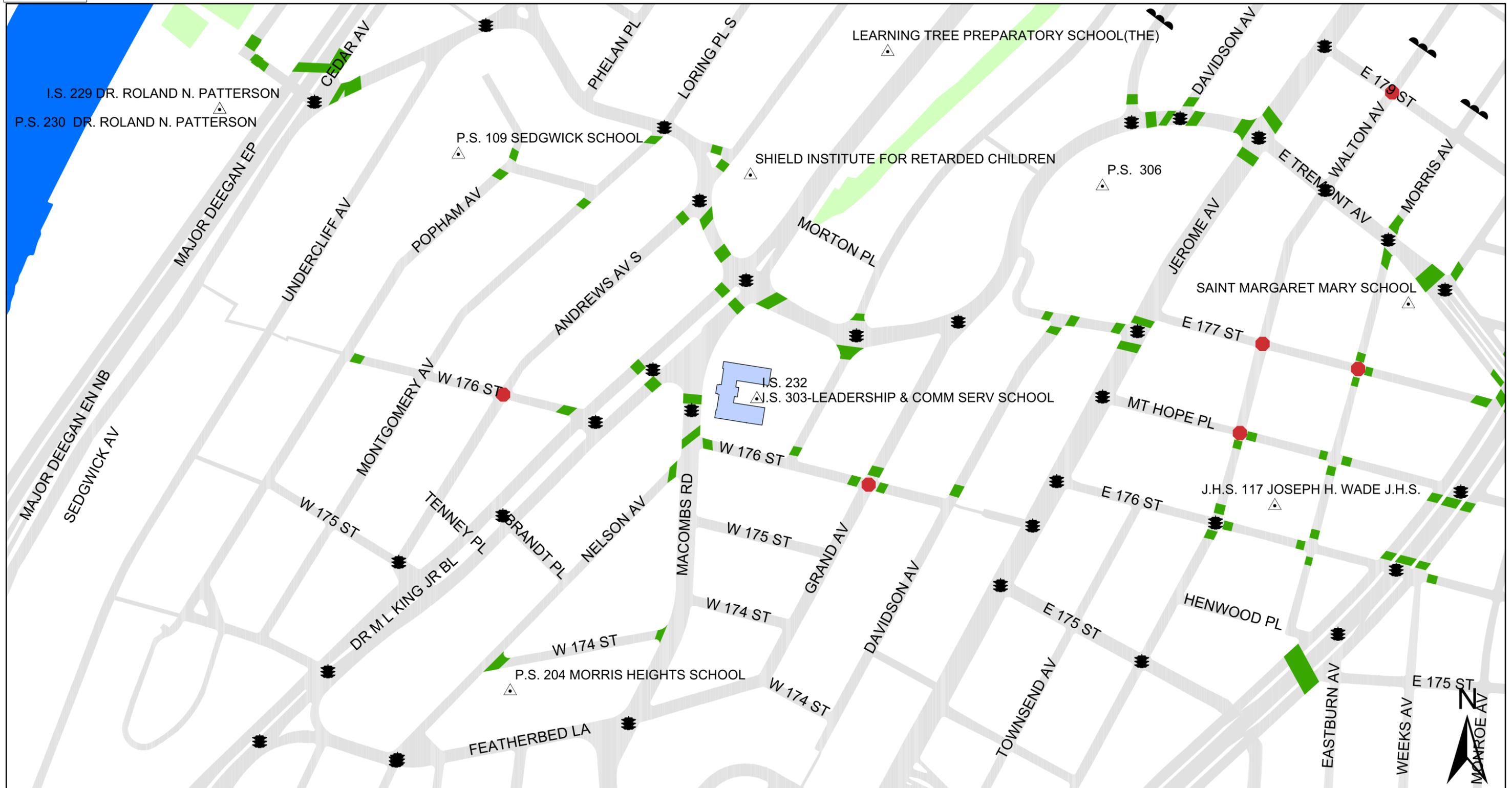
THE LEADERSHIP AND COMMUNITY SERVICE ACADEMY

CATCHMENT AREA





School Traffic Safety Map



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 	TRAFFIC SIGNAL 
SCHOOL CROSSWALK 	ALL - WAY STOP 
	SPEED REDUCER 

IS 232 Bronx

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

Map created on 11/16/2006

EXHIBIT 3

COMM. BOARD: 205
 PRECINCT: 46

1.5.1

3. TRAFFIC OPERATIONS

3.1 SCHOOL BUS OPERATIONS

According to school representatives, approximately 40 students (20 from each school) are transported to and from school via eight to nine special education buses. The school busses drop off and pick up student in front of the school on Macombs Road, at the same location where the Bx18 bus has a stop. This causes congestion in front of the school.

3.2 PARENT DROP-OFF OPERATIONS

According to school representatives, ten percent of the students are dropped off. Parents typically double park in front of the school on Macombs Road when dropping off students.

3.3 PARKING REGULATIONS

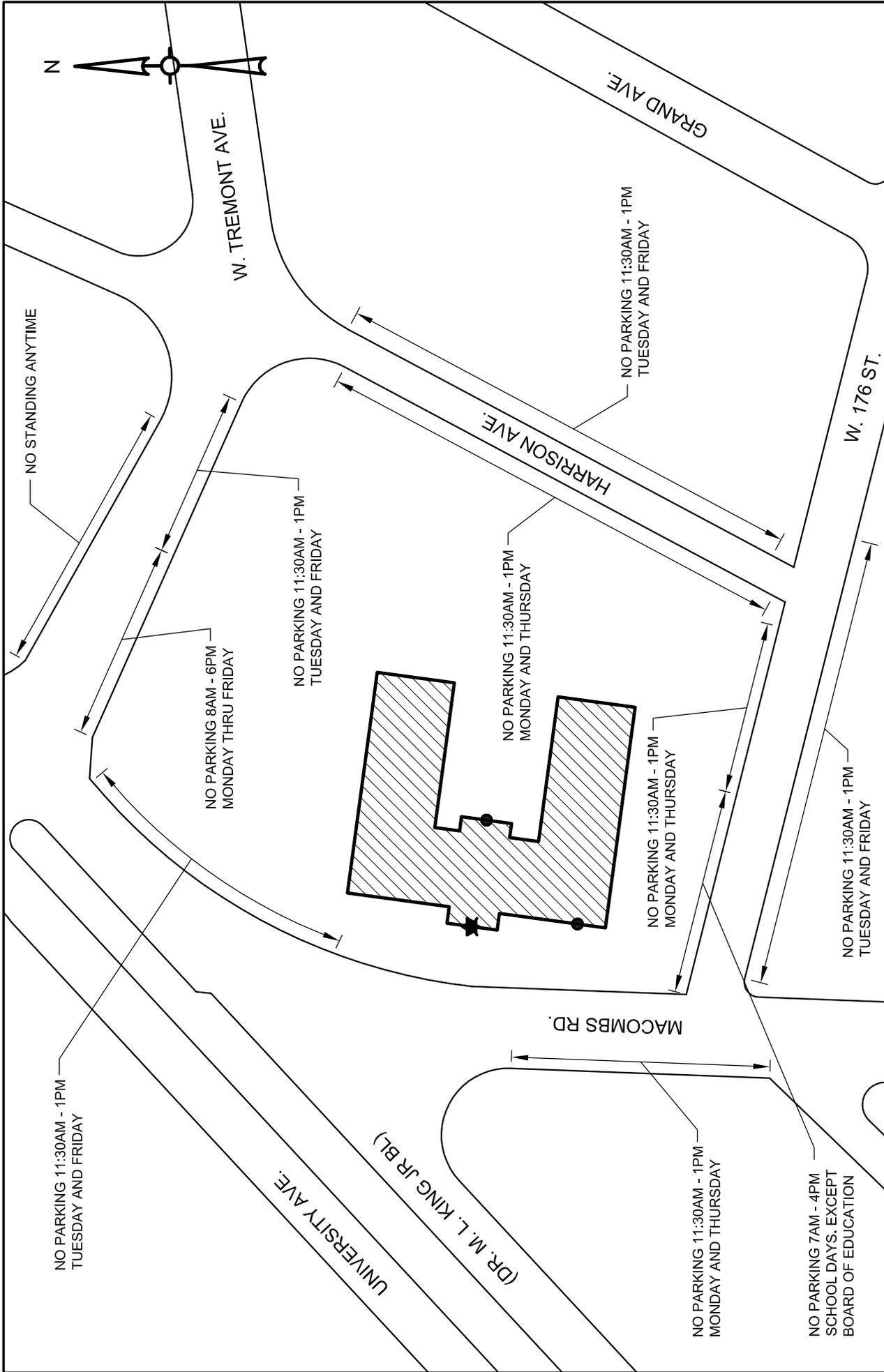
The existing on-street parking regulations in the vicinity of the school are shown in Exhibit 4.

3.4 EXISTING SCHOOL SIGNS AND MARKINGS

Exhibit 3 shows the existing signals and pavement markings assigned to C.I.S. 303 / C.I.S. 232. It should be noted that a citywide signage program is currently underway to upgrade school signage to the current edition of the 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” in Exhibit 6.



Figure 6: Looking west along West Tremont Avenue from the intersection with University Avenue.



LEGEND:

- ★ MAIN ENTRANCE
- ENTRANCE



EXHIBIT 4

CIS 303/232 BRONX
 THE LEADERSHIP AND COMM. SERVICE ACADEMY
 EXISTING PARKING REGULATIONS

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 C.I.S. 303 / C.I.S 232 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 accident. 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.

INTERSECTION	TOTAL ACCIDENTS	PEDESTRIAN ACCIDENTS	PEDESTRIAN FATALITIES	SCHOOL-RELATED ACCIDENTS*
Macombs Road and West 176 th Street/Nelson Avenue	2	2	0	0
Macombs Road and University Avenue	12	1	0	1
West Tremont Avenue and University Avenue	64	4	0	0
Morton Place and University Avenue	7	1	0	1
Harrison Avenue and West 176 th Street	1	0	0	0
Grand Avenue and West 176 th Street	25	3	0	1
Davidson Avenue and West 176 th Street	7	2	0	0
University Avenue and West 176 th Street	14	2	0	0
West Tremont Avenue and Andrews Avenue South	6	1	0	0
TOTAL	138	16	0	3

** School-related accidents are defined as accidents involving school-age pedestrians (age 4 to 14), occurring on weekdays during the school year*

TABLE 3: ACCIDENT SUMMARY OF NYPD DATA (2001-2004)				
INTERSECTION	TOTAL ACCIDENTS	PEDESTRIAN ACCIDENTS	PEDESTRIAN FATALITIES	SCHOOL-RELATED ACCIDENTS*
Macombs Road and West 176 th Street/Nelson Avenue	16	8	0	5
Macombs Road and University Avenue	20	3	0	1
West Tremont Avenue and University Avenue	93	14	0	1
Morton Place and University Avenue	22	4	0	1
Harrison Avenue and West 176 th Street	5	4	0	1
Grand Avenue and West 176 th Street	8	0	0	0
Davidson Avenue and West 176 th Street	19	3	0	1
University Avenue and West 176 th Street	40	13	0	2
West Tremont Avenue and Andrews Avenue South	22	4	0	1
TOTAL	245	53	0	13

* School-related accidents are defined as accidents involving school-age pedestrians (age 4 to 14), occurring on weekdays during the school year.

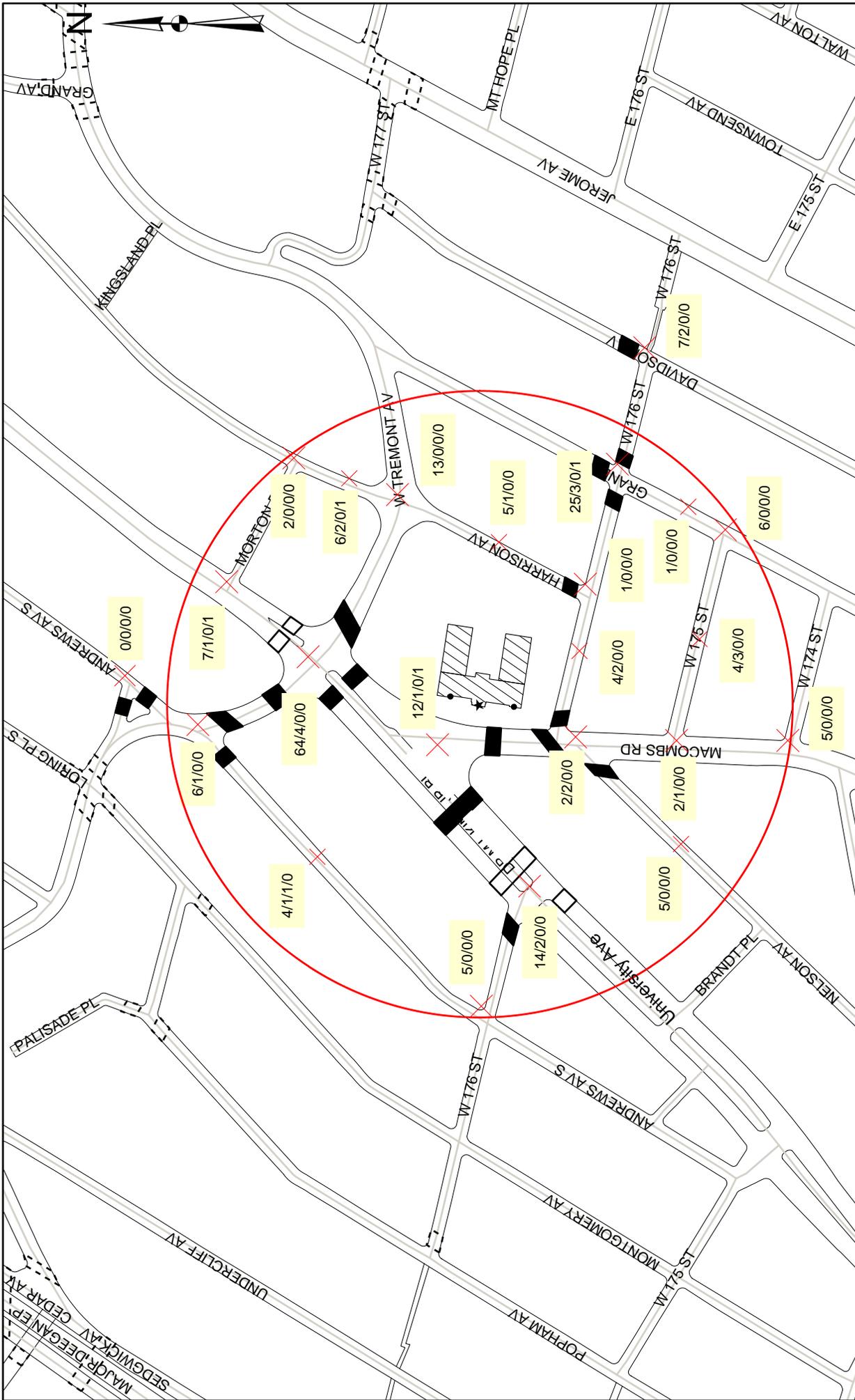


EXHIBIT 5
C.I.S. 303/232 BRONX
THE LEADERSHIP AND COMMUNITY SERVICE ACADEMY
ACCIDENT SUMMARY (1998-2000)

3.6 TRAFFIC OPERATIONS AND ISSUES

The specific roadway-related physical conditions for each location within the vicinity of the schools directly affect the safety and efficiency of operations for both pedestrian and vehicular traffic. These conditions are required information when analyzing a location, and are the starting point for any revisions that may be considered to improve safety and/or efficiency.

The following sub-sections outline the physical conditions and issues concerning traffic operations and accidents at the intersections in the vicinity of C.I.S. 303 / C.I.S. 232.

3.6.1 Macombs Road and University Avenue

This is a three leg “T”-intersection with two pedestrian signals and school crosswalk. The first pedestrian actuated crosswalk is located across University Avenue on the west leg of the intersection, and second is located across Macombs Road on the south leg of the intersection. Following a pedestrian actuation, these signals stop vehicular traffic on University Avenue and Macombs Road, respectively, to allow pedestrians to cross the roadway (see Figures 1 and 7).

Macombs Road is a two-way north-south street with two travel lanes and one on-street parking lane on each side of the roadway. University Avenue is also a two-way street with two travel lanes, one bicycle lane, and one on-street parking lane on each side of the roadway. University Avenue also has a wide, raised concrete median along the center of the roadway. The intersection of Macombs Road and University Avenue is expansive due to the angle at which the two roadways intersect, and includes a triangular, raised concrete island and a large area of painted channelization (see Figures 7 and 7A).

A total of 12 accidents were reported at this intersection between 1998 and 2000 (Table 2), including one pedestrian accident, which was also school-related. The school-related accident occurred at approximately 5:00 pm on Monday, June 19, 2000 when a six-year-old pedestrian sustained a non-incapacitating injury after being struck at the intersection while attempting to cross against the traffic signal. The accident was reported to have occurred during daylight conditions. The road surface was dry and the weather was cloudy at the time of the accident.



Figure 7: Looking west to the Macombs Road and University Avenue intersection (pedestrian-actuated crossings of both roadways are shown)

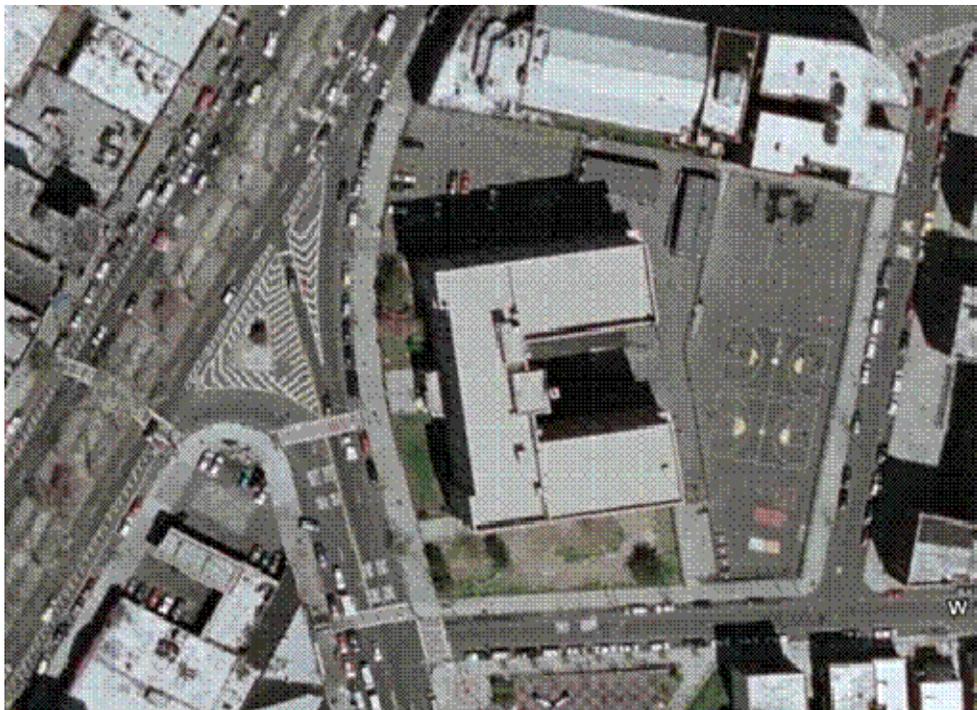


Figure 7A: An aerial look of the intersection of Macombs Road and University Avenue

3.6.2 West Tremont Avenue and University Avenue

This is a signalized intersection with school crosswalks located across the west and east legs of West Tremont Avenue, and the south leg of University Avenue. A pedestrian crosswalk is located across the north leg of University Avenue. University Avenue is a two-way street with two travel lanes, one bicycle lane, and one on-street parking lane on each side of the roadway. University Avenue also has a wide, raised concrete median along the center of the roadway. West Tremont Avenue is a two-way east-west street with one travel lane and one on-street parking lane on each side of the roadway (see Figures 6, 8 and 9).

There were a total of 64 accidents reported at this intersection between 1998 and 2000 (Table 2), including four pedestrian accidents, none of which were school-related. No pedestrian fatalities occurred during the three-year period between 1998 and 2000.



Figure 8: Looking north along University Avenue from the intersection with West Tremont Avenue



Figure 9: Looking east along West Tremont from the intersection with University Avenue

3.6.3 Macombs Road and West 176th Street/Nelson Avenue

This is an offset unsignalized intersection with school crosswalks located across the north leg of Macombs Road, the west leg of Nelson Avenue, and the east leg of West 176th Street. Macombs Road is two-way north-south street with two travel lanes and one on-street parking lane on each side of the roadway. West 176th Street is a two-way east-west street with one travel lane and one on-street parking lane on each side of the roadway (see Figure 10). The westbound approach of West 176th Street is stop-controlled at its intersection with Macombs Road. Nelson Avenue is a one-way westbound street with one travel lane and on-street parking permitted on both sides of the roadway.

Although field observations revealed that some pedestrians do use the existing crosswalks to cross Macombs Road at the intersection with West 176th Street/Nelson Avenue, a significant number of pedestrians (35 adults and 76 children) were also observed crossing Macombs Road diagonally, in a southwest-northeast pattern, where no crosswalks exist. This pattern results in longer crossing times for pedestrians, and increases their exposure to conflicting vehicular traffic movements along Macombs Road.

There were a total of two accidents reported at this intersection between 1998 and 2000 (Table 2), including two pedestrian accidents, neither of which were school-related. School officials noted that two students were struck at the intersection of Macombs Road and 176th Street in two separate incidents in 2003.



Figure 10: Looking east along West 176th Street from the intersection with Macombs Road (the school is shown to the left)

3.6.4 Grand Avenue and West 176th Street

This is an all-way stop-controlled intersection with school crosswalks across the north leg of Grand Avenue, and the east and west legs West 176th Street. Grand Avenue is a two-way north-south street with one travel lane and one on-street parking lane on each side of the roadway. West 176th Street is a two-way east-west street with one travel lane and one on-street parking lane on each side of the roadway.

There were a total of 25 accidents reported at this intersection between 1998 and 2000 (Table 2), including three pedestrian accidents, one of which was school-related. The school-related accident occurred at approximately 9:00 am on Wednesday, March 24, 1999, when three seven-year-old pedestrians were struck while attempting to cross the intersection. Two of these pedestrians suffered what were classified as “possible injuries” and the extent of the third pedestrian’s injuries was not reported. The pedestrians’ actions were reported as “crossing, no signal or crosswalk.” At the time of the accident, the road surface was wet and the weather was cloudy. The lighting condition was reported as “dark, road lighted.”

3.6.5 Harrison Avenue and West 176th Street

This is a three-leg unsignalized “T”-intersection with a crosswalks located on the north leg of Harrison Avenue. Harrison Avenue is a one-way northbound roadway with one travel lane and on-street parking permitted on both sides of the roadway. West 176th

Street is a two-way east-west street with one travel lane and one on-street parking lane on each side of the roadway.

There was one accident reported at this intersection between 1998 and 2000 (Table 2), but it was not a pedestrian accident.

3.6.6 Davidson Avenue and West 176th Street

This is a three-leg unsignalized “T”-intersection with a school crosswalk located across the north leg of Davidson Avenue. Davidson Avenue is a one-way northbound roadway with one travel lane and on-street parking permitted on both sides of the roadway. West 176th Street is a two-way east-west street with one travel lane and one on-street parking lane on each side of the roadway. The eastbound approach of West 176th Street is stop-controlled at its intersection with Davidson Avenue.

There were a total of seven accidents reported at this intersection between 1998 and 2000 (Table 2), including two pedestrian accidents, neither of which were school-related. No pedestrian fatalities occurred at this intersection between 1998 and 2000.

3.6.7 University Avenue and West 176th Street

This is a three-leg signalized “T”-intersection with a school crosswalk located across the west leg of West 176th Street, and pedestrian crosswalks located across the north and south legs of University Avenue. University Avenue is a two-way street with two travel lanes, one bicycle lane, and one on-street parking lane on each side of the roadway. University Avenue also has a wide, raised concrete median along the center of the roadway. West 176th Street is a one-way westbound street with one travel lane and one on-street parking lane on each side of the roadway.

There were a total of 16 accidents reported at this intersection between 1998 and 2000 (Table 2), including two pedestrian accidents, neither of which were school-related. No pedestrian fatalities occurred at this intersection between 1998 and 2000.

3.6.8 West Tremont Avenue and Andrews Avenue South

This is a four-leg signalized intersection with school crosswalks located across the east leg of West Tremont Avenue, and north and south legs of Andrews Avenue South. A pedestrian crosswalk is located across the west leg of West Tremont Avenue. West Tremont Avenue is a two-way east-west street with one travel lane and one on-street parking lane on each side of the roadway. Andrews Avenue South is a one-way southbound street with one travel lane and on-street parking permitted on both sides of the roadway.

There were a total of 14 accidents reported at this intersection between 1998 and 2000 (Table 2), including two pedestrian accidents that were not school-related. No pedestrian fatalities occurred at this intersection between 1998 and 2000.

It should also be noted that a fatal pedestrian accident occurred southwest of this intersection along Andrews Avenue South, mid-block between West Tremont Avenue and West 176th Street. This particular accident occurred at approximately 4:00 am on December 8, 1999 when a 51-year-old pedestrian was reported to have been struck while crossing Andrews Avenue South. At the time of the accident, the road surface was dry and the weather was clear. The accident was reported as occurring during “daylight conditions” which is likely an erroneous entry due to the time of the accident (4:00 am).

3.6.9 Morton Place and University Avenue

This is a three-leg unsignalized “T”-intersection with no crosswalks. Morton Place is a one-way westbound street with one travel lane and on-street parking permitted on both sides of the roadway. University Avenue is a two-way street with two travel lanes, one bicycle lane, and one on-street parking lane on each side of the roadway. University Avenue also has a wide, raised concrete median along the center of the roadway.

There were a total of seven accidents reported at this intersection between 1998 and 2000 (Table 2), including one pedestrian accident that was also school-related. This particular accident occurred at approximately 5:00 pm on May 28, 1998 when an eight-year-old pedestrian was reported to have sustained a “possible injury” while performing “other actions in the roadway.” The accident was reported to have occurred during daylight conditions, and the road surface was dry and the weather was clear. No pedestrian fatalities occurred at this intersection between 1998 and 2000.

3.7 SIGNAL TIMING

Pedestrian crossing times were field-verified for crosswalks at signalized intersections in the vicinity of C.I.S. 303 / C.I.S. 232, and were found to be adequate based upon a child pedestrian walking at a rate of three feet per second. Signal timings are shown in Table 4.

TABLE 4: PEDESTRIAN CROSSING TIMES AT SIGNALIZED INTERSECTIONS				
INTERSECTION	CROSSWALK LENGTH (FEET)	PEDESTRIAN CROSSING TIME ACTUAL (SECONDS)	PEDESTRIAN CROSSING TIME REQUIRED (SECONDS)	TIMING ADJUSTMENT REQUIRED?
Macombs Road and University Avenue				
crossing Macombs Road	60	24	23	NO
crossing University Avenue	40	17	17	NO
West Tremont Avenue and University Avenue				
crossing West Tremont Avenue	90	34	33	NO
crossing University Avenue	135	79	48	NO
West Tremont Avenue and Andrews Avenue South				
crossing West Tremont Avenue	78	31	29	NO
crossing Andrews Avenue South	63	79	24	NO

Note – A child pedestrian walking rate of 3 feet/second, plus 3 seconds reaction time, was utilized in the calculations for the required pedestrian crossing time.

3.8 PHYSICAL CONDITIONS

3.8.1 Roadways and Sidewalks

The roadways and sidewalks in the vicinity of C.I.S. 303 / C.I.S. 232 were observed to be in fair condition.

3.8.2 Pedestrian Ramps

Pedestrian ramps in the vicinity of the school appear to be standard.

4. POTENTIAL MEASURES TO IMPROVE STUDENT PEDESTRIAN SAFETY

This section describes the proposed measures to improve student pedestrian safety around C.I.S. 303 / C.I.S. 232. The proposed 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 involve capital improvements. Each of the short- and long-term measures recommended for C.I.S. 303 / C.I.S. 232 is discussed below, and is illustrated in more detail in Exhibit 6 at the end of this section.

4.1 SHORT-TERM MEASURES

➤ *Install “NO STANDING 7AM - 4PM SCHOOL DAYS” signs*

Install “NO STANDING 7AM-4PM SCHOOL DAYS” signs for a distance of 30 feet in front of the main entrance to the school on Macombs Road. (This is a typical requirement for all NYC schools in order to provide for emergency access to and from the school.)

➤ *Install graphic “YIELD TO PEDESTRIAN” signs*

Install “YIELD TO PEDESTRIAN” signs at intersection approaches with substantial vehicle–student pedestrian volumes. “YIELD TO PEDESTRIAN” signs are recommended on the following approaches to signalized intersections in the vicinity of C.I.S. 303 / C.I.S. 232:

- The westbound approach to the West 176th Street and Harrison Avenue intersection.
- The southbound approach to the University Avenue and West 176th Street intersection.

These signs are suggested to improve driver awareness, and the visibility and safety of student-pedestrians.

➤ *Place advance stop bars before 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, as shown in Exhibit 7.

➤ *Restrict truck deliveries on the west side of Macombs Road*

Commercial truck loading and unloading activities on Macombs Road during dismissal time increase congestion around the entrances to the school on this roadway. Therefore, the following action is recommended:

- Install “NO LOADING/UNLOADING 2 PM – 4 PM SCHOOL DAYS” signs on the west side of Macombs Road, between University Avenue and West 176th Street, as shown in Exhibit 6.

➤ Install pedestrian crosswalk at the West 176th Street and Grand Avenue intersection

This all-way stop-controlled intersection currently has no crosswalk across the south leg. Therefore, the following action is recommended:

- Install a pedestrian crosswalk across the south leg of the West 176th Street and Grand Avenue intersection, supplemented by the standard advance signing and striping.

➤ Designate additional school bus refuge area on West 176th Street, east of Macombs Road

During the field visit, the consultant team observed school busses dropping off and picking up students in front of the school on Macombs Road, at the same location as the Bx18 bus stop. Therefore, the following action is recommended:

- An additional curbside refuge area for school buses should be designated along the north side of West 176th Street, east of Macombs Road, to reduce the propensity for bus congestion in front of the school and conflicts with the Bx18 bus stop on Macombs Road.

➤ Administer student pedestrian safety education program

During the field visit the consultant team observed students crossing at midblock and in the middle of the uncontrolled intersections of West 176th Street / Nelson Avenue and Macombs road. As stated by the schools principals this is a dangerous intersection where a student was struck and killed and 2 other students were involved in accidents. Therefore, the following action is recommended:

- The school should participate in the NYCDOT Safety Education Program to educate students to use designated school crosswalks while crossing the street, not to cross mid-block, not to cross against signals, and not to run out between cars.

4.2 LONG-TERM MEASURES

➤ Consider reconfiguration of the Macombs Road and University Avenue intersection:

Although a raised concrete island and painted channelization exist at this intersection (see Figures 1, 2, 4 and 7), the intersection is relatively expansive due to the angle at which the two roadways intersect. The relatively open cross-sectional features do not encourage low speed traffic movements in the vicinity of the school. Therefore, the following actions should be considered provided that the Final Design confirms that construction of the recommended reconfiguration confirms that it would be feasible and not interfere with traffic operations. Final details pertaining to the geometry of the intersection will be developed during the Final Design/Contract Document preparation.

- Redesign and reconstruct the Macombs Road leg of the intersection for a standard 90-degree configuration, as shown in Exhibit 6.
- Modify and install school crosswalks located across University Avenue and Macombs Road, as shown in Exhibit 6. Relocate and modify (as needed) the associated pedestrian signal hardware.
- Provide an at-grade cut-through section of the existing center median along University Avenue to align with the proposed school crosswalks.

In addition,

- As part of the intersection reconfiguration described above, consider relocating the existing pedestrian signal located mid-block in front of the school to the intersection of West 176th Street and McCombs Road. Note: All proposed signals would be subject to approval by NYCDOT Signals Division prior to installation.

➤ Consider installing curb extensions (neckdowns) at the following intersection:

Consideration should be given to installing curb extensions at the following locations, provided that the Final Design confirms that construction of the recommended curb extensions would be feasible and 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.

- Install curb extensions on all four corners of the West Tremont Avenue and University Avenue intersection.
- Provide at-grade cut-through sections for the crosswalks located across the north and south legs (University Avenue) of the intersection.

Macomb Road is relatively wide (two travel lanes plus one on-street parking lane in each direction) and there is no controlled crossing location in close proximity to the school. Therefore the following actions are recommended:

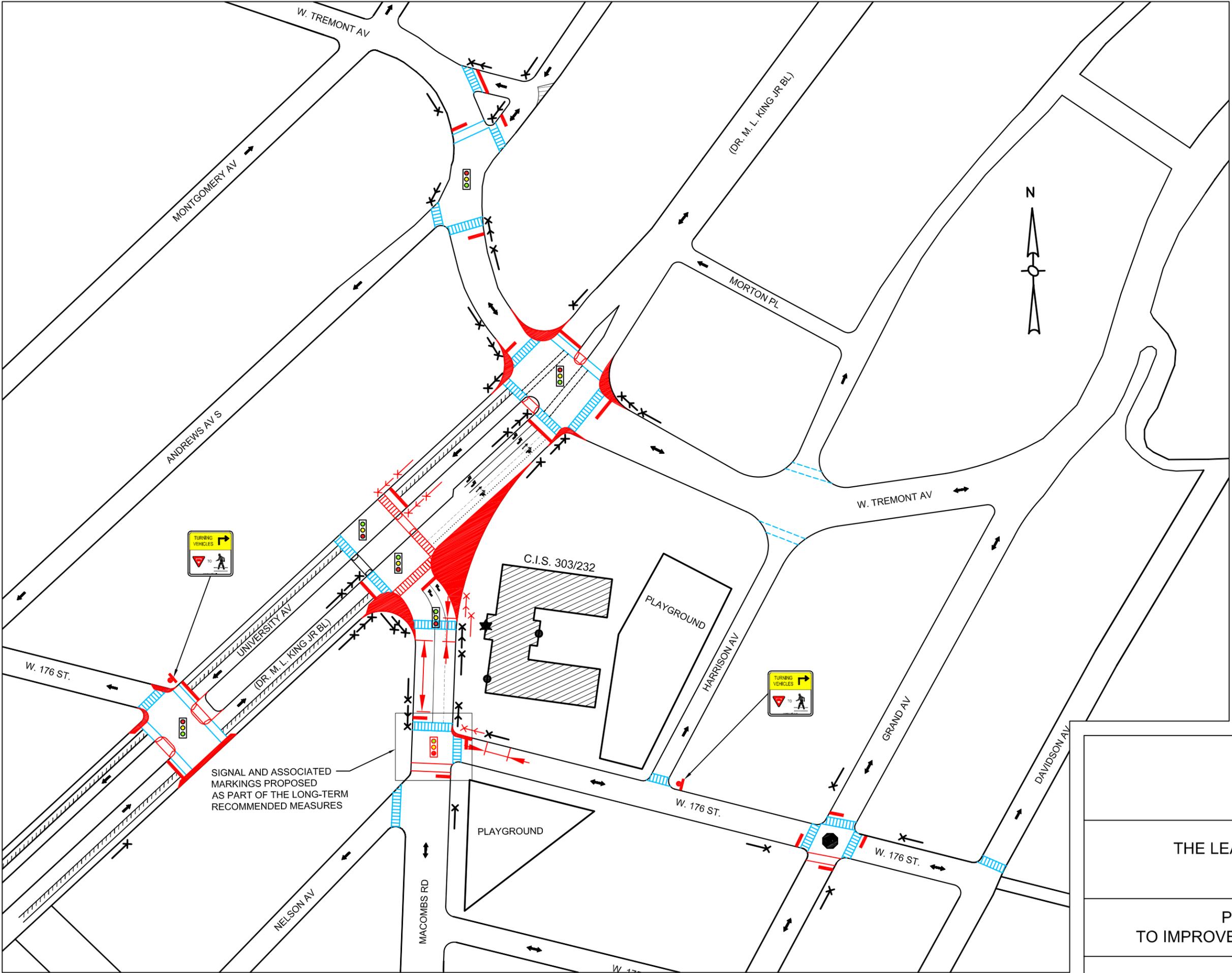
- Provide a curb extension (neckdown) on the northwest corner of the Macombs Road and Nelson Avenue intersection.
- Provide curb extensions (neckdowns) on the northeast and southeast corners of the Macombs Road and West 176th Street intersection.

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. These curb extensions would not eliminate or reduce the width of any moving lanes.

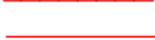
- *Extend existing median and provide at-grade cut-through sections for pedestrians at the University Avenue and West 176th Street intersection:*

It is recommended to:

- Extend the existing median on University Avenue through the crosswalks located across the north and south legs of the intersection, and provide at-grade cut-through sections for pedestrians at both crosswalks, as shown in Exhibit 7.



SIGNAL AND ASSOCIATED MARKINGS PROPOSED AS PART OF THE LONG-TERM RECOMMENDED MEASURES

- LEGEND**
-  MAIN ENTRANCE
 -  OTHER ENTRANCES
 -  EXISTING TRAVEL DIRECTION
 -  EXISTING ADVANCE WARNING SIGN OR SCHEDULED TO BE INSTALLED
 -  EXISTING SCHOOL CROSSWALK WARNING ASSEMBLY OR SCHEDULED TO BE INSTALLED
 -  SIGNALIZED LOCATION
 -  EXISTING ALL WAY STOP LOCATION
 -  EXISTING SCHOOL CROSSWALK
 -  EXISTING SCHOOL CROSSWALK ASSOCIATED WITH ANOTHER SCHOOL
 -  EXISTING PEDESTRIAN CROSSWALK
 -  PROPOSED SIGNALIZED LOCATION
 -  PROPOSED ADVANCE WARNING SIGN
 -  PROPOSED SCHOOL CROSSWALK WARNING ASSEMBLY
 -  PROPOSED SCHOOL CROSSWALK
 -  PROPOSED PEDESTRIAN CROSSWALK
 -  PROPOSED STOP LINE IN ADVANCE OF SCHOOL CROSSWALK
 -  PROPOSED TRAFFIC SIGN
 -  PROPOSED "NO STANDING 7:00AM - 4:00PM SCHOOL DAYS"
 -  PROPOSED "NO LOADING / UNLOADING 2 - 4PM SCHOOL DAYS"
 -  PROPOSED PEDESTRIAN RAMP TO BE CONSTRUCTED
 -  PROPOSED STRIPED REFUGE ISLAND WITH AT-GRADE CUT THROUGH SECTION
 -  PROPOSED CURB EXTENSION (NECKDOWN)

1" = 200'

EXHIBIT 6

**C.I.S. 303 / C.I.S. 232
THE LEADERSHIP AND COMMUNITY
SERVICE ACADEMY
BRONX**

**POTENTIAL MEASURES
TO IMPROVE STUDENT PEDESTRIAN SAFETY**

APPENDIX

