



CITYWIDE PEDESTRIAN BRIDGE SAFETY PROJECT

Description

Pedestrian bridges play a critical role in connecting communities across the City. With a large number of highways and major arterials close to residential neighborhoods, pedestrians and cyclists rely upon these bridges to safely cross these roadways.

In the spring of 2004, the Department of Transportation initiated a citywide Pedestrian Bridge Safety Project. This ambitious endeavor encompassed all 122 pedestrian bridges within the five boroughs and was spurred by both community concerns and the Department's proactive approach to mitigate safety concerns.

From the outset, the Department sought to develop a program that would address the varying levels of risk to pedestrians and bicyclists exiting every pedestrian bridge in the city. While the bridges vary in general design, there are common design characteristics which are prevalent at each pedestrian bridge. As such, the Department undertook a survey of all 122 bridges to establish standard criteria to categorize the bridges according to the level of risk and to develop mitigation measures accordingly.

Based upon previous and current experiences, the Department found the greatest risk occurred at the landings of the bridges, or where the walkways returned to grade and exited onto the street. At these locations, there are two critical safety concerns that the Department worked to alleviate. The first concern was the orientation of the landing in relation to the connecting

roadway. Depending on the configuration of these landings, both pedestrians and wheeled users (i.e. cyclists, rollerbladers, skateboarders and wheelchair users) approaching the landing and exiting the bridge were forced to enter the roadway under unsafe conditions, such as the lack of a protected crossing or stop controls for oncoming vehicles. This orientation of the pedestrian bridges and roadways led the Department to identify a second critical concern, the need for bridge users to safely come to a stop prior to entering the roadbed.

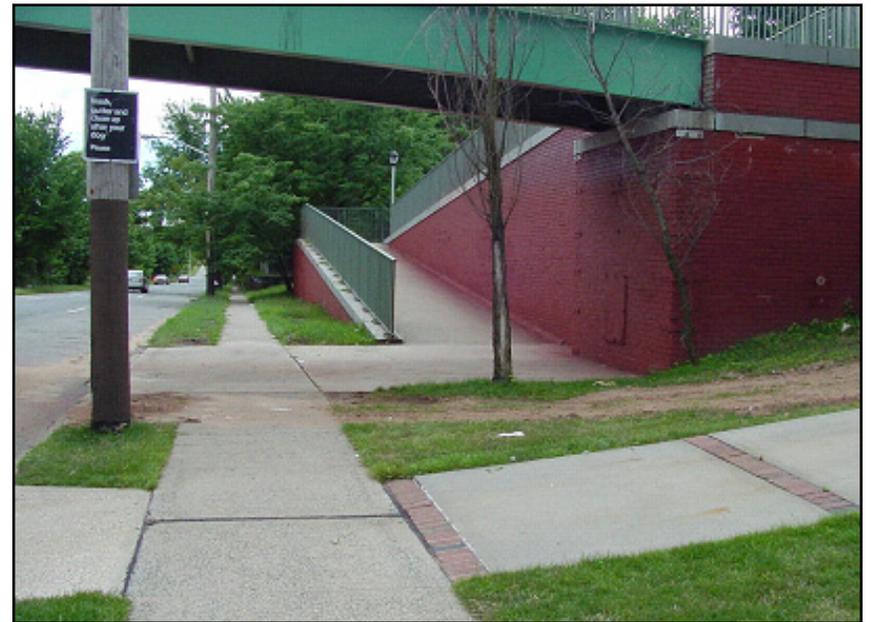
Using these two characteristics, the Department categorized all 120 bridge crossings into three distinct categories.

Type 1 Bridges

Type 1 bridges exit directly onto large sidewalks, parkland or a distinct protected pedestrian area. In total, the department identified 87 such bridges. This configuration was considered to have the lowest risk and needed no remediation, since the bridge users exited into a protected area or refuge and were able to safely cross the street. This configuration also provides the opportunity for the user to come to a stop prior to entering or crossing the roadbed.

Type 2 Bridges

Type 2 bridges, of which there are 13 citywide, carry a higher risk factor. At the landings of each of these bridges, the passageway exits directly into a controlled intersection and/or street. Under this configuration, bridge users immediately enter upon the roadway after exiting the bridge. Although the intersection control provides safe passage for a bridge user who comes to



Type 1 Pedestrian Bridge at Jefferson Boulevard over the Korean War Veterans Parkway in Staten Island



Type 2 Pedestrian Bridge at Fresh Meadows Lane and the Long Island Expressway Service Road in Queens



Type 3 Pedestrian Bridge at 84th Street over the Brooklyn Queens Expressway in Brooklyn

a complete stop on the landing before entering the roadway, this can be problematic for wheeled users accelerating down the incline and failing to stop before entering the intersection, as both the driver and cyclist have limited sight distances and opportunities to react to each other.

Type 3 Bridges

The final category of bridges is classified as Type 3 bridges, of which 20 exist citywide. These bridges pose the greatest risk to bridge users, as the landings exit directly into an uncontrolled intersection or street. At these locations, pedestrians and bicyclists are forced to enter the roadway upon exiting the bridge and no controls exist to provide for a protected crossing. This configuration can be especially problematic for wheeled users, as these individuals may not come to a complete stop prior to entering the roadway. Both pedestrians/cyclists, as well as motorists on the arterial have limited sight distances and reaction times due to the proximity of the landing to the roadway. On the service roads of major highways, this problem is exacerbated due to higher vehicle speeds.

Development of a Remediation Program

Upon completion of the citywide inventory, the Department developed a safety mitigation “tool box” to address the identified risks and conditions at each of the bridges. Overall, Type 2 and Type 3 bridges required the greatest need of remediation. The “tool box” focused on implementing treatments in two distinct areas, on pedestrian bridge landings and within the intersection roadbed itself.

At the bridge landings, the goal of the remediation program was to force users of the bridge to come to a complete stop before exiting the bridge and entering the roadbed. This is especially critical for wheeled users or for children traveling on the bridge. In order to achieve this goal, the Department developed an innovative fencing design that requires bridge users, particularly bicyclists, to travel through a slalom or staggered fencing formation that forces the users to come to a complete stop at the end of the bridge. This design is ADA compliant and signage on the fencing advises the bridge users to come to a complete stop prior to proceeding into the roadway. These signs are distinct in design and highly visible to all bridge users.

This treatment was installed at the following locations citywide:

Bronx

- Cross Bronx Expressway at Ellis Avenue
- Cross Bronx Expressway at Watson Avenue
- Bruckner Expressway at Waterbury Avenue



Slalom fencing design requires bridge users to come to a stop at the end of the bridge. In addition, STOP signage and instructions to use pedestrian activated signals are posted along the fencing.

Brooklyn

- Gowanus/Brooklyn Queens Expressway at 72th Street
- Gowanus/Brooklyn Queens Expressway at 84th Street
- Prospect Expressway at East 7th Street/ Fort Hamilton Parkway
- Belt Parkway/Shore Parkway Service Road at 27th Avenue Pedestrian Bridge, North side only

Queens

- Clearview Expressway at 33rd Avenue
- Clearview Expressway at 42nd Avenue
- Clearview Expressway at 46th Avenue
- Long Island Expressway at Fresh Meadows Lane
- Long Island Expressway at 159th Street
- Long Island Expressway at 148th Street
- Long Island Expressway at 136th Street
- Long Island Expressway at 112th Street
- Long Island Expressway at 99th Street
- Long Island Expressway at 84th Street
- Long Island Expressway at Cloverdale Road

The second mitigation measure, instituted mainly at Type 3 bridges, was the installation of new stop controls to facilitate a safe, protected pedestrian crossing. In total, the Department developed four options for intersection control. These included:

- Full traffic signals at all locations that meet appropriate warrants;
- Experimental pedestrian activated signals at most locations that did not meet warrants for full signals;
- Stop signs and roadway markings, as appropriate; and
- Installation of pedestrian separators to guide pedestrians to a controlled intersection, as appropriate.

Of these treatments, the most common improvement implemented was the installation of an experimental pedestrian activated signal. During regular operation, the signal displays a flashing amber for the major road, with a flashing red on the minor road. During this time the pedestrian crossing signal is illuminated by a “Don’t Walk” display. Upon activation by a bridge user, the major road display would cycle to amber, then steady red, providing a protected crossing. The minor road would feature a flashing red, while the pedestrian crossing would indicate a walk signal. It takes a maximum of 15 seconds from the time the pedestrian pushes the button to the time they received a “Walk” display. Additional signage is also posted to advise pedestrians to utilize the push button to cross the street.

In addition to the experimental signals, all locations with this treatment also received accompanying improvements to signs and markings. “Stop Here on Red” signage was installed on the major approach to improve motorist compliance with the signal operation, Where necessary, all intersection control (one-way arrows, Stop signs, etc.) and warning signs were replaced and all lane lines in the immediate vicinity of the crossing as well as the crossings were refurbished. Finally, appropriate Stop Bars were installed on both the major and minor legs of the intersection as well as “Stop” word messages on the minor roadway.

In total, this signal design was installed at 15 bridge locations (23 signals) citywide by December 2004. The following represents the locations where the experimental signals were implemented:

Queens

- Clearview Expressway @ 46th Avenue - 2 signals (both service roads)
- Horace Harding Expressway Service Road @ Cloverdale Boulevard - 2 signals (both service roads)
- Horace Harding Expressway Service Road @ Corona Avenue - 1 signal (westbound service road)
- Grand Central Parkway @ 112th Street - 1 signal (southbound service road)

Brooklyn

- Ocean Parkway @ East 7th Street - 1 signal (north roadway)
- Shore Parkway @ Hubbard Street - 1 signal (north service road)

Bronx

- Park Avenue @ Saint Paul's Place - 1 signal
- Cross Bronx Expressway @ Ellis Avenue/Gleason Avenue - 2 signals (both access points on south service road)
- Cross Bronx Expressway @ Watson Avenue - 2 signals (both service roads)
- Bruckner Expressway @ Baisley Ave (Waterbury Avenue) - 1 signal (southbound service road)
- Park Avenue @ East 176th Street - 2 signals (both roadways)
- Park Avenue @ East 178th Street - 2 signals (both roadways)
- Park Avenue @ East 179th Street - 2 signals (both roadways)

Manhattan

- West 158th Street @ Henry Hudson Parkway - 1 signal (at exit of northbound parkway)

Staten Island

- Freemont Avenue at North and South Railroad Avenues - 2 signals
In March 2006, the New York State Department of Transportation completed construction of a new pedestrian bridge over the Van Wyck Expressway at 87th Street. Given the design of the landing and the existence of fencing along the curb, pedestrians are directed to the corresponding crosswalk at the corner. Therefore there is no need for

the “slalom” fences at this location. However, the “experimental” push-button signal and associated signage were installed on both approaches. All work was completed in late March 2006. The images to the right depict the bridge and roadway while under construction.



Pedestrians crossing the service road cross at an unsignalized intersection. The newly constructed bridge is depicted in the background, as well as location of pedestrian fencing.



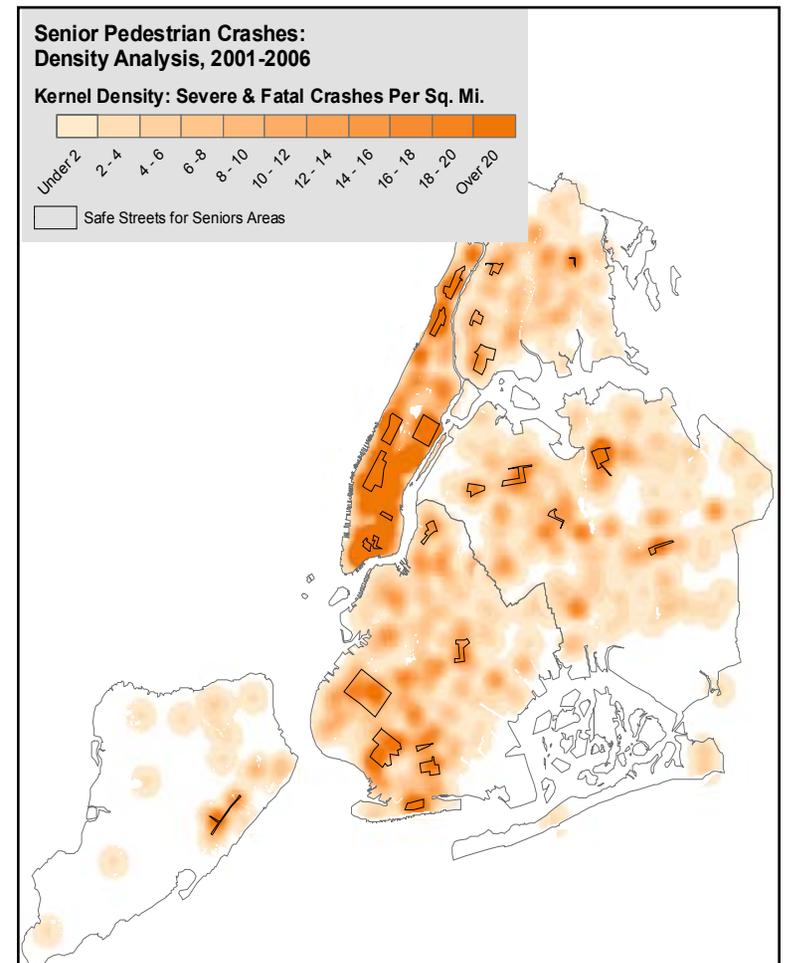
NYCDOT installed a push-button activated signal at this intersection. Orange mesh fencing indicates location where fencing will be installed to direct pedestrians to cross at the controlled intersection

SAFE STREETS FOR SENIORS INITIATIVE

Background

To identify focus areas for the Safe Streets for Seniors program, a geographic analysis was conducted of all crashes in which a pedestrian over the age of 65 was killed or severely injured. These crashes were mapped, and the density of such crashes per square mile was determined using kernel density analysis. Twenty-five neighborhoods with a high density of pedestrian crashes or injuries were identified, most of which are also home to a large number of seniors.

Five focus areas (one in each borough) were chosen and examined, identifying problems and issues for pedestrians, especially those faced by seniors. Typical issues included insufficient crossing time, low visibility, poor sidewalk condition, absence of pedestrian ramps, and faded markings and signage. Detailed safety records were used to identify site-specific issues. Plans for specific improvements were developed. Safety improvements have been implemented at three of the five pilot areas. Consultant services have been obtained to study the twenty remaining areas.





BRIGHTON BEACH SENIOR PEDESTRIAN FOCUS AREA

Implemented Improvements - June 2008

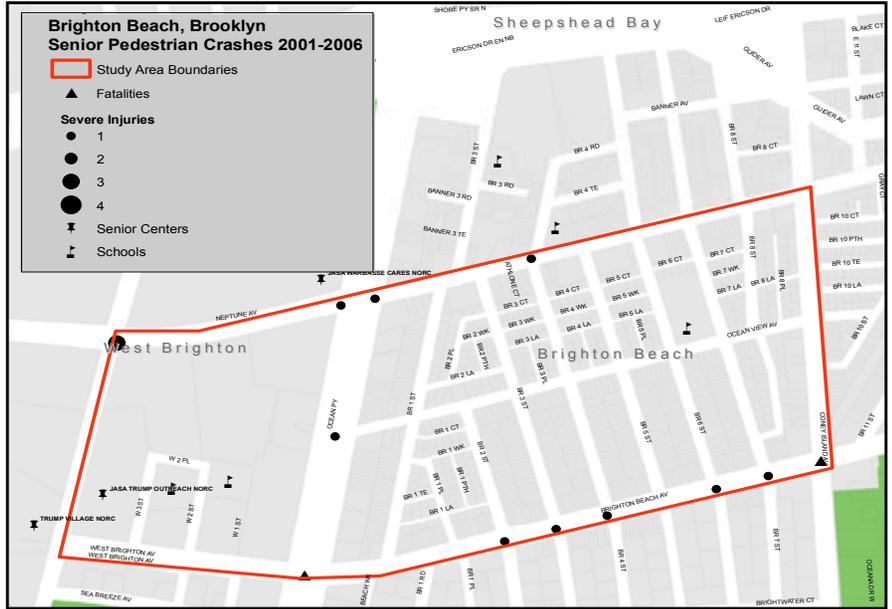
- Implemented longer pedestrian clearance phases based on 3 ft/sec walking speed at 19 intersections.
- Increased pedestrian crossing time at intersections where feasible
- Installed advance stop bars at all intersections
- Installed high-visibility crosswalks where appropriate
- Installed or replaced 27 signs

Brighton Beach Avenue & Coney Island Avenue

- Installed pedestrian refuge islands at south, east, and north crosswalks
- Converted signal phasing from Barnes Dance to conventional phasing
- Modified signal timing to increase pedestrian crossing time and reduce pedestrian wait time
- Added 12-second LPs at beginning and end of each crossing phase (leading and lagging pedestrian intervals)

Brighton Beach Avenue from Ocean Parkway to Brighton 7th Street

- Installed “No U-Turn” and “Yield-to-Pedestrian” signage
- Installed two truck loading zones.



Neptune Avenue at West 5th Street

- Marked channelization to narrow westbound roadway from Ocean Parkway to West 5th Street
- Converted signal phasing from Barnes Dance to conventional phasing
- Modified signal timing to increase pedestrian crossing time and reduce pedestrian wait time
- Added 12-second LPIs at beginning and end of each crossing phase (leading and lagging pedestrian intervals)

Ocean Parkway from Belt Parkway to Sea Breeze Avenue

- Narrowed southbound roadway from three lanes to two lanes

Ocean Parkway at Neptune Avenue

- Installed pedestrian refuge islands in north and south crosswalks
- Upgraded existing sidewalks at intersection
- Banned northbound right turn
- Removed lane on westbound Neptune Avenue west of intersection

Ocean Parkway at Oceanview Avenue

- Installed pedestrian refuge islands in north and south crosswalks



New pedestrian refuge island in north crosswalk of Coney Island Ave and Brighton Beach Ave under the elevated subway



New pedestrian refuge island in east crosswalk of Coney Island Ave and Brighton Beach Ave



New pedestrian refuge island in south crosswalk of Coney Island Ave and Brighton Beach Ave



New pedestrian refuge islands were built in the north and south crosswalks at Ocean Parkway and Oceanview Avenue. Ocean Parkway was narrowed with a painted median to calm traffic from the Belt Parkway to Brighton Avenue.



Neptune Avenue between Ocean Parkway and West 5th Street was narrowed to calm traffic and shorten the crossing distance for pedestrians at the intersections. A bike lane is provided on the north side of the street.



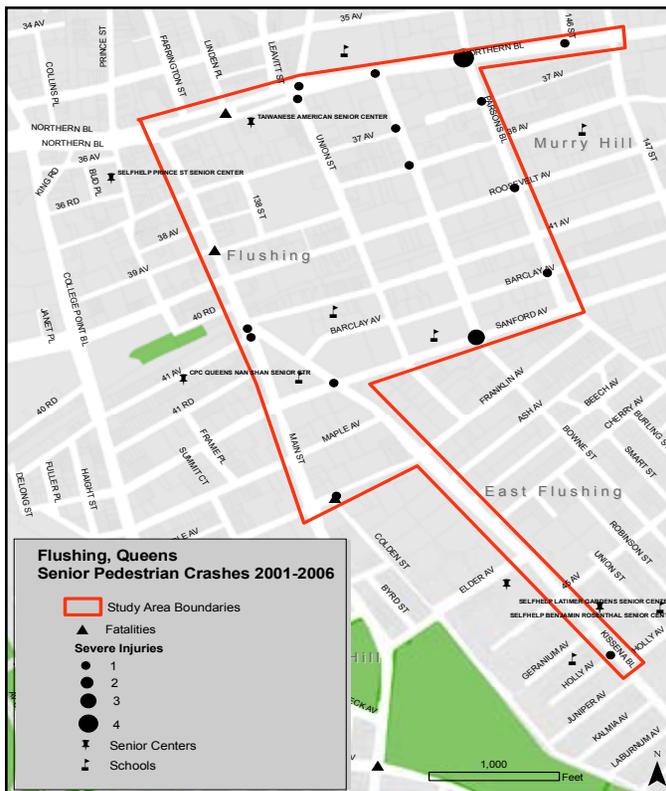
Newly constructed sidewalk and pedestrian ramps with safety surface to minimize tripping hazards such as cracked or broken sidewalks or roadbeds



Pedestrian refuge islands were built in the north and south crosswalks of the Ocean Parkway and Neptune Avenue to provide a safe space for pedestrians who might not be able to make it all the way across these long roadways.



FLUSHING SENIOR PEDESTRIAN FOCUS AREA



Implemented Improvements - July 2008

- Implemented longer pedestrian clearance phases based on 3 ft/second walking speed at 45 intersections
- Increased pedestrian crossing time at intersections where feasible
- Installed advance stop bars at all intersections
- Installed high-visibility crosswalks where appropriate
- Installed or replaced 25 signs

Parsons Boulevard from Northern Boulevard to Sanford Avenue

- Installed high-visibility crosswalks at 4 intersections
- Reconstructed neckdown at northeast corner of Sanford Avenue

Northern Boulevard at Linden Place

- Installed new pedestrian signal and crosswalk across eastbound Northern Boulevard

Northern Boulevard at Bowne Street

- **Constructed pedestrian refuge in west crosswalk by extending existing median tip**

Northern Boulevard & Parsons Boulevard

- **Implemented Leading Pedestrian Interval (LPI) for Northern Boulevard**
- **Daylighted southeast corner**

Main Street / Kissena Boulevard / 41st Avenue

- **Installed pedestrian refuge island on Kissena Boulevard east of Main Street**
- **Realigned cut-through from southbound Main Street to southbound Kissena Boulevard**
- **Extended median and pedestrian fencing at 41st Avenue**
- **Banned right turn from northbound Kissena Blvd to 41st Avenue**
- **Banned right turn from Main Street to 41st Avenue**

Kissena Boulevard & Elder Avenue

- **Constructed neckdown on northwest corner**

Bowne Street from Sanford Avenue to Northern Boulevard

- **Installed painted median to narrow roadway**
- **Installed high-visibility crosswalks**
- **Constructed pedestrian refuge islands at Northern Boulevard, 37th Avenue and 38th Avenue**
- **Created left turn bays at 37th, 38th, 39th, Roosevelt and Sanford Avenues**

Colden Street from Elder Avenue to Franklin Avenue

- **Installed painted median to narrow roadway**



Colden Street was narrowed to calm traffic between Cherry Avenue and Franklin Avenue.



A new signal was installed on eastbound Northern Boulevard at Linden Place. There is now a safe, signalized crosswalk for pedestrian wishing to cross Northern Boulevard at this intersection.



The concrete island on Northern Boulevard at Bowne Street was extended to provide a 'tip' to protect pedestrians using this crosswalk.



A new neckdown was constructed on the northeast corner of Parsons Boulevard and Sanford Avenue. The new sidewalk extension helps to align the intersection, shortens the crossing distance for pedestrians and slows vehicles turning at the corner.



Bowne Street was narrowed to calm traffic with a painted median, left turn bays and pedestrian refuge islands from Northern Blvd. to Sanford Avenue.

LOWER EAST SIDE SENIOR PEDESTRIAN FOCUS AREA

Implemented Improvements - October 2008

- Implemented longer pedestrian clearance phases based on 3 ft/sec walking speed at 43 intersections
- Increased pedestrian crossing time at intersections where feasible
- Installed high-visibility crosswalks where appropriate
- Installed advance stop bars at all intersections

Bowery & Delancey Street/Kenmare Street

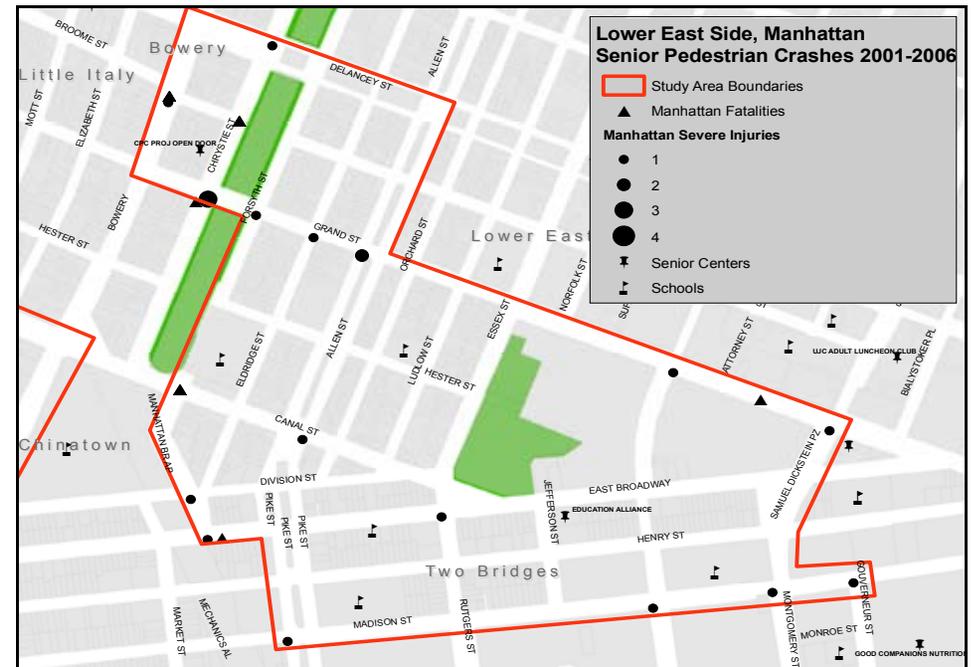
- Constructed pedestrian refuge island in south crosswalk
- Banned northbound and eastbound left turns
- Added left-turn phase for westbound Delancey Street

Bowery at Broome Street

- Banned westbound left turn

Bowery at Grand Street

- Banned turns from eastbound Grand Street



Chrystie Street (Canal Street to Houston Street)

- Installed northbound and southbound bicycle lanes
- Removed parking lane on east curb
- Reduced number of moving lanes along this stretch where feasible

Chrystie Street & Broome Street

- Installed pedestrian refuge island in north crosswalk
- Converted signal timing to provide a conflict-free pedestrian crossing of north and west crosswalks
- Eliminated south crosswalk and installed pedestrian fencing

Chrystie Street & Delancey Street

- Installed pedestrian refuge islands in north and south crosswalks

Forsyth Street (Hester Street to Houston Street)

- Converted from two-way to one-way northbound from Grand Street to Delancey Street
- Provided painted sidewalk for pedestrians along west curb
- Installed floating parallel parking lane
- Replaced angle parking with parallel parking on east curb

Rutgers Street (Madison and Cherry Streets)

- Installed pedestrian refuge islands at intersections
- Marked a painted median with slip ramp for right turn access
- Removed angled parking and installed parallel parking along median
- Aligned intersection at Madison Street

Canal Street/Division Street & Ludlow Street

- Closed Division Street between Ludlow Street and Canal Street to vehicles
- Installed crosswalk across Division Street



New pedestrian space on Ludlow Street



New pedestrian fencing on the east side of Chrystie Street at Broome Street



New pedestrian fencing on the west side of Chrystie Street at Broome Street



Forsyth Street pedestrian space with floating parking lane, buffer and one-way northbound operation



BEFORE: Rutgers Street from Cherry Street facing north



AFTER: Rutgers Street from Cherry Street facing north with new pedestrian island and street configuration



AFTER: Rutgers Street from Madison Street facing south with new pedestrian island and street configuration

SAFE ROUTES TO SCHOOL



Map of 1st 32 Priority Schools - Capital Construction Locations

Description

The Safe Routes to School's "Priority Schools Program" is an ongoing effort by NYCDOT to improve student pedestrian safety around schools that have the most serious crash histories by making operational and capital safety improvements to the streets. Each of DOT's Priority Schools receives an individualized planning study which determines both short-term and long-term capital measures to improve safety.

Starting in 2004, DOT analyzed citywide crash data and school data in order to identify its first 135 Priority Schools (Group I). As of December 2007, 100% of the short-term operational safety improvements at the 135 Priority Schools were completed. This work included new traffic and pedestrian signals, the addition of exclusive pedestrian crossing time, speed reducers, speed boards, high visibility crosswalks and new parking regulations. Capital construction of the long-term safety measures has begun and will continue in future years.



New school crosswalks and signage make crossing the street near schools even safer

As of September 2008, DDC construction of the long-term capital safety measures was nearly complete at eight Priority Schools:

- I.S. 131 in Manhattan
- St. Simon Stock in the Bronx
- P.S. 9 in the Bronx
- P.S. 124 in Manhattan
- P.S. 72 in Manhattan
- I.S. 131 in the Bronx
- P.S. 92 in Brooklyn

The next locations to be constructed will be:

- P.S. 314 Brooklyn
- I.S. 51 Staten Island
- P.S. 217 Brooklyn
- P.S. 252 Brooklyn
- I.S. 192 Queens

2008 Selection of New Priority Schools

As of July 2008, DOT has re-analyzed the latest available citywide crash data and school data in order to identify a new group (Group II) of 135 Priority Schools. Each Priority School will receive an individualized planning study to determine both short-term operational and long-term capital recommended measures to improve safety for students walking to school. In August 2008, an RFP was issued to enable DOT to select a consultant to conduct the new studies. The types of safety measures that will result from each study include new traffic medians, neckdowns, wider sidewalks, and other traffic calming measures such as speed bumps, new traffic signals and improved signs and crosswalks around 135 schools.