

Safe Streets for Seniors

Hamilton Heights, Manhattan

FINAL REPORT

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Janette Sadik-Khan, Commissioner



Safe Streets for Seniors
HAMILTON HEIGHTS

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PROJECT DESCRIPTION

1 PROJECT DESCRIPTION

Since 1990 the number of pedestrian fatalities in New York City has decreased by 56%. Moreover, prior to 1950, pedestrians accounted for three-fourths of all traffic fatalities and since then, that percentage has decreased to account for about one-half of all traffic fatalities. Despite these statistical improvements, pedestrians continue to be the largest at risk mode – with older adults more likely to suffer serious injuries or fatalities from traffic crashes than other pedestrians. The rate of pedestrian fatalities for every 100,000 persons in the City has decreased by nearly half since 1991 – to 2.0 from 3.8 – while the rate of senior pedestrian fatalities per 100,000 seniors has decreased even more sharply – to 6.6 from 13.1. Nevertheless, while seniors make up only 12% of the population in New York City, they still comprise 39% of pedestrian fatalities. The recognition of the disproportional representation of the senior population among severe pedestrian injuries and fatalities led to the development of the Department of Transportation’s Safe Streets for Seniors (SSS) Program.

The purpose of this project is to address senior pedestrian safety issues at 25 Senior Pedestrian Focus Areas (SPFAs) in the five boroughs of New York City and to develop and implement mitigation measures to improve the safety of seniors and other pedestrians within the 25 SPFAs. DOT identified SPFAs to include the top senior pedestrian crash (severe injury and fatality) areas within each borough. Four of the SPFAs are located in the Bronx, seven in Brooklyn, five in Queens, eight in Manhattan and one in Staten Island. The SPFAs have been selected based on the density of senior pedestrian crashes resulting in fatalities or severe injuries in a five-year period. DOT conducted in-house studies for five pilot SPFAs and is utilizing consultant services to perform a comprehensive study of pedestrian safety conditions at intersections and along corridors within 20 selected SPFAs.

The project evaluates the crash history and existing traffic conditions and controls (e.g., roadway geometry, signal timing) at selected intersections and corridors within each SPFA in order to develop short- and long-term measures to reduce pedestrian crashes specifically for seniors, and improve safety and traffic operations for all users. The DOT makes specific safety recommendations consisting of low-cost as well as capital engineering and design improvements for these 20 areas. In addition, the DOT conducts data analysis as needed, prepares engineering and design schematics and related services, as necessary, for capital improvements.

In this report, the Hamilton Heights SPFA located in Manhattan has been studied and improvements have been recommended.

2 BACKGROUND

Land use in the Hamilton Heights study area is a mix of commercial and residential buildings. There are five senior centers located in or near the study area: Hamilton Grange Senior Center at 420 W 145th Street between Convent Avenue and St. Nicholas Avenue; Wilson Major Morris Community Center at 459 West 152nd Street between Amsterdam Avenue and St. Nicholas Avenue; Mary McLeod Bethune Senior Center at 1970 Amsterdam Avenue between Amsterdam Avenue and Broadway; Church on the Hill Older Adult Luncheon Club at 2005 Amsterdam Avenue between Amsterdam Avenue and St. Nicholas Avenue; and the Fort Washington Houses at 99 Fort Washington Avenue between Fort Washington Avenue and Riverside Drive.

There are five schools located within the study area (list of school names and addresses shown in Exhibit 5).

Bicycle Facilities

The 2010 NYC Cycling Map shows “existing” and “planned/proposed” bicycle facilities throughout the city. In the vicinity of the Hamilton Heights study area, there are existing Class 2 bike routes on Fort Washington Avenue and St. Nicholas Avenue. There are also planned/proposed bike routes on Broadway, W 145th Street, W 155th Street, W 157th Street, W 158th Street and W 165th Street (Exhibit 2).

Truck Routes

There are several local truck routes within the study area including those along Broadway, Amsterdam Avenue, W 145th Street and W 155th Street (Exhibit 3).

Bus Lines and Subway

Eight bus lines operate within the study area including (Exhibit 4):

- M2: Operates along W 165th Street
- M3: Operates along Amsterdam Avenue and St. Nicholas Avenue
- M4: Operates along Broadway
- M5: Operates along Broadway
- M100: Operates along Amsterdam Avenue
- M101: Operates along Amsterdam Avenue
- BX19: Operates along W 145th Street
- X 6: Operates along W 155th Street

The **1** and **C** subway lines run along Broadway and St. Nicholas Avenue, respectively, through the study area (Exhibit 4). Subway stations for the **1** and **C** lines are located at the following intersections:

- Broadway and W 145th Street
- Broadway and W 157th Street
- St. Nicholas Avenue and W 155th Street
- St. Nicholas Avenue and 163rd Street

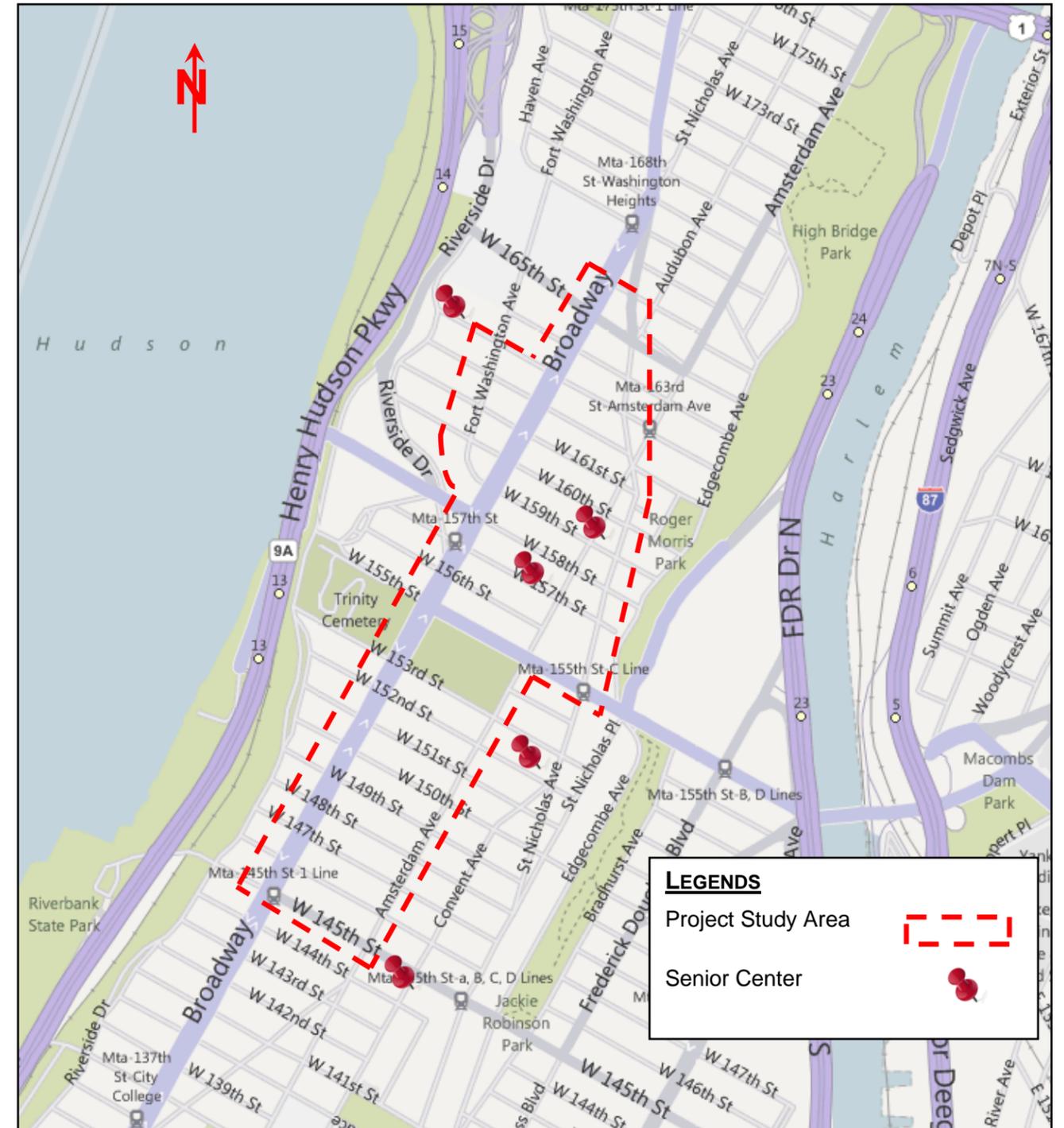


EXHIBIT 1 – AREA MAP

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BACKGROUND

EXHIBIT 2 – BIKE MAP

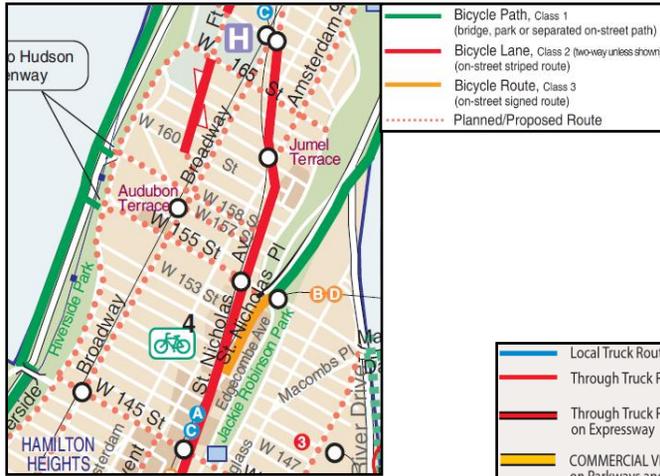


EXHIBIT 3 – TRUCK MAP

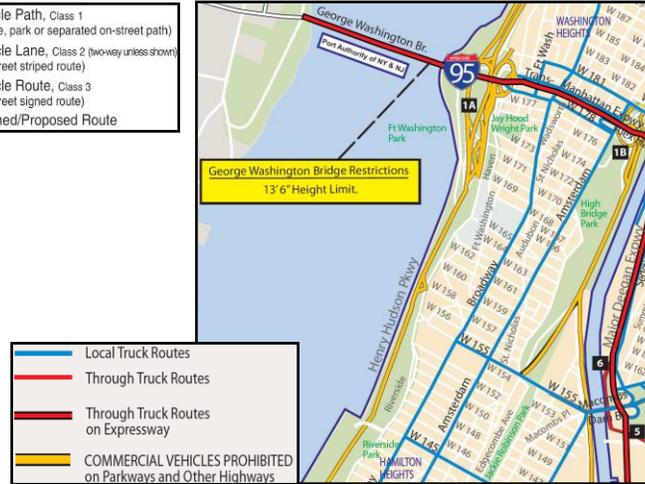


EXHIBIT 4 – TRANSIT MAP



EXHIBIT 5 – LIST OF SCHOOLS IN THE STUDY AREA

SCHOOL NAME	ADDRESS
P.S. 153	1750 Amsterdam Avenue, New York, NY 10031
The Church of St. Catherine of Genoa	506 West 153rd Street, New York, NY 10031
P.S. 28 Wright Brothers	475 West 155th Street, New York, NY 10032
P.S. 4	500 West 160th Street, New York, NY 10032
St. Rose of Lima School	517 West 164th Street, New York, NY 10032

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EXISTING CONDITIONS

3 EXISTING CONDITIONS

3.1 ABOUT THE STUDY AREA

The Hamilton Heights Study Area consists of three major north-south corridors: Broadway, Amsterdam Avenue and St. Nicholas Avenue (Photo No. 1). There are also two major east-west corridors within the study area: W 145th Street and W 155th Street. Four of the major corridors carry truck routes (Exhibit 3). All of the major corridors carry at least one New York City Transit route (Exhibit 4). Many of the senior residents interviewed showed some concerns about these corridors, especially Amsterdam Avenue, W 145th Street and W 155th Street. The combination of heavy traffic volumes, operational factors and geometric factors make these corridors difficult for senior pedestrians to safely cross.



Photo No. 1 : Broadway and W 155th Street

3.2 FIELD OBSERVATIONS AND SENIOR PEDESTRIANS CONCERNS

There were numerous issues that were repeatedly observed during the field visits and/or conveyed by senior pedestrians during interviews. Those issues are listed here:

- Insufficient crossing time
- Missing or inadequate pedestrian ramps
- Turning vehicles not yielding to pedestrians
- Insufficient pedestrian signs

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TRAFFIC OPERATIONS

4 TRAFFIC OPERATIONS

4.1 CRASH SUMMARY

Crash data was obtained from the New York City Department of Transportation (NYCDOT) for the Hamilton Heights study area from 2001 through 2006. This data provides some details relating to the circumstances and cause of each crash. Table 1 and Exhibit 6 show a summary of crashes.

TABLE 1: DMV SIX YEAR CRASH SUMMARY (2001-2006)

INTERSECTION		SENIOR PEDESTRIAN CRASHES	SENIOR PEDESTRIAN FATALITIES
Broadway NB	W 145 th Street	1	0
Amsterdam Avenue	W 147 th Street	2	0
Amsterdam Avenue	W 151 st Street	1	0
W 151 st Street	Broadway SB	1	0
Amsterdam Avenue	W 155 th Street	1	0
Broadway SB	W 156 th Street	1	0
Edgecombe Avenue	St. Nicholas Avenue	1	0
St. Nicholas Avenue	W 159 th Street	1	0
Broadway NB	W 159 th Street	1	0
Broadway SB	W 160 th Street	1	0
Broadway NB	W 163 rd Street	1	0
Broadway SB	W 166 th Street	1	0
St. Nicholas Avenue	Audubon Avenue	2	0
Ft. Washington Avenue	W 163 rd Street	2	0
TOTAL		17	0

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TRAFFIC OPERATIONS



EXHIBIT 6 – PEDESTRIAN CRASH STATISTICS (2001-2006)

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TRAFFIC OPERATIONS

4.2 TRAFFIC VOLUMES

In order to analyze conditions for vehicles and pedestrians, traffic volume data was collected at key locations (see Table 2).

The results of the ATR, TMC and pedestrian counts are included in Appendices A, B and C and the Technical Supplement.

TABLE 2: TRAFFIC VOLUME DATA

LOCATION	ATR ¹	TMC ²	PED COUNTS
Broadway & W 145 th Street	x	x	x
Broadway & W 155 th Street	x		
Broadway & W 160 th Street		x	x
Broadway & W 166 th Street		x	x
Amsterdam Avenue & W 145 th Street	x		
Amsterdam Avenue & W 147 th Street		x	x
Amsterdam Avenue between W 151 st Street & W 152 nd Street	x		x
Amsterdam Avenue & W 155 th Street	x	x	x
Amsterdam Avenue & W 162 nd Street	x		
St Nicholas Avenue & W 155 th Street	x		
St Nicholas Avenue & W 165 th Street		x	x

Notes:

1. Twenty-four hour Automatic Traffic Recorder (ATR)
2. Turning Movement Counts (TMC's)

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TRAFFIC OPERATIONS

4.3 SIGNAL TIMING: PEDESTRIAN INTERVAL

According to MUTCD 2009 (Manual on Uniform Traffic Control Devices) Section 4E.06, a minimum of seven (7) seconds is allocated for a walk interval, in addition to a pedestrian clearance time based on a walking speed of 3.5 feet per second. All signalized intersections within the study area were modified to provide a clearance interval of 3 feet per second to accommodate the slower walking speeds of seniors.

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ILLUSTRATING THE SOLUTION

5 ILLUSTRATING THE SOLUTION

5.1 EXECUTIVE SUMMARY AND GENERAL RECOMMENDATIONS

TABLE 3: SUMMARY OF SPECIFIC RECOMMENDATIONS

Locations	Install Pedestrian Head	Install Pedestrian Countdown Signal	Traffic Pattern Change / Eliminate a Lane	Extended / Raised Median	Curb Extension / Neckdown	Add Pedestrian Ramp	High-visibility Crosswalk	Standard Crosswalk	Stripe Stop Bar	Stripe Median	Stripe Parking Lane / Buffer	Stripe Angle Parking	Stripe Channelization	Stripe Bike Lane	install new Cross with Care Sign	Left-turn Bay	Speed Reducer (Hump)	Left Turn Restriction
Broadway & W 145 th Street	x					x									x ¹			
Broadway & W 146 th Street	x				x ¹										x ¹			
Broadway & W 147 th Street	x				x ¹										x ¹			
Broadway & W 148 th Street	x						x		x									
Broadway & W 149 th Street	x						x		x									
Broadway & W 150 th Street	x						x		x									
Broadway & W 151 st Street	x						x		x									
Broadway & W 152 nd Street	x						x		x									
Broadway & W 153 rd Street	x																	
Broadway & W 155 th Street	x				x		x		x		x		x					
Broadway & W 156 th Street	x						x		x		x		x					
Broadway & W 157 th Street	x						x		x				x					
Edward Morgan Place & W 157 th St.						x	x	x			x		x					
Broadway & W 158 th Street	x					x	x		x									
Broadway & W 159 th Street	x	x ¹			x ¹	x									x ¹			
W 159 th Street between Broadway and Amsterdam Avenue																	x ¹	
Broadway & W 160 th Street	x	x ¹		x ¹											x ¹			
W 160 th Street between Broadway and Amsterdam Avenue																	x ¹	
Broadway & W 161 st Street	x	x ¹		x ¹	x ¹				x ¹						x ¹			
Broadway & W 162 nd Street	x					x	x		x									
Broadway & W 163 rd Street	x						x		x									

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ILLUSTRATING THE SOLUTION

TABLE 3: SUMMARY OF SPECIFIC RECOMMENDATIONS

Locations	Install Pedestrian Head	Install Pedestrian Countdown Signal	Traffic Pattern Change / Eliminate a Lane	Extended / Raised Median or Island	Curb Extension / Neckdown	Add Pedestrian Ramp	High-visibility/School Crosswalk	Standard Crosswalk	Stripe Stop Bar	Stripe Median	Stripe Parking Lane / Buffer	Stripe Angle Parking	Stripe Channelization	Stripe Bike Lane	install new Cross with Care Sign	Left-turn Bay	Speed Reducer (Hump)	Left Turn Restriction
Broadway & W 164 th Street	x																	
Broadway & W 165 th Street	x						x		x									
Broadway & W 166 th Street	x						x		x									
Amsterdam Avenue & W 146 th Street					x ¹	x												
Amsterdam Avenue & W 147 th Street					x,x ¹													
Amsterdam Avenue & W 151 st Street							x											
Amsterdam Avenue & W 152 nd Street							x											
Amsterdam Avenue & W 157 th Street									x									
Amsterdam Avenue & W 158 th Street									x									
Amsterdam Avenue & W 159 th Street	x ¹										x ²							
Amsterdam Avenue & W 160 th Street	x ¹						x ²		x ²		x ²		x ²	x ²				
Amsterdam Avenue & W 161 st Street	x ¹			x ¹		x ²	x ²		x ²		x ²		x ²	x ²				
Amsterdam Avenue & W 162 nd Street	x ¹	x ²	x ²			x ²	x ²		x ²		x ²	x ²	x ²	x ²		x ²		
St Nicholas Avenue & W 155 th Street						x			x							x		
St Nicholas Avenue & W 156 th Street									x	x								
St Nicholas Avenue & W 157 th Street									x	x								
St Nicholas Avenue & W 158 th Street						x	x		x	x						x		
St Nicholas Avenue & W 159 th Street	x ¹						x		x		x ²		x	x ²		x		
St Nicholas Avenue & W 160 th Street	x ¹	x ²				x	x ²	x ²	x ²		x ²	x ²		x ²				
St Nicholas Avenue & W 161 st Street		x ²	x ²			x ²	x ²				x ²	x ²		x ²				
St Nicholas Avenue & W 162 nd Street	x ¹	x ²	x ²	x ²	x ²	x ²	x ²		x ²		x ²	x ²	x ²	x ²				
St Nicholas Avenue & W 163 rd Street		x ²					x ²		x ²		x ²	x ²	x ²	x ²				
St Nicholas Avenue & W 164 th Street									x	x	x ²			x ²		x		
St Nicholas Avenue/Audubon Avenue & W 165 th Street					x				x	x			x					x

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TABLE 3: SUMMARY OF SPECIFIC RECOMMENDATIONS

Locations	Install Pedestrian Head	Install Pedestrian Countdown Signal	Traffic Pattern Change / Eliminate a Lane	Extended / Raised Median or Island	Curb Extension / Neckdown	Add Pedestrian Ramp	High-visibility/School Crosswalk	Standard Crosswalk	Stripe Stop Bar	Stripe Median	Stripe Parking Lane / Buffer	Stripe Angle Parking	Stripe Channelization	Stripe Bike Lane	install new Cross with Care Sign	Left-turn Bay	Speed Reducer (Hump)	Left Turn Restriction
St Nicholas Avenue & W 166 th Street							x		x									
Ft Washington Avenue & W 160 th St.							x		x									
Ft Washington Avenue & W 161 st St.							x		x									
Ft Washington Avenue & W 162 nd St.							x		x									
Ft Washington Avenue & W 163 rd St.						x	x		x									

Notes:

x – Recommendations proposed in Safe Street for Seniors – Hamilton Heights

x¹ – Recommendations proposed under School Safety Project.

x² – Recommendations proposed under other NYCDOT projects.

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General Recommendations

- Place stop bars ten feet in advance of all crosswalks
The NYCDOT standard for placement of a stop bar is ten feet in advance of any marked pedestrian crosswalk, including school and high-visibility crosswalks. This positioning helps to maximize pedestrian visibility and to minimize the potential for pedestrian/vehicle conflicts. Therefore, it is recommended that stop bars be placed ten feet in advance of all crosswalks.
- Provide additional crossing time where feasible
A number of senior residents interviewed indicated that there was not enough time to cross many of the streets. Therefore, all of the signals, where possible, will be retimed to allow more crossing time for pedestrians.
- Green projects where feasible
All medians, pedestrian plazas and curb extensions will be part of the Greenstreets program, where feasible. The Greenstreets program is a citywide program to convert paved vacant traffic islands and medians into green spaces filled with shade trees, flowering trees, shrubs and groundcover.

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ILLUSTRATING THE SOLUTION

5.2 BROADWAY



Photo No. 2: Broadway & W 151st Street (looking south)

Within the study area, Broadway is a north-south two-way arterial from W 145th Street to W 166th Street (Photo No. 2). Broadway is a 101-foot wide street with three moving lanes in each direction and parking on both sides, including left-turn lanes at major intersections. A median island is provided along the entire Broadway corridor to shorten the pedestrian crossing distance at intersections and provide safer pedestrian refuge. Broadway is a local truck route throughout the study area. W 145th Street and W 155th streets are also local truck routes which intersect Broadway within the study area. Subway line 1 and two bus routes, M4 and M5 serve Broadway corridor. W 145th Street and W 155th Street

also carry bus routes, Bx19 and Bx6, respectively. In addition, a bike route is proposed along Broadway. It should be noted that P.S. 153 and P.S. 4 are located near the Broadway corridor. Proposed recommendations for this project concur with previously proposed School Safety recommendations.

Neckdowns are recommended at the following locations to shorten the crossing distance and slow turning traffic:

- Northeast corner of Broadway and W 146th Street (School Safety Project)
- Southeast corner of Broadway and W 147th Street (School Safety Project)
- Northwest corner of Broadway and W 155th Street (Photo No. 3)
- Southeast (School Safety Project) corner of Broadway and W 159th Street
- Northeast corner of Broadway and W 161st Street (School Safety Project)



Photo No. 3: Broadway & W 155th Street (looking west)

Pedestrian countdown signals are recommended under the School Safety Project at the following intersections. These countdown signals will provide senior pedestrians with more information about when the traffic light will change, allowing for safer crossings:

- Broadway and W 159th Street (School Safety Project)
- Broadway and W 160th Street (School Safety Project)
- Broadway and W 161st Street (School Safety Project)

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Median pedestrian island extensions are recommended at the following locations to slow down turning traffic:

- North and south crosswalks at Broadway and W 160th Street (School Safety Project)
- North and south crosswalks at Broadway and W 161st Street (School Safety Project)

Turning movement counts for the AM and PM peak hours were performed at Broadway and W 145th Street, Broadway and W 160th Street, and Broadway and W 166th Street. The vehicle/pedestrian conflicts at these intersections were not found to be significant and, therefore, do not require the installation of a Leading Pedestrian Interval (LPI) (see Appendix B).



Photo No. 4: Broadway & W 151st St. (looking east)

Broadway is a wide roadway and seniors expressed difficulty seeing pedestrian signal indications located approximately 100 feet away from the curb. It is therefore recommended that pedestrian signal heads with typical 'WALK' and 'DON'T WALK' indications be provided on the median island at various intersections along the Broadway corridor to improve its visibility to seniors (Photo No. 4). It is further recommended that, at various intersections along Broadway, standard crosswalks be replaced by high visibility crosswalks and new pedestrian ramps be provided. New stop bars should also be provided at various intersections along Broadway. The locations of these specific recommendations are

noted in Table 3. In addition, under the School Safety Project, it is recommended that 'Cross with Care' signs be provided at the intersections of Broadway and W 145th Street, Broadway and W 146th Street, Broadway and W 147th Street, Broadway and W 159th Street, Broadway and W 160th Street, and Broadway and W 161st Street. A parking lane stripe should be added on Broadway between W156th and W 157th Streets, and also on the north side of W155th, west of Broadway. It is also recommended that a hatched buffer be provided at the intersections of Broadway and W 155th Street, and Broadway and W 157th Street. Channelization is recommended at Broadway from W 155th Street to W 157th Street.

The proposed improvements along Broadway are shown in Exhibits 8, 9 and 10.

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5.3 AMSTERDAM AVENUE

Within the study area, Amsterdam Avenue is a north-south two-way arterial from W 145th Street to W 162nd Street (Photo No. 5). Amsterdam Avenue is a 59-foot wide corridor with two moving lanes in each direction and parking on both sides of the roadway. Amsterdam Avenue is a local truck route throughout the entire study area. W 145th Street and W 155th streets are also local truck routes which intersect Amsterdam Avenue within study area. Amsterdam Avenue serves the M100, M101 and M3 bus lines. W 145th Street and W 155th Street also carry bus routes Bx19 and Bx6, respectively. It should be noted that P.S. 153 and P.S. 4 are located along the Amsterdam Avenue corridor. Proposed recommendations for this project concur with previously proposed School Safety recommendations.



Photo No. 5: Amsterdam Av. & W 150th St. (looking north)

Neckdowns are recommended at the following locations to shorten the crossing distance and slow turning traffic:

- Northwest corners of Amsterdam Avenue and W 146th Street (School Safety Project)
- Southwest (School Safety Project) and northeast corners of Amsterdam Avenue and W 147th Street

A median pedestrian island is recommended at the north crosswalk of Amsterdam Avenue and W 162nd Street intersection (NYCDOT Improvement) in order to slow down turning traffic and to provide refuge for senior pedestrians.

Curbside improvements are also proposed at Amsterdam Avenue from W 161st Street to W 162nd Street (Photo No. 6). These improvements are proposed under a separate NYCDOT pedestrian safety project. The details of these recommendations are presented in the St Nicholas Avenue section of this report.



Photo No. 6: Amsterdam Ave. & St Nicholas Ave. (looking south)

Pedestrian countdown signals are recommended under the School Safety Project at the following intersections. These countdown signals will provide senior pedestrians with more information about when the traffic light will change, allowing for safer crossings:

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ILLUSTRATING THE SOLUTION

- Amsterdam Avenue and W 159th Street (School Safety Project)
- Amsterdam Avenue and W 160th Street (School Safety Project)
- Amsterdam Avenue and W 161st Street (School Safety Project)
- Amsterdam Avenue and St Nicholas Avenue/W 162nd Street (School Safety Project)

Turning movement counts for the AM and PM peak hours were performed at Amsterdam Avenue and W 147th Street, and Amsterdam Avenue and W 155th Street. The vehicle/pedestrian conflicts at these intersections were not found to be significant and, therefore, do not require the installation of a Leading Pedestrian Interval (LPI) (see Appendix B).

New pedestrian ramps are proposed at various intersections along Amsterdam Avenue. It is also recommended that, at various intersections, standard crosswalks be replaced by high visibility crosswalks. The locations of these specific recommendations are noted in Table 3. At the intersection of Amsterdam Avenue and W 160th Street, new school crosswalks should be provided on all four legs of the intersection (School Safety Project). New stop bars should also be provided at various intersections along Amsterdam Avenue. In addition, under the School Safety Project, it is recommended that parking lanes be striped along Amsterdam Avenue from W 159th Street to W 162nd Street. Under the NYCDOT Improvements, channelization is recommended at the intersections of Amsterdam Avenue and W 160th Street, W 161st Street and W 162nd Street, and a new bike lane is proposed along Amsterdam Avenue from W 160th Street to W 162nd Street.

The proposed improvements along Amsterdam Avenue are shown in Exhibits 11, 12 and 14.

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5.4 ST NICHOLAS AVENUE

Within the study area, St Nicholas Avenue is a north-south two-way roadway from W 155th Street to W 166th Street (Photo No. 7). St Nicholas Avenue is a 60-foot wide corridor with one moving lane in each direction, bike lanes in both directions and parking on both sides of the roadway. The  subway line and M3 bus run along St. Nicholas Avenue. W 155th Street, which intersects St Nicholas Avenue within the study area, carries bus route Bx6. It should be noted that P.S. 4 is located near the St Nicholas Avenue corridor. Proposed recommendations for this project concur with previously proposed School Safety recommendations.



Photo No. 7: St Nicholas Av. & W 159th St. (looking south)

Neckdowns are recommended at the following locations to shorten the crossing distance and slow turning traffic:

- Southwest corner of St Nicholas Avenue and W 165th Street
- Northeast corner of Amsterdam Avenue and St Nicholas Avenue/W 162nd Street (NYCDOT Improvement)

Under a separate pedestrian safety project, a new traffic pattern has been recommended by the NYCDOT within the project study area along the St Nicholas Avenue corridor as it intersects with Amsterdam Avenue and West 162nd Street. According to this new traffic pattern, St Nicholas Avenue from W 160th Street to W 162nd Street be converted into one-way northbound roadway and from W 162nd Street to W 163rd Street be converted into one-way southbound roadway. W 161st Street from Amsterdam Avenue to St Nicholas Avenue would also be converted into one-way westbound roadway. These measures will help in reducing vehicular and pedestrian conflict points at this existing five-legged staggered intersection, where St Nicholas Avenue presently operates under a two-way scheme from W 160th Street to W 163rd Street (Photo No. 8). Median refuge islands will be reconstructed to modify the intersection geometry and restrict the above noted vehicular movements that presently exist. Thus, direct access of St Nicholas Avenue northbound to Amsterdam Avenue and to the remaining north portion of St Nicholas Avenue will be blocked and a new 'STOP' controlled intersection will be introduced as St Nicholas Avenue intersects W 161st Street/ Amsterdam Avenue. Additionally, 38 angular street parking spaces will be created as a result of the proposed changes in the traffic pattern along Nicholas Avenue from St 163rd Street to Amsterdam Avenue and from 161st W Street to 160th Street. Refuge islands reconstruction recommended under this NYCDOT scheme will include:

- St Nicholas Avenue from W 161st Street to W 162nd Street
- North leg of St Nicholas Avenue and Amsterdam Avenue/W 162nd Street

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ILLUSTRATING THE SOLUTION

Pedestrian countdown signals are recommended under the School Safety Project at the following intersections. These countdown signals will provide senior pedestrians with more information about when the traffic light will change, allowing for safer crossings:

- St Nicholas Avenue and W 159th Street (School Safety Project)
- St Nicholas Avenue and W 160th Street (School Safety Project)
- St Nicholas Avenue and W 162nd Street (School Safety Project)



Photo No. 8: St Nicholas Av. & Amsterdam Av. (looking west)

Turning movement counts for the AM and PM peak hours were performed at St Nicholas Avenue/Audubon Avenue and W 165th Street. The vehicle/pedestrian conflicts at this intersection were not found to be significant and, therefore, do not require the installation of a Leading Pedestrian Interval (LPI) (see Appendix B).

New pedestrian ramps are proposed at various intersections along St Nicholas Avenue. It is also recommended that, at various intersections, standard crosswalks be replaced by high visibility crosswalks and that new stop bars be provided. The locations of these specific recommendations are noted in Table 3. In order to reduce speeding and pedestrian crossing distance along the 60-foot wide St Nicholas Avenue, travel lane width is recommended to be reduced to 11.5-feet in both directions. This measure will be accomplished by installing new hatched median island with left turn bays between W 155th Street and W 159th Street. The proposed hatched median island/left turn bays width is recommended to be a maximum of 11-feet.



Photo No. 9: St Nicholas Av. & W 165th St. (looking south)

A new 'No Left Turn' sign should be installed on the signal mast arm facing southbound St Nicholas Avenue traffic at W 165th Street (Photo No. 9). Channelization (peg-a-track) is recommended at the intersections of St Nicholas Avenue and Amsterdam Avenue/W 162nd Street (NYCDOT Improvements), and St Nicholas Avenue and W 165th Street. A new bike lane is also proposed along St Nicholas Avenue from W 160th Street to W 162nd Street (NYCDOT Improvements).

The proposed improvements along St Nicholas Avenue are shown in Exhibits 13 and 14.

5

ILLUSTRATING THE SOLUTION

5.5 FT WASHINGTON AVENUE

Within the study area, Ft Washington Avenue is a north-south two-way roadway from Broadway to W 163rd Street (Photo No. 10). Ft Washington Avenue is a 42-foot wide corridor with one moving lane in each direction, a northbound bike lane and parking on both sides of the roadway. Ft Washington Avenue serves the southbound M4 bus line.

It is recommended that, at various intersections, standard crosswalks be replaced by high visibility crosswalks. New stop bars should also be provided at the various intersections along Ft Washington Avenue. In addition, a new pedestrian ramp is proposed at the northeast corner of Ft Washington Avenue and W 163rd Street.



Photo No. 10: St Nicholas Av. & W 160th St. (looking north)

The proposed improvements along Ft Washington Avenue are shown in Exhibit 15.

EXHIBIT 7 – RECOMMENDATION INDEX

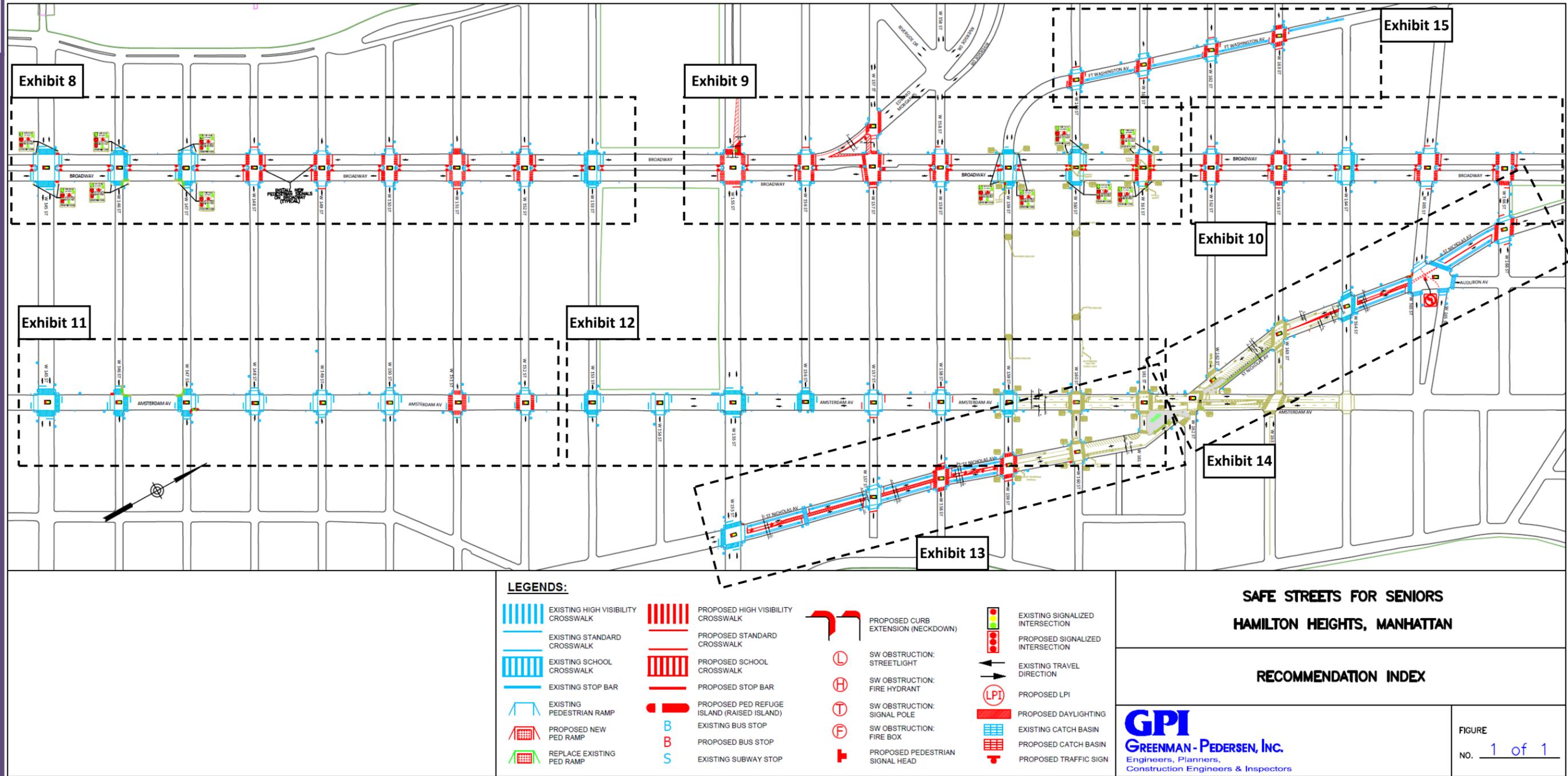
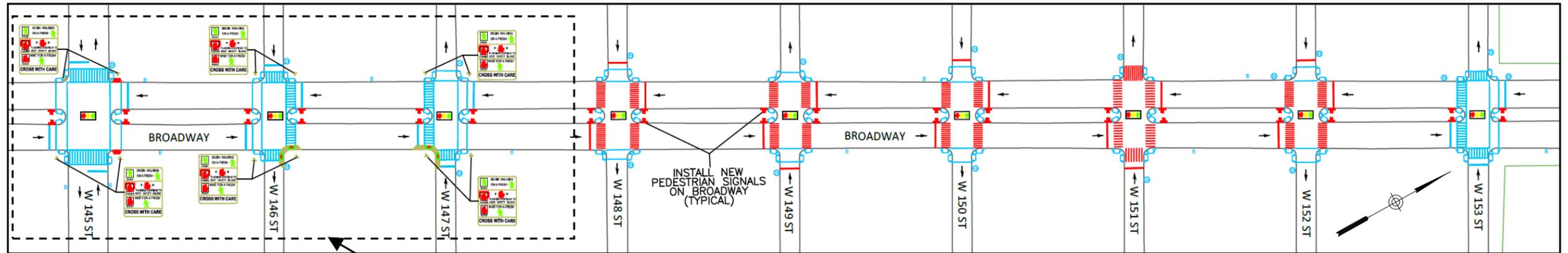


EXHIBIT 8 – BROADWAY FROM W 145TH STREET TO W 153RD STREET



CURB EXTENSION AND CROSS WITH CARE SIGNS IMPROVEMENTS UNDER P.S. 153 SCHOOL SAFETY PROJECT (SHOWN IN COLOR)

LEGENDS:

EXISTING HIGH VISIBILITY CROSSWALK	PROPOSED HIGH VISIBILITY CROSSWALK	PROPOSED CURB EXTENSION (NECKDOWN)	EXISTING SIGNALIZED INTERSECTION
EXISTING STANDARD CROSSWALK	PROPOSED STANDARD CROSSWALK	SW OBSTRUCTION: STREETLIGHT	PROPOSED SIGNALIZED INTERSECTION
EXISTING SCHOOL CROSSWALK	PROPOSED SCHOOL CROSSWALK	SW OBSTRUCTION: FIRE HYDRANT	TRAVEL DIRECTION
EXISTING STOP BAR	PROPOSED STOP BAR	SW OBSTRUCTION: SIGNAL POLE	PROPOSED LPI
EXISTING PEDESTRIAN RAMP	PROPOSED PED REFUGE ISLAND (RAISED ISLAND)	SW OBSTRUCTION: FIRE BOX	PROPOSED DAYLIGHTING
PROPOSED NEW PED RAMP	EXISTING BUS STOP	PROPOSED PEDESTRIAN SIGNAL HEAD	EXISTING CATCH BASIN
REPLACE EXISTING PED RAMP	PROPOSED BUS STOP	PROPOSED PEDESTRIAN COUNTDOWN SIGNAL	PROPOSED CATCH BASIN
	EXISTING SUBWAY STOP		PROPOSED TRAFFIC SIGN

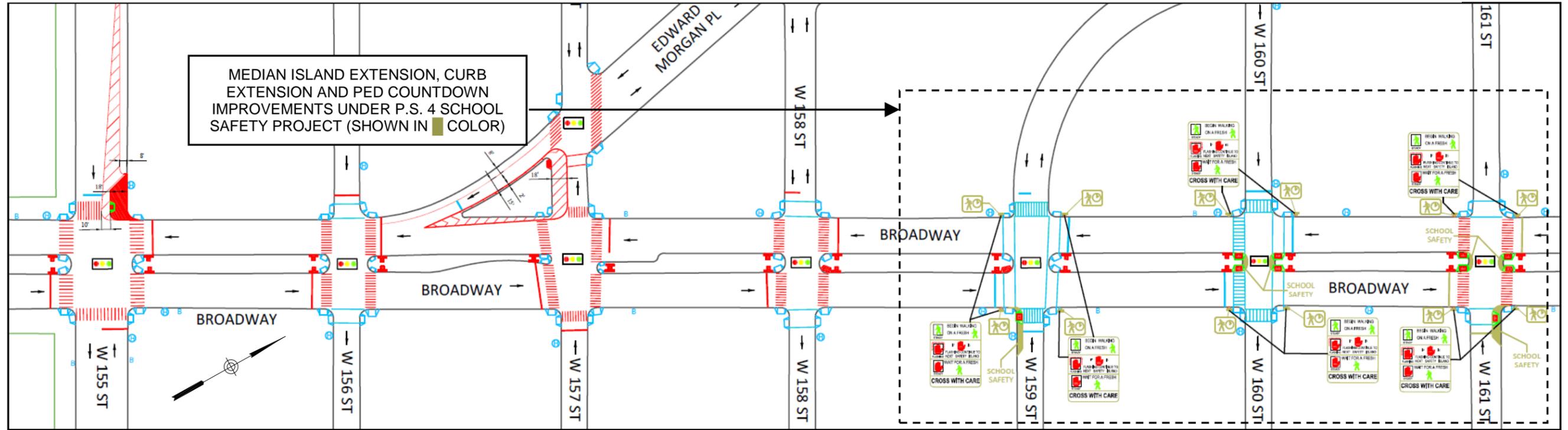
- Pedestrian concerns in this area:**
- Non-standard pedestrian ramps
 - Turning vehicles not yielding to pedestrians
 - Signal timing (insufficient crossing time)

- Additional Information**
- This study area was visited on April 7th, April 8th and August 3rd, 2010
 - Parking regulations for the project area have been collected and are shown in Appendix E

- Recommended improvements include:**
- Time all signals for seniors and where feasible, the crossing time will be extended
 - Install new high visibility crosswalks as shown in the illustration
 - Install new advanced stop bars as shown in the illustration
 - Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
 - Install neckdowns or curb extensions (School Safety Project)
 - Install new pedestrian signal heads with typical 'WALK' and 'DON'T WALK' indications at the locations shown in the illustration
 - Install new 'Cross With Care' signs as shown in the illustration (School Safety Project)

- Traffic Analysis**
- Turning movement and pedestrian counts were conducted at:
 - Broadway and W 145th Street
- Turning movement and pedestrian counts summaries are shown in Appendices B and C

EXHIBIT 9 – BROADWAY FROM W 155TH STREET TO W 161ST STREET



LEGENDS:

	EXISTING HIGH VISIBILITY CROSSWALK		PROPOSED HIGH VISIBILITY CROSSWALK		PROPOSED CURB EXTENSION (NECKDOWN)		EXISTING SIGNALIZED INTERSECTION
	EXISTING STANDARD CROSSWALK		PROPOSED STANDARD CROSSWALK		SW OBSTRUCTION: STREETLIGHT		PROPOSED SIGNALIZED INTERSECTION
	EXISTING SCHOOL CROSSWALK		PROPOSED SCHOOL CROSSWALK		SW OBSTRUCTION: FIRE HYDRANT		TRAVEL DIRECTION
	EXISTING STOP BAR		PROPOSED STOP BAR		SW OBSTRUCTION: SIGNAL POLE		PROPOSED LPI
	EXISTING PEDESTRIAN RAMP		PROPOSED PED REFUGE ISLAND (RAISED ISLAND)		SW OBSTRUCTION: FIRE BOX		PROPOSED DAYLIGHTING
	PROPOSED NEW PED RAMP		EXISTING BUS STOP		PROPOSED PEDESTRIAN SIGNAL HEAD		EXISTING CATCH BASIN
	REPLACE EXISTING PED RAMP		PROPOSED BUS STOP		PROPOSED PEDESTRIAN COUNTDOWN SIGNAL		PROPOSED CATCH BASIN
			EXISTING SUBWAY STOP				PROPOSED TRAFFIC SIGN

Pedestrian concerns in this area:

- Non-standard pedestrian ramps
- Turning vehicles not yielding to pedestrians
- Signal timing (insufficient crossing time)

Additional Information

- This study area was visited on April 7th, April 8th and August 3rd, 2010
- Parking regulations for the project area have been collected and are shown in Appendix E

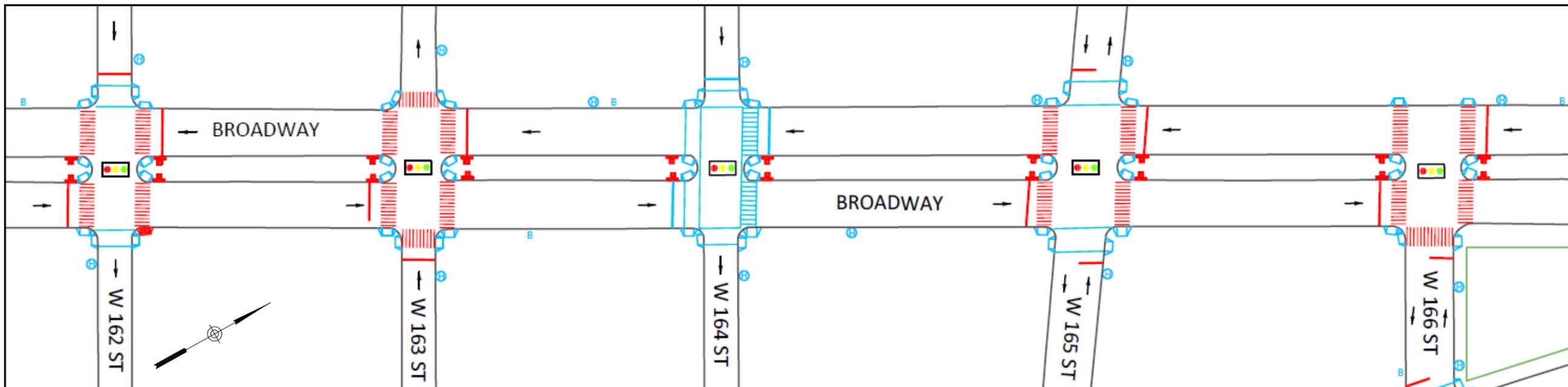
Recommended improvements include:

- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks as shown in the illustration
- Install new advanced stop bars as shown in the illustration
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
- Install new pedestrian refuge island extensions as shown in the illustration (School Safety Project)
- Install neckdown or curb extension
- Install new pedestrian signal heads with typical 'WALK' and 'DON'T WALK' indications at the locations shown in the illustration
- Install new pedestrian countdown signals at the intersections shown in the illustration (School Safety Project)
- Install new 'Cross With Care' signs as shown in the illustration (School Safety Project)
- Install new parking lane striping at the locations shown in the illustration
- Install new hatched buffer at the locations shown in the illustration

Traffic Analysis

- Turning movement and pedestrian counts were conducted at:
 - Broadway and W 160th Street

Turning movement and pedestrian counts summaries are shown in Appendices B and C



LEGENDS:

EXISTING HIGH VISIBILITY CROSSWALK	PROPOSED HIGH VISIBILITY CROSSWALK	PROPOSED CURB EXTENSION (NECKDOWN)	EXISTING SIGNALIZED INTERSECTION
EXISTING STANDARD CROSSWALK	PROPOSED STANDARD CROSSWALK	SW OBSTRUCTION: STREETLIGHT	PROPOSED SIGNALIZED INTERSECTION
EXISTING SCHOOL CROSSWALK	PROPOSED SCHOOL CROSSWALK	SW OBSTRUCTION: FIRE HYDRANT	TRAVEL DIRECTION
EXISTING STOP BAR	PROPOSED STOP BAR	SW OBSTRUCTION: SIGNAL POLE	PROPOSED LPI
EXISTING PEDESTRIAN RAMP	PROPOSED PED REFUGE ISLAND (RAISED ISLAND)	SW OBSTRUCTION: FIRE BOX	PROPOSED DAYLIGHTING
PROPOSED NEW PED RAMP	EXISTING BUS STOP	PROPOSED PEDESTRIAN SIGNAL HEAD	EXISTING CATCH BASIN
REPLACE EXISTING PED RAMP	PROPOSED BUS STOP	PROPOSED PEDESTRIAN COUNTDOWN SIGNAL	PROPOSED CATCH BASIN
	EXISTING SUBWAY STOP		PROPOSED TRAFFIC SIGN

Additional Information

- This study area was visited on April 7th, April 8th and August 3rd, 2010
- Parking regulations for the project area have been collected and are shown in Appendix E

Pedestrian concerns in this area:

- Non-standard pedestrian ramps
- Turning vehicles not yielding to pedestrians
- Signal timing (insufficient crossing time)

Recommended improvements include:

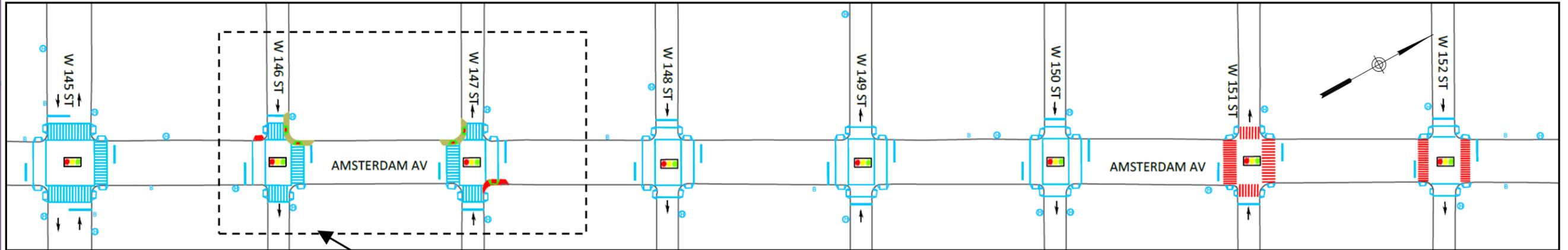
- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks as shown in the illustration
- Install new advanced stop bars as shown in the illustration
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
- Install new pedestrian signal heads with typical 'WALK' and 'DON'T WALK' indications at the locations shown in the illustration

Traffic Analysis

- Turning movement and pedestrian counts were conducted at:
 - Broadway and W 166th Street

Turning movement and pedestrian counts summaries are shown in Appendices B and C

EXHIBIT 11 – AMSTERDAM AVENUE FROM W 145TH STREET TO W 152ND STREET



CURB EXTENSION AND CROSS WITH CARE SIGNS IMPROVEMENTS UNDER P.S. 153 SCHOOL SAFETY PROJECT (SHOWN IN COLOR)

Recommended improvements include:

- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks as shown in the illustration
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
- Install neckdowns or curb extensions

LEGENDS:

EXISTING HIGH VISIBILITY CROSSWALK	PROPOSED HIGH VISIBILITY CROSSWALK	PROPOSED CURB EXTENSION (NECKDOWN)	EXISTING SIGNALIZED INTERSECTION
EXISTING STANDARD CROSSWALK	PROPOSED STANDARD CROSSWALK	SW OBSTRUCTION: STREETLIGHT	PROPOSED SIGNALIZED INTERSECTION
EXISTING SCHOOL CROSSWALK	PROPOSED SCHOOL CROSSWALK	SW OBSTRUCTION: FIRE HYDRANT	TRAVEL DIRECTION
EXISTING STOP BAR	PROPOSED STOP BAR	SW OBSTRUCTION: SIGNAL POLE	PROPOSED LPI
EXISTING PEDESTRIAN RAMP	PROPOSED PED REFUGE ISLAND (RAISED ISLAND)	SW OBSTRUCTION: FIRE BOX	PROPOSED DAYLIGHTING
PROPOSED NEW PED RAMP	EXISTING BUS STOP	PROPOSED PEDESTRIAN SIGNAL HEAD	EXISTING CATCH BASIN
REPLACE EXISTING PED RAMP	PROPOSED BUS STOP	PROPOSED PEDESTRIAN COUNTDOWN SIGNAL	PROPOSED CATCH BASIN
	EXISTING SUBWAY STOP		PROPOSED TRAFFIC SIGN

Pedestrian concerns in this area:

- Non-standard pedestrian ramps
- Turning vehicles not yielding to pedestrians
- Signal timing (insufficient crossing time)

Additional Information

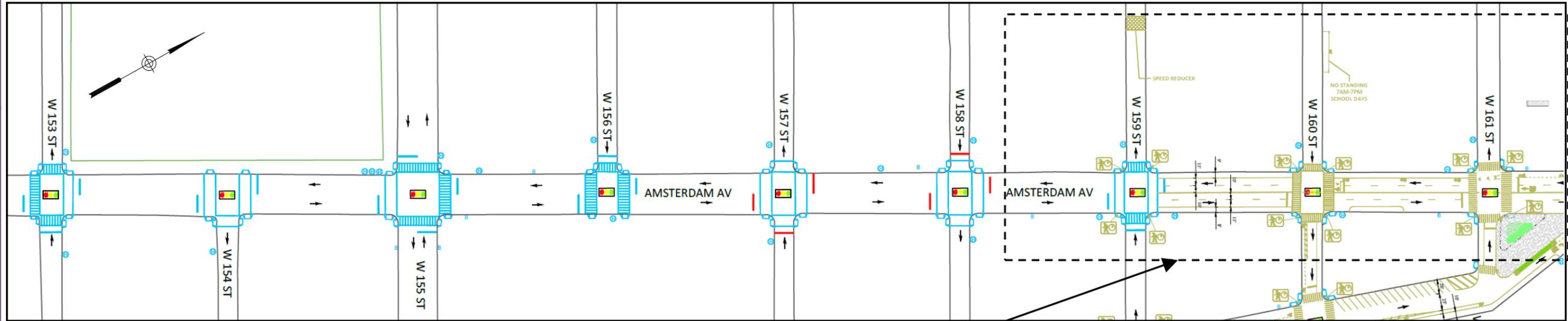
- This study area was visited on April 7th, April 8th and August 3rd, 2010
- Parking regulations for the project area have been collected and are shown in Appendix E

Traffic Analysis

- Turning movement and pedestrian counts were conducted at:
 - Amsterdam Avenue and W 147th Street

Turning movement and pedestrian counts summaries are shown in Appendices B and C

EXHIBIT 12 – AMSTERDAM AVENUE FROM W 153RD STREET TO W 161ST STREET



PEDESTRIAN COUNTDOWN SIGNAL AND SCHOOL CROSSWALK IMPROVEMENTS UNDER P.S. 4 SCHOOL SAFETY PROJECT (SHOWN IN ■ COLOR)

LEGENDS:

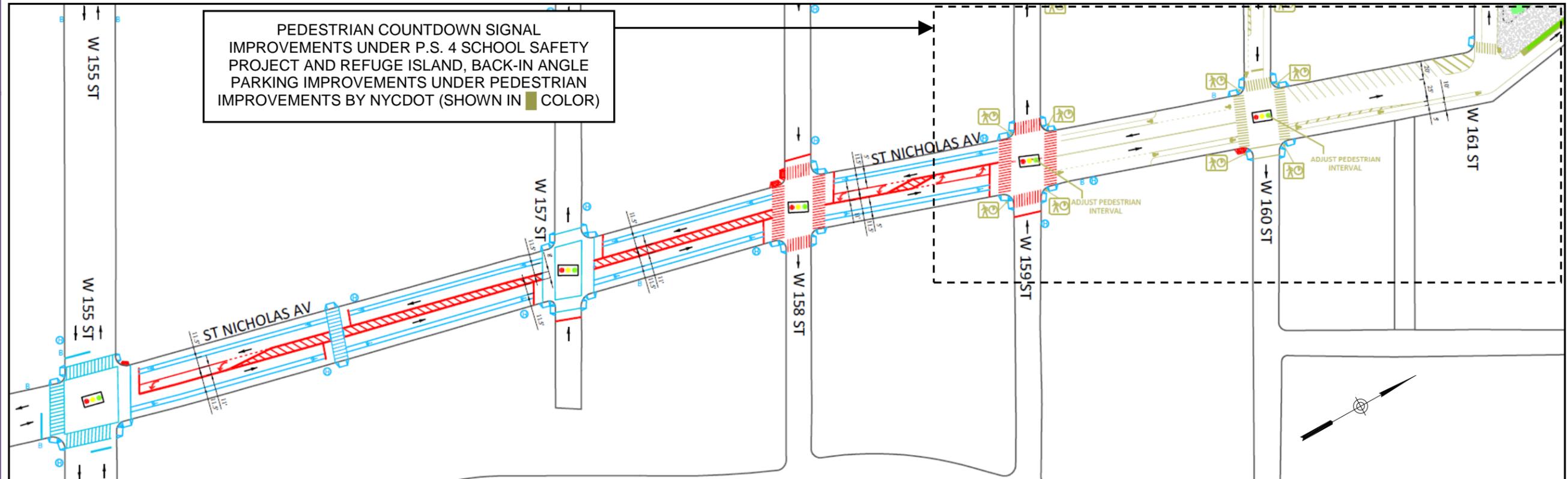
EXISTING HIGH VISIBILITY CROSSWALK	PROPOSED HIGH VISIBILITY CROSSWALK	PROPOSED CURB EXTENSION (NECKDOWN)	EXISTING SIGNALIZED INTERSECTION
EXISTING STANDARD CROSSWALK	PROPOSED STANDARD CROSSWALK	SW OBSTRUCTION: STREETLIGHT	PROPOSED SIGNALIZED INTERSECTION
EXISTING SCHOOL CROSSWALK	PROPOSED SCHOOL CROSSWALK	SW OBSTRUCTION: FIRE HYDRANT	TRAVEL DIRECTION
EXISTING STOP BAR	PROPOSED STOP BAR	SW OBSTRUCTION: SIGNAL POLE	PROPOSED LPI
EXISTING PEDESTRIAN RAMP	PROPOSED PED REFUGE ISLAND (RAISED ISLAND)	SW OBSTRUCTION: FIRE BOX	PROPOSED DAYLIGHTING
PROPOSED NEW PED RAMP	EXISTING BUS STOP	PROPOSED PEDESTRIAN SIGNAL HEAD	EXISTING CATCH BASIN
REPLACE EXISTING PED RAMP	PROPOSED BUS STOP	PROPOSED PEDESTRIAN COUNTDOWN SIGNAL	PROPOSED CATCH BASIN
	EXISTING SUBWAY STOP		PROPOSED TRAFFIC SIGN

- Recommended improvements include:**
- Time all signals for seniors and where feasible, the crossing time will be extended
 - Install new high visibility and school crosswalks as shown in the illustration (School Safety Project)
 - Install new advanced stop bars as shown in the illustration
 - Install new pedestrian countdown signals as shown in the illustration (School Safety Project)
 - Install new parking lane striping at the locations shown in the illustration (NYCDOT Improvements)
 - Install a new hatched buffer at the locations shown in the illustration (NYCDOT Improvements)

- Pedestrian concerns in this area:**
- Non-standard pedestrian ramps
 - Turning vehicles not yielding to pedestrians
 - Signal timing (insufficient crossing time)

- Traffic Analysis**
- Turning movement and pedestrian counts were conducted at:
 - Amsterdam Avenue and W 155th Street
- Turning movement and pedestrian counts summaries are shown in Appendices B and C

- Additional Information**
- This study area was visited on April 7th, April 8th and August 3rd, 2010
 - Parking regulations for the project area have been collected and are shown in Appendix E



LEGENDS:

EXISTING HIGH VISIBILITY CROSSWALK	PROPOSED HIGH VISIBILITY CROSSWALK	PROPOSED CURB EXTENSION (NECKDOWN)	EXISTING SIGNALIZED INTERSECTION
EXISTING STANDARD CROSSWALK	PROPOSED STANDARD CROSSWALK	SW OBSTRUCTION: STREETLIGHT	PROPOSED SIGNALIZED INTERSECTION
EXISTING SCHOOL CROSSWALK	PROPOSED SCHOOL CROSSWALK	SW OBSTRUCTION: FIRE HYDRANT	TRAVEL DIRECTION
EXISTING STOP BAR	PROPOSED STOP BAR	SW OBSTRUCTION: SIGNAL POLE	PROPOSED LPI
EXISTING PEDESTRIAN RAMP	PROPOSED PED REFUGE ISLAND (RAISED ISLAND)	SW OBSTRUCTION: FIRE BOX	PROPOSED DAYLIGHTING
PROPOSED NEW PED RAMP	EXISTING BUS STOP	PROPOSED PEDESTRIAN SIGNAL HEAD	EXISTING CATCH BASIN
REPLACE EXISTING PED RAMP	PROPOSED BUS STOP	PROPOSED PEDESTRIAN COUNTDOWN SIGNAL	PROPOSED CATCH BASIN
	EXISTING SUBWAY STOP		PROPOSED TRAFFIC SIGN

Pedestrian concerns in this area:

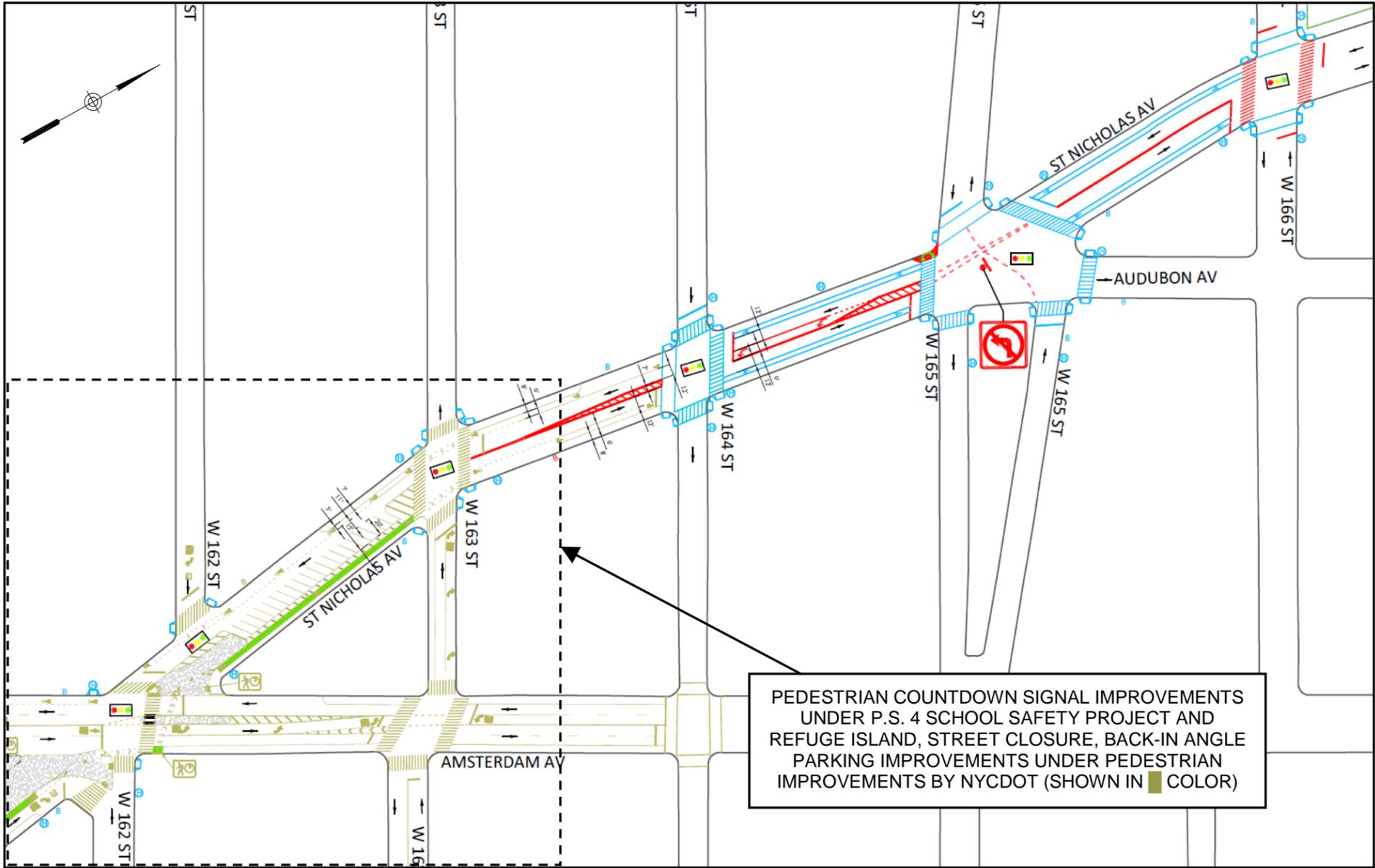
- Non-standard pedestrian ramps
- Turning vehicles not yielding to pedestrians
- Signal timing (insufficient crossing time)

Additional Information

- This study area was visited on April 7th, April 8th and August 3rd, 2010
- Parking regulations for the project area have been collected and are shown in Appendix E

Recommended improvements include:

- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks as shown in the illustration
- Install new advanced stop bars as shown in the illustration
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
- Install hatched median island with left turn bays on St. Nicholas Avenue between W 155th Street and W 159th Street as shown in the illustration
- Install new pedestrian countdown signals as shown in the illustration (School Safety Project)
- Install new back-in angle parking along St. Nicholas Avenue between W 160th Street and W 161st Street (NYCDOT Improvements)
- Install new hatched buffer at locations shown in illustration (NYCDOT Improvements)
- Install new channelization
- Install new island on St. Nicholas Avenue between W 161st Street and W 162nd Street (NYCDOT Improvements)
- Change traffic patterns as shown in the illustration



Recommended improvements include:

- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks as shown in the illustration
- Install new advanced stop bars as shown in the illustration
- Install a hatched median island with a left turn bay on St. Nicholas Avenue between W 163rd Street and W 165th Street as shown in the illustration
- Install neckdown or curb extension
- Install new pedestrian countdown signals at the intersection of St. Nicholas Avenue and W 162nd Street (School Safety Project)
- Install a new median island on the north crosswalk at the intersection of Amsterdam Avenue and St. Nicholas Avenue (NYCDOT Improvements)
- Install a new island on St. Nicholas Avenue between W 161st street and W 162nd Street (NYCDOT Improvements)
- Install new back-in angle parking along St. Nicholas Avenue between W 162nd Street and W 163rd Street (NYCDOT Improvements)
- Install new hatched buffer and channelization at the locations shown in the illustration (NYCDOT Improvements)
- Restrict Left turn vehicles by introducing 'No Left Turn' sign for southbound St Nicholas Avenue traffic at W 165th Street
- Change traffic patterns as shown in the illustration

Pedestrian concerns in this area:

- Non-standard pedestrian ramps
- Turning vehicles not yielding to pedestrians
- Signal timing (insufficient crossing time)

Additional Information

- This study area was visited on April 7th, April 8th and August 3rd, 2010
- Parking regulations for the project area have been collected and are shown in Appendix E

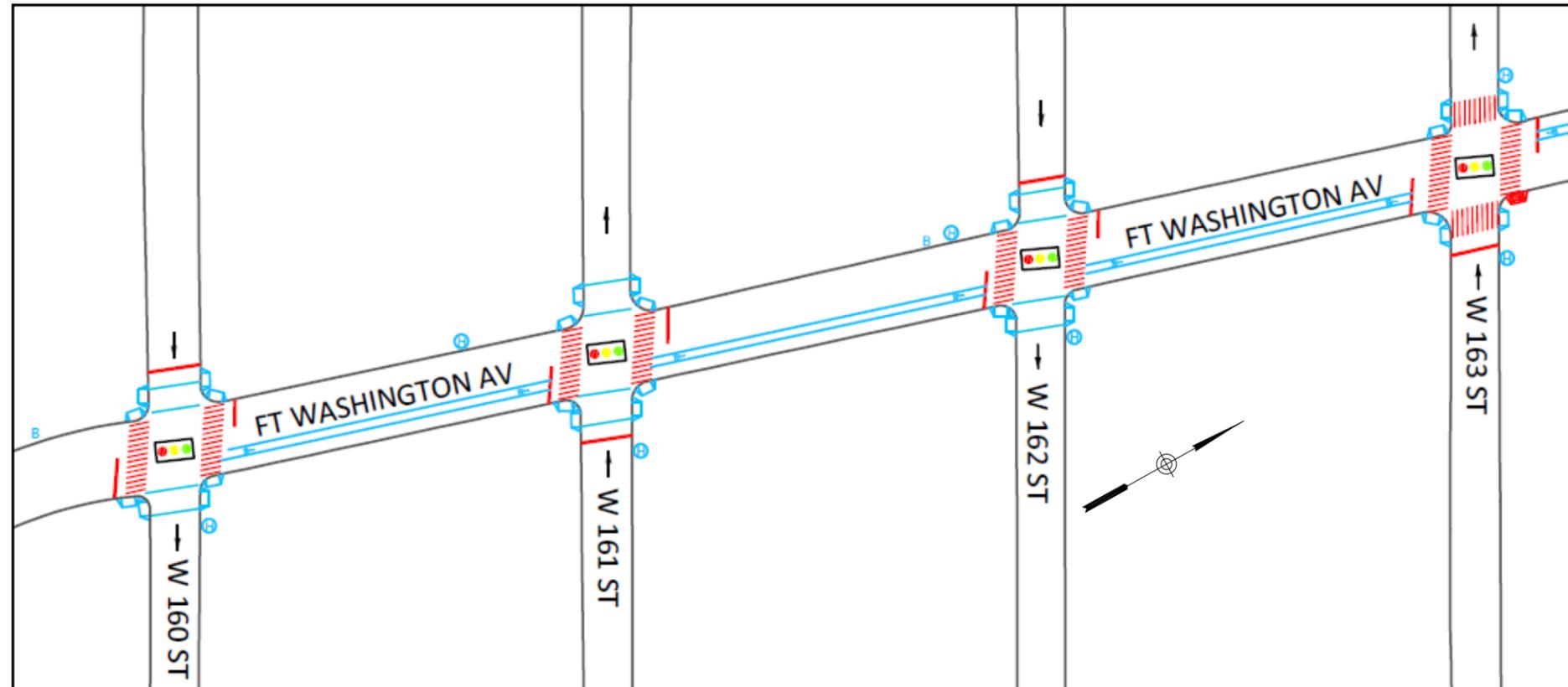
Traffic Analysis

- Turning movement and pedestrian counts were conducted at:
 - St. Nicholas Avenue/Audubon Avenue and W 165th Street

Turning movement and pedestrian counts summaries are shown in Appendices B and C

LEGENDS:

EXISTING HIGH VISIBILITY CROSSWALK	PROPOSED HIGH VISIBILITY CROSSWALK	PROPOSED CURB EXTENSION (NECKDOWN)	EXISTING SIGNALIZED INTERSECTION
EXISTING STANDARD CROSSWALK	PROPOSED STANDARD CROSSWALK	SW OBSTRUCTION: STREETLIGHT	PROPOSED SIGNALIZED INTERSECTION
EXISTING SCHOOL CROSSWALK	PROPOSED SCHOOL CROSSWALK	SW OBSTRUCTION: FIRE HYDRANT	TRAVEL DIRECTION
EXISTING STOP BAR	PROPOSED STOP BAR	SW OBSTRUCTION: SIGNAL POLE	PROPOSED LPI
EXISTING PEDESTRIAN RAMP	PROPOSED PED REFUGE ISLAND (RAISED ISLAND)	SW OBSTRUCTION: FIRE BOX	PROPOSED DAYLIGHTING
PROPOSED NEW PED RAMP	EXISTING BUS STOP	PROPOSED PEDESTRIAN SIGNAL HEAD	EXISTING CATCH BASIN
REPLACE EXISTING PED RAMP	PROPOSED BUS STOP	PROPOSED PEDESTRIAN COUNTDOWN SIGNAL	PROPOSED CATCH BASIN
	EXISTING SUBWAY STOP		PROPOSED TRAFFIC SIGN



LEGENDS:

EXISTING HIGH VISIBILITY CROSSWALK	PROPOSED HIGH VISIBILITY CROSSWALK	PROPOSED CURB EXTENSION (NECKDOWN)	EXISTING SIGNALIZED INTERSECTION
EXISTING STANDARD CROSSWALK	PROPOSED STANDARD CROSSWALK	SW OBSTRUCTION: STREETLIGHT	PROPOSED SIGNALIZED INTERSECTION
EXISTING SCHOOL CROSSWALK	PROPOSED SCHOOL CROSSWALK	SW OBSTRUCTION: FIRE HYDRANT	TRAVEL DIRECTION
EXISTING STOP BAR	PROPOSED STOP BAR	SW OBSTRUCTION: SIGNAL POLE	PROPOSED LPI
EXISTING PEDESTRIAN RAMP	PROPOSED PED REFUGE ISLAND (RAISED ISLAND)	SW OBSTRUCTION: FIRE BOX	PROPOSED DAYLIGHTING
PROPOSED NEW PED RAMP	EXISTING BUS STOP	PROPOSED PEDESTRIAN SIGNAL HEAD	EXISTING CATCH BASIN
REPLACE EXISTING PED RAMP	PROPOSED BUS STOP	PROPOSED PEDESTRIAN COUNTDOWN SIGNAL	PROPOSED CATCH BASIN
	EXISTING SUBWAY STOP		PROPOSED TRAFFIC SIGN

Recommended improvements include:

- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks as shown in the illustration
- Install new advanced stop bars as shown in the illustration
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks

Pedestrian concerns in this area:

- Non-standard pedestrian ramps
- Signal timing (insufficient crossing time)

Additional Information

- This study area was visited on April 7th, April 8th and August 3rd, 2010
- Parking regulations for the project area have been collected and are shown in Appendix E

Safe Streets for Seniors

Hamilton Heights, Manhattan

APPENDIX

September 2012



Janette Sadik-Khan, Commissioner



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APPENDIX – A

AUTOMATIC TRAFFIC RECORDER COUNTS (ATR)

Twenty-four hour Automatic Traffic Recorder (ATR) counts were collected in August, September and November of 2009 and May of 2010. The results are shown in Table 1. Detailed ATR data are presented in the Technical Supplement.

TABLE 1: EXISTING ATR TRAFFIC VOLUMES		
Locations	Direction	ADT* (veh/day)
Broadway between 145 th Street & 146 th Street	Southbound	13494
Broadway between 144 th Street & 145 th Street	Northbound	12833
145 th Street between Broadway and Amsterdam Avenue	Westbound	6569
145 th Street between Broadway and Riverside Drive	Eastbound	1771
145 th Street between Amsterdam Avenue and Broadway	Eastbound	5608
145 th Street between Amsterdam Avenue and Convent Avenue	Westbound	8339
155 th Street between St Nicholas Avenue and St Nicholas Place	Westbound	10046
	Eastbound	11372
Amsterdam Avenue between 151 st Street and 152 nd Street	Northbound	9351
	Southbound	7578
155 th Street between Amsterdam Avenue and St Nicholas Avenue	Westbound	8937
155 th Street between Amsterdam Avenue and Broadway	Eastbound	6226
155 th Street between Broadway and Riverside Drive	Eastbound	1662
155 th Street between Broadway and Amsterdam Avenue	Westbound	6909
Amsterdam Avenue between 144 th Street and 145 th Street	Northbound	11237
Amsterdam Avenue between 145 th Street and 146 th Street	Southbound	7987
Amsterdam Avenue between 154 th Street and 155 th Street	Northbound	8483
Amsterdam Avenue between 155 th Street and 156 th Street	Southbound	6897
Amsterdam Avenue between 161 st Street and 162 nd Street	Northbound	6731
Amsterdam Avenue between 162 nd Street and 163 rd Street	Southbound	6869

*Note: ADT is Average Daily Traffic

APPENDIX – B

TURNING MOVEMENT COUNTS

Turning movement counts (TMC's) in 15-minute increments were collected in November of 2009 and May of 2010 during the morning (7:30 am to 9:30 am) and evening (4:00 pm to 6:00 pm) peak periods. The results of the turning movement counts for both the AM and PM peak hours are shown in Table 2. Detailed TMC data are presented in the Technical Supplement.

TABLE 2: TURNING MOVEMENT COUNTS														
Intersection	Time	Class	Northbound			Southbound			Eastbound			Westbound		
			L	T	R	L	T	R	L	T	R	L	T	R
Broadway and 145 th Street*	AM	Auto	9	310	66	82	622	32	4	68	22	66	98	55
		Truck	1	33	5	7	47	0	0	0	1	2	5	6
		Bus	0	23	9	1	32	1	0	13	0	5	7	6
		Total	10	366	80	90	701	33	4	81	23	73	110	67
	PM	Auto	29	715	105	69	496	15	1	45	24	80	132	107
		Truck	0	17	1	4	20	0	0	0	0	0	1	0
		Bus	0	16	4	1	15	0	0	9	3	1	6	5
		Total	29	748	110	74	531	15	1	54	27	81	139	112
Broadway and 160 th Street	AM	Auto	-	494	44	40	780	-	19	18	21	-	-	-
		Truck	-	57	6	4	61	-	13	0	1	-	-	-
		Bus	-	20	3	2	21	-	6	0	0	-	-	-
		Total	-	571	53	46	862	-	38	18	22	-	-	-
	PM	Auto	-	805	69	44	544	-	31	18	22	-	-	-
		Truck	-	73	1	2	23	-	3	0	0	-	-	-
		Bus	-	23	1	0	9	-	2	0	0	-	-	-
		Total	-	901	71	46	576	-	36	18	22	-	-	-
Broadway and 166 th Street	AM	Auto	-	470	48	46	752	-	-	-	-	51	-	8
		Truck	-	41	3	23	67	-	-	-	-	2	-	11
		Bus	-	13	2	11	23	-	-	-	-	0	-	0
		Total	-	524	53	80	842	-	-	-	-	53	-	19
	PM	Auto	-	785	46	41	676	-	-	-	-	77	-	20
		Truck	-	60	2	22	15	-	-	-	-	2	-	2
		Bus	-	19	1	9	6	-	-	-	-	0	-	0
		Total	-	864	49	72	697	-	-	-	-	79	-	22
Amsterdam Avenue and 147 th Street	AM	Auto	25	439	-	-	422	18	-	-	-	23	17	9
		Truck	2	52	-	-	50	0	-	-	-	4	1	0
		Bus	0	14	-	-	15	0	-	-	-	1	0	0
		Total	27	505	-	-	487	18	-	-	-	28	18	9
	PM	Auto	16	630	-	-	351	28	-	-	-	19	31	19
		Truck	2	61	-	-	30	0	-	-	-	1	0	0
		Bus	2	17	-	-	7	0	-	-	-	0	0	0
		Total	20	708	-	-	388	28	-	-	-	20	31	19

Intersection	Time	Class	Northbound			Southbound			Eastbound			Westbound		
			L	T	R	L	T	R	L	T	R	L	T	R
Amsterdam Avenue and 155 th Street	AM	Auto	22	241	106	72	330	34	23	260	44	129	314	39
		Truck	4	19	11	6	18	7	10	19	6	7	14	11
		Bus	2	19	1	11	28	7	8	29	7	2	14	0
		Total	28	279	118	89	376	48	41	308	57	138	342	50
	PM	Auto	34	416	87	66	237	53	28	291	38	79	239	52
		Truck	3	28	8	5	8	1	9	14	6	7	13	4
		Bus	1	22	1	2	19	2	2	14	2	0	15	1
		Total	38	466	96	73	264	56	39	319	46	86	267	57
St Nicholas Avenue and 165 th Street	AM	Auto	31	148	10	13	60	8	6	79	57	10	64	31
		Truck	1	15	0	5	15	0	1	3	2	2	3	2
		Bus	1	6	0	2	7	0	0	1	0	0	0	1
		Total	33	169	10	20	82	8	7	83	59	12	67	34
	PM	Auto	101	221	12	4	56	29	7	71	40	11	100	30
		Truck	4	18	0	6	12	0	0	4	1	1	1	1
		Bus	1	7	0	4	6	0	0	1	0	0	0	0
		Total	106	246	12	14	74	29	7	76	41	12	101	31
Audubon Avenue and 165 th Street	AM	Auto	31	47	10	-	-	-	82	79	57	10	64	51
		Truck	1	7	0	-	-	-	2	3	2	2	3	4
		Bus	1	2	0	-	-	-	0	1	0	0	0	2
		Total	33	56	10	-	-	-	84	83	59	12	67	57
	PM	Auto	101	87	12	-	-	-	42	71	40	11	100	26
		Truck	4	3	0	-	-	-	2	4	1	1	1	5
		Bus	1	1	0	-	-	-	1	1	0	0	0	3
		Total	106	91	12	-	-	-	45	76	41	12	101	34

* Turning movement counts taken from NYCDOT W 145th Street improvement project.

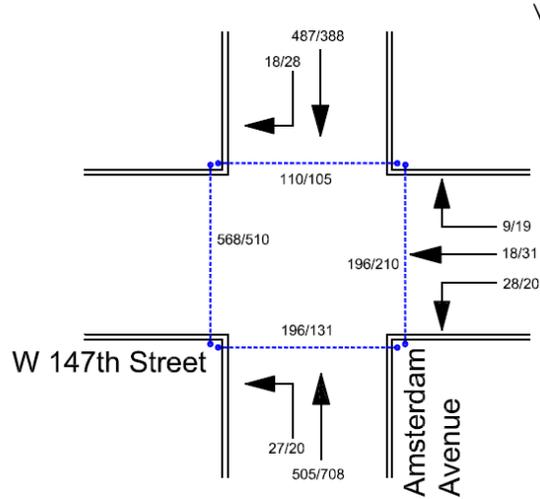
Based on these manual counts, the AM and PM peak hours were determined to be:

7:45 am – 8:45 am (AM peak hour) and 4:00 pm – 5:00 pm (PM peak hour)

- Broadway and 160th Street
- Broadway and 166th Street
- Amsterdam Avenue and 147th Street
- Amsterdam Avenue and 155th Street
- St Nicholas Avenue and Audubon Avenue and 165th Street

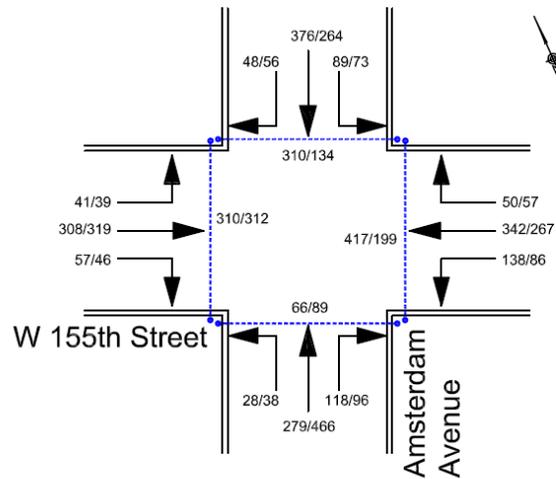
7:45 am – 8:45 am (AM peak hour) and 5:00 pm – 6:00 pm (PM peak hour)

- Broadway and 145th Street



Intersection of Amsterdam Avenue and West 147th Street

Note: Turning Movement and Pedestrian counts conducted on Thursday, 05/20/2010.



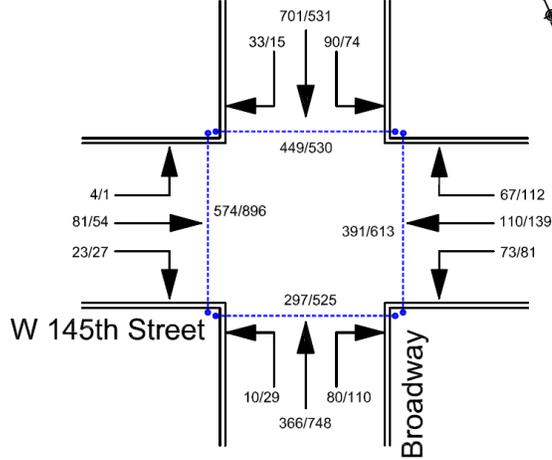
Intersection of Amsterdam Avenue and West 155th Street

Note: Turning Movement and Pedestrian counts conducted on Thursday, 05/20/2010.

Pedestrian counts conducted on Wednesday, 11/04/2009.

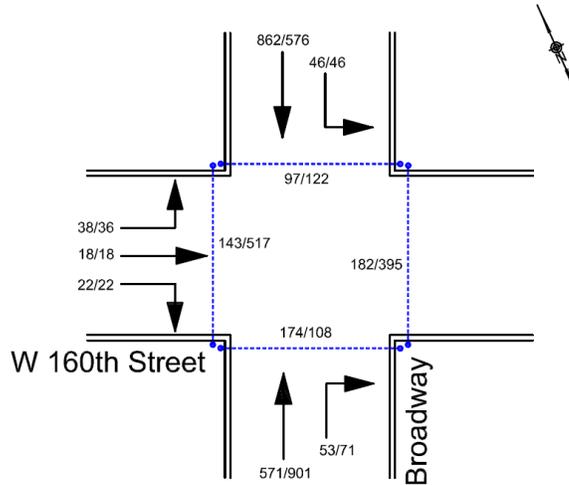
- LEGENDS:**
- 161/224 AM/PM
 - 25/53 Conflicting Pedestrians
 - 36/66 Turning Movement

APPENDIX - B
HAMILTON HEIGHTS, MANHATTAN
PEAK HOUR TRAFFIC COUNTS



Intersection of Broadway and West 145th Street

Note: Turning Movement counts conducted on Thursday, 11/05/2009.
Pedestrian counts conducted on Thursday, 05/20/2010.

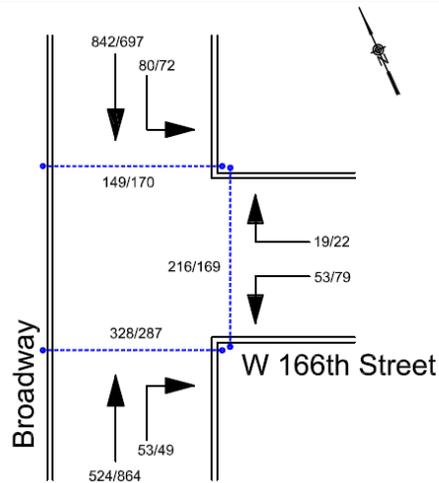


Intersection of Broadway and West 160th Street

Note: Turning Movement and Pedestrian counts conducted on Thursday, 05/20/2010.

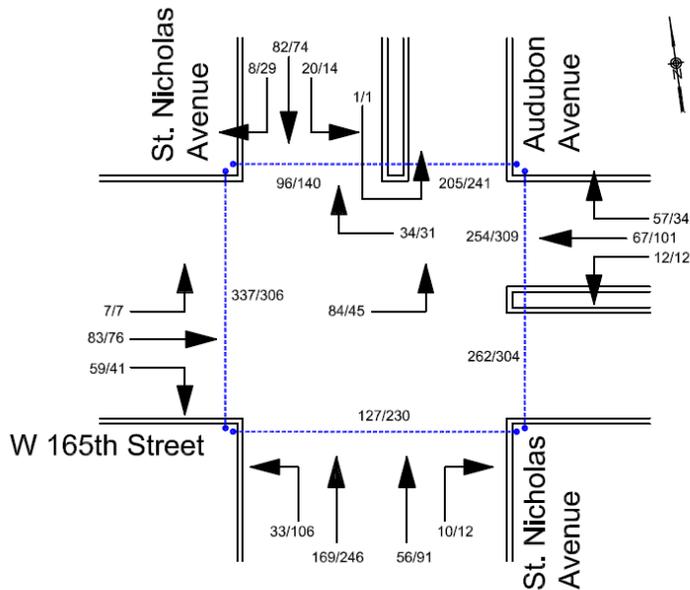
- LEGENDS:**
- 161/224 AM/PM
 - 25/53 Conflicting Pedestrians
 - 36/66 Turning Movement

APPENDIX - B
HAMILTON HEIGHTS, MANHATTAN
PEAK HOUR TRAFFIC COUNTS



Intersection of Broadway and West 166th Street

Note: Turning Movement and Pedestrian counts conducted on Thursday, 05/20/2010.



Intersection of St. Nicholas Avenue and Audubon Avenue/West 165th Street

Note: Turning Movement and Pedestrian counts conducted on Thursday, 05/20/2010.

- LEGENDS:**
- 161/224 AM/PM
 - 25/53 Conflicting Pedestrians
 - 36/66 Turning Movement

APPENDIX - B
HAMILTON HEIGHTS, MANHATTAN
PEAK HOUR TRAFFIC COUNTS

APPENDIX – C

PEDESTRIAN COUNTS

Pedestrian counts in 15-minute increments were collected in November of 2009 and May of 2010 during the morning (7:30 am to 9:30 am) and evening (4:00 pm to 6:00 pm) peak periods. The results of the pedestrian counts for both the AM and PM peak hours are shown in Table 3. Detailed pedestrian count data are presented in the Technical Supplement.

TABLE 3: PEDESTRIAN COUNTS

Intersection	Time	Crosswalks (Legs)				Totals
		N	S	E	W	
Broadway and 145 th Street	AM	449	297	391	574	1711
	PM	530	525	613	896	2564
Broadway and 160 th Street	AM	97	174	182	143	596
	PM	122	108	395	517	1142
Broadway and 166 th Street	AM	149	328	216	-	693
	PM	170	287	169	-	626
Amsterdam Avenue and 147 th Street	AM	110	196	196	568	1070
	PM	105	131	210	510	956
Amsterdam Avenue and 155 th Street*	AM	310	66	417	310	1103
	PM	134	89	199	312	734
St Nicholas Avenue and 165 th Street	AM	96	127	262	337	882
	PM	140	230	309	306	985
Audubon Avenue and 165 th Street	AM	205	127	262	337	931
	PM	241	230	309	306	1086

* Pedestrian counts taken from NYCDOT W 155th Street improvement project.

All signal timings in the study area were found to be adequate in all directions and approaches except at the intersection of St Nicholas Avenue/Audubon Avenue and W 165th Street as shown in the following table:

TABLE 4: PEDESTRIAN CROSSING INTERVAL AT SIGNALIZED INTERSECTIONS

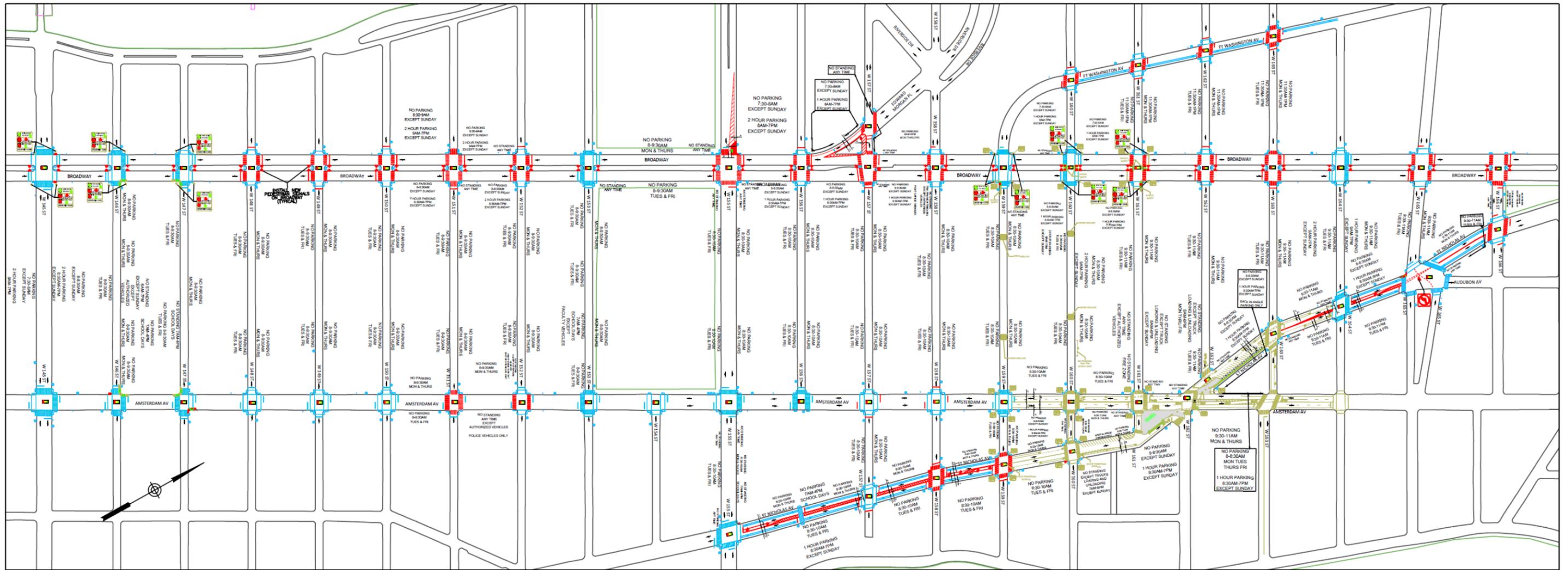
Intersection Name	Crossing Distance (Feet)	Pedestrian Interval Actual ¹ (Seconds)	Ped. Interval Req'd (Seconds) ¹			Timing Adjustment? (Yes/No)
			Clearance Time ³ (A)	Walk Interval ² (B)	Pedestrian Interval (A)+(B)	
Amsterdam Avenue and West 147th Street						
Crossing Amsterdam Avenue	60	27	7	20	27	NO
Crossing West 147 th Street	30	63	7	10	17	NO
Amsterdam Avenue and West 151st Street						
Crossing Amsterdam Avenue	60	27	7	20	27	NO
Crossing West 151 st Street	30	63	7	10	17	NO
Amsterdam Avenue and West 155th Street						
Crossing Amsterdam Avenue	60	40	7	20	27	NO
Crossing West 155 th Street	30	50	7	10	17	NO
Broadway and West 145th Street						
Crossing Broadway	104/52 ⁴	32	7	35/18 ⁵	42/25 ⁵	NO
Crossing West 145 th Street	62	58	7	21	28	NO
Broadway and West 160th Street						
Crossing Broadway	104/52 ⁴	32	7	35/18 ⁵	42/25 ⁵	NO
Crossing West 160 th Street	32	58	7	11	18	NO
Broadway and West 166th Street						
Crossing Broadway	104/52 ⁴	36	7	35/18 ⁵	42/25 ⁵	NO
Crossing West 166 th Street	42	54	7	14	21	NO
St. Nicholas Avenue @ W 165th Street and Audubon Avenue						
Crossing W 165 th Street	60	41	7	20	27	NO
Crossing St. Nicholas Avenue	83	29	7	28	35	YES
Crossing Audubon Avenue	44	20	7	15	22	YES

Notes:

1. The pedestrian interval consists of the pedestrian walk interval plus the pedestrian clearance time. Yellow change interval and red clearance interval are included in pedestrian clearance time.
2. The walk interval should be at least 7 seconds in length to provide pedestrians adequate opportunity to leave the curb or shoulder before the pedestrian clearance time begins.
3. A rate of 3 ft/sec was utilized as the senior pedestrian walking rate to evaluate pedestrian clearance time.
4. Broadway is 104 feet wide with a raised median-island in the center.
5. Pedestrians need two signal cycles to cross Broadway at the rate of 3 ft/sec while stopping at the raised median separating the northbound and southbound travel lanes of Broadway.

APPENDIX – D

PARKING REGULATIONS



LEGENDS:

	EXISTING HIGH VISIBILITY CROSSWALK		PROPOSED HIGH VISIBILITY CROSSWALK		PROPOSED CURB EXTENSION (NECKDOWN)		EXISTING SIGNALIZED INTERSECTION
	EXISTING STANDARD CROSSWALK		PROPOSED STANDARD CROSSWALK		SW OBSTRUCTION: STREETLIGHT		PROPOSED SIGNALIZED INTERSECTION
	EXISTING SCHOOL CROSSWALK		PROPOSED SCHOOL CROSSWALK		SW OBSTRUCTION: FIRE HYDRANT		EXISTING TRAVEL DIRECTION
	EXISTING STOP BAR		PROPOSED STOP BAR		SW OBSTRUCTION: SIGNAL POLE		PROPOSED LPI
	EXISTING PEDESTRIAN RAMP		PROPOSED PED REFUGE ISLAND (RAISED ISLAND)		SW OBSTRUCTION: FIRE BOX		PROPOSED DAYLIGHTING
	PROPOSED NEW PED RAMP		EXISTING BUS STOP		PROPOSED PEDESTRIAN SIGNAL HEAD		EXISTING CATCH BASIN
	REPLACE EXISTING PED RAMP		EXISTING SUBWAY STOP				PROPOSED CATCH BASIN
							PROPOSED TRAFFIC SIGN

**SAFE STREETS FOR SENIORS
HAMILTON HEIGHTS, MANHATTAN**

PROPOSED MEASURES TO IMPROVE SAFETY

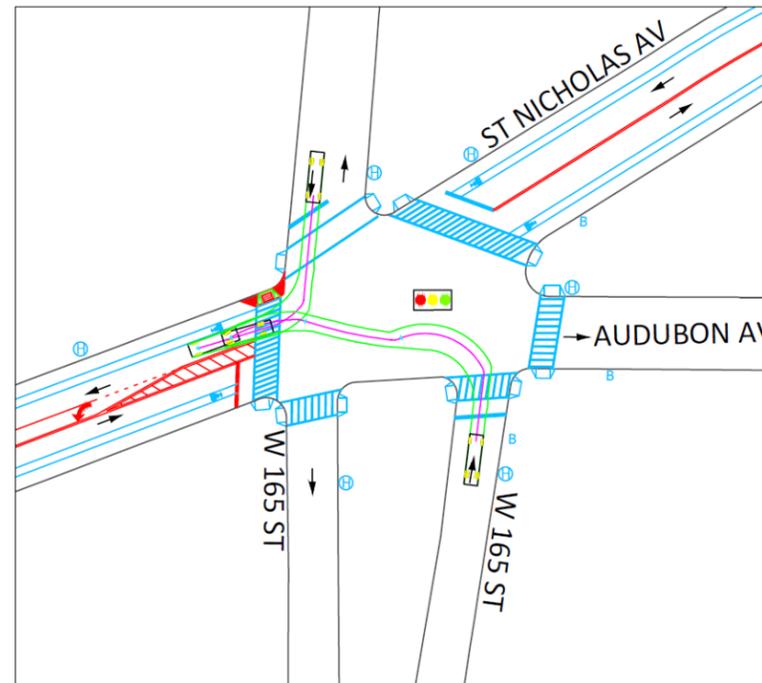
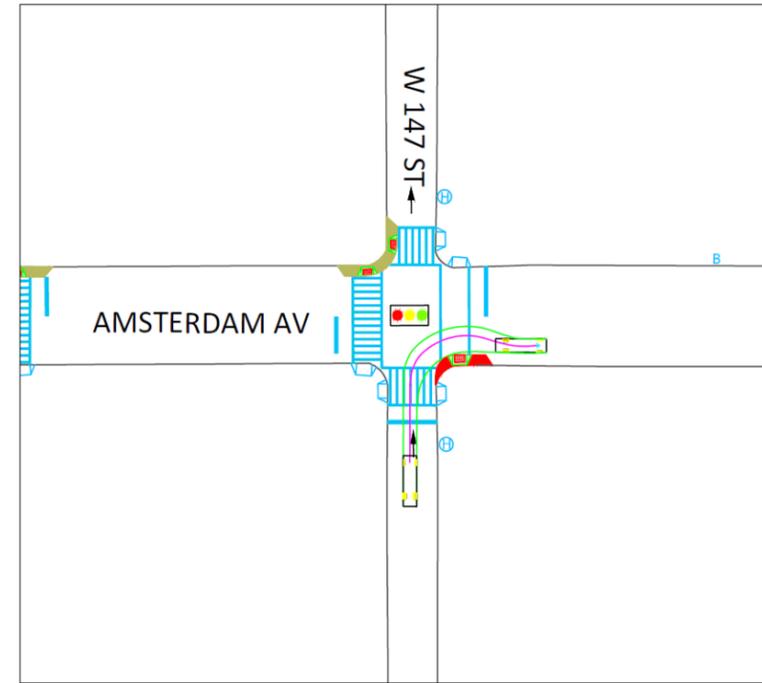
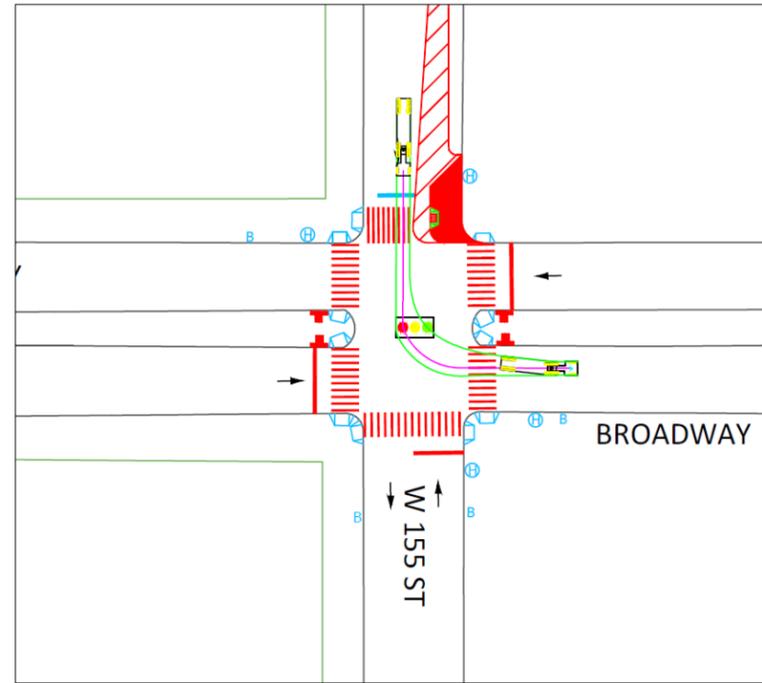
GPI
GREENMAN - PEDERSEN, INC.
Engineers, Planners,
Construction Engineers & Inspectors

FIGURE
NO. 1 of 1

APPENDIX – E

ADDITIONAL TRAFFIC DATA & ANALYSIS

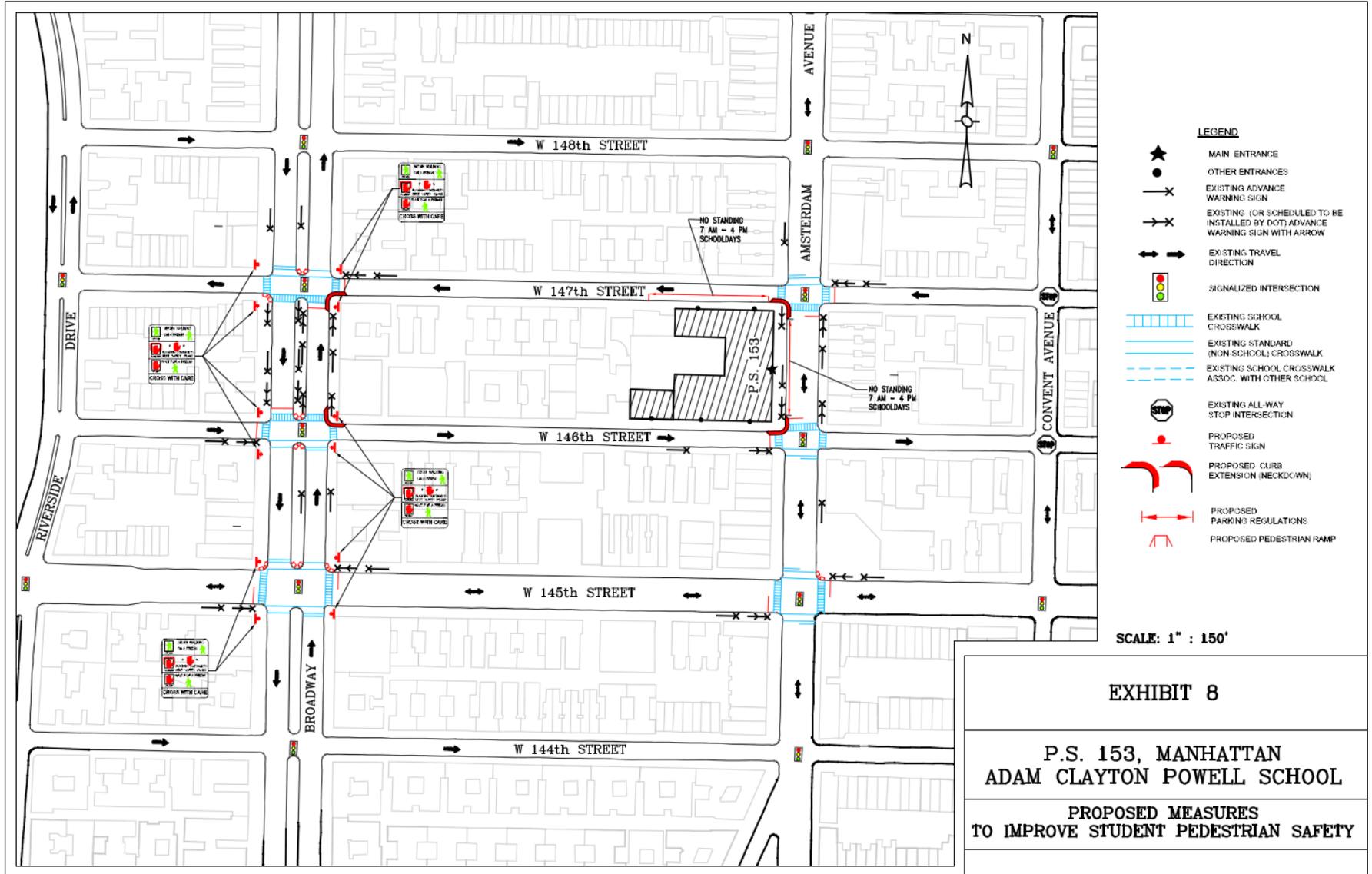
TURNING RADIUS ANALYSIS



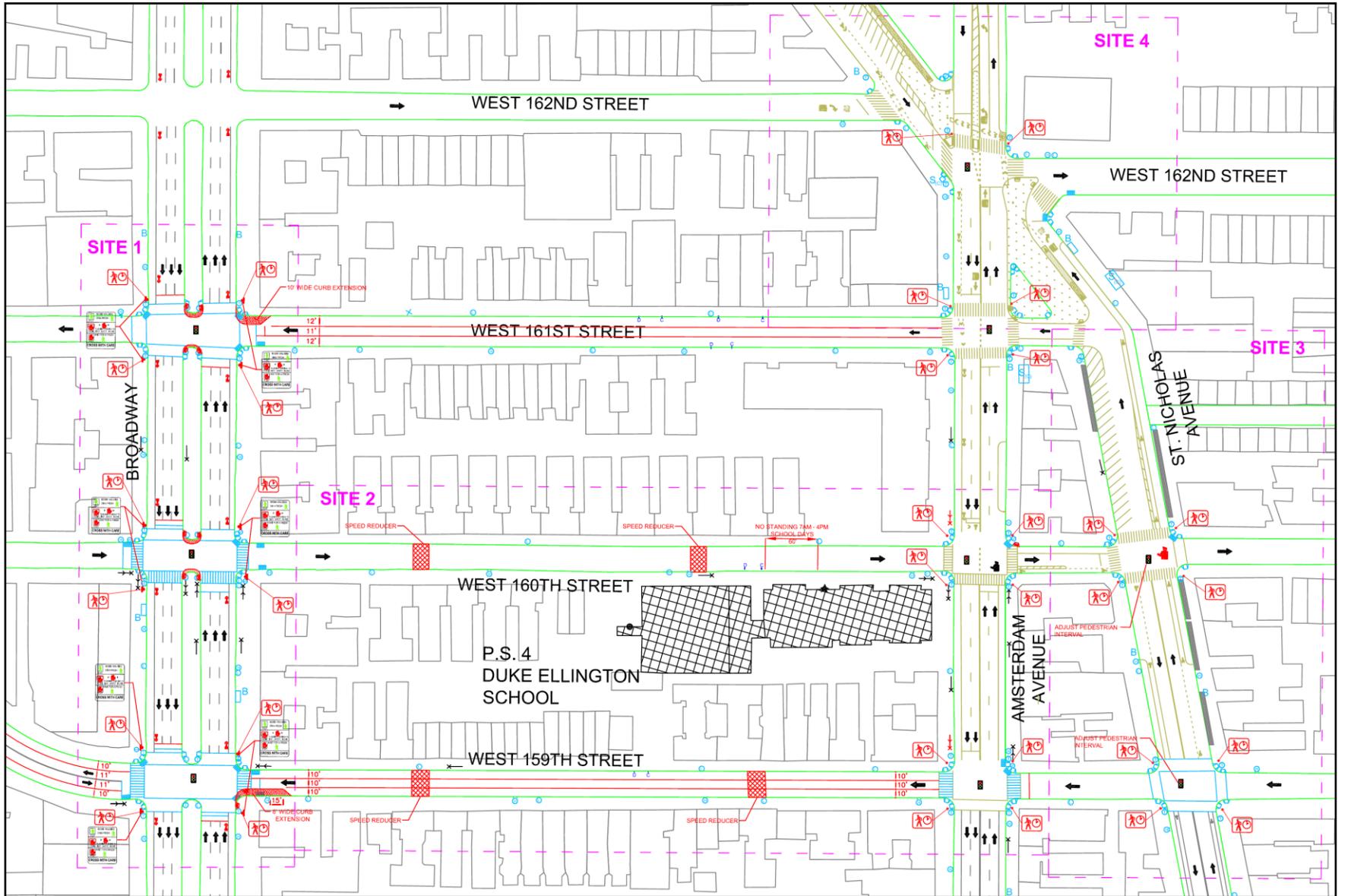
Note: All Turning Radius Analyses were carried out using SU vehicle except Truck Routes, where WB-40 vehicle was used for analysis.

APPENDIX – F
RECOMMENDATIONS BY SCHOOL SAFETY AND NYCDOT

SCHOOL SAFETY EXHIBITS



SCHOOL SAFETY EXHIBITS



NYCDOT IMPROVEMENTS

