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Improving Traffic Safety

The Department has actively accelerated its efforts to improve pedestrian and traffic safety by instituting a proactive and systematic approach to the identification of locations throughout the city that have repeatedly been the site of traffic or pedestrian-related accidents.

Beginning in the late 1980's, these efforts have significantly reduced the number of traffic-related accidents and fatalities throughout the city. Since 1990, the number of total accidents and fatalities have continued on a downward trend. As illustrated in Table 1, the total number of accidents has decreased significantly by 27.9% since 1990. Fatalities have decreased even more dramatically by 48.8% since 1990 and despite a slight increase in 1999, they are now at historic lows.

**TABLE 1
TOTAL ACCIDENTS AND FATALITIES 1990-2003**

Year	Total Accidents	Total Fatalities
1990	307,492	701
1991	276,468	626
1992	272,230	592
1993	266,193	536
1994	266,244	488
1995	230,835	485
1996	219,110	426
1997	214,421	493
1998	211,735	368
1999	215,179	420
2000	231,182	380
2001	221,983	392
2002	N/A	386
2003	N/A	359
% Change	-27.9 (1990 vs. 2001)	-48.8% (1990 vs. 2003)

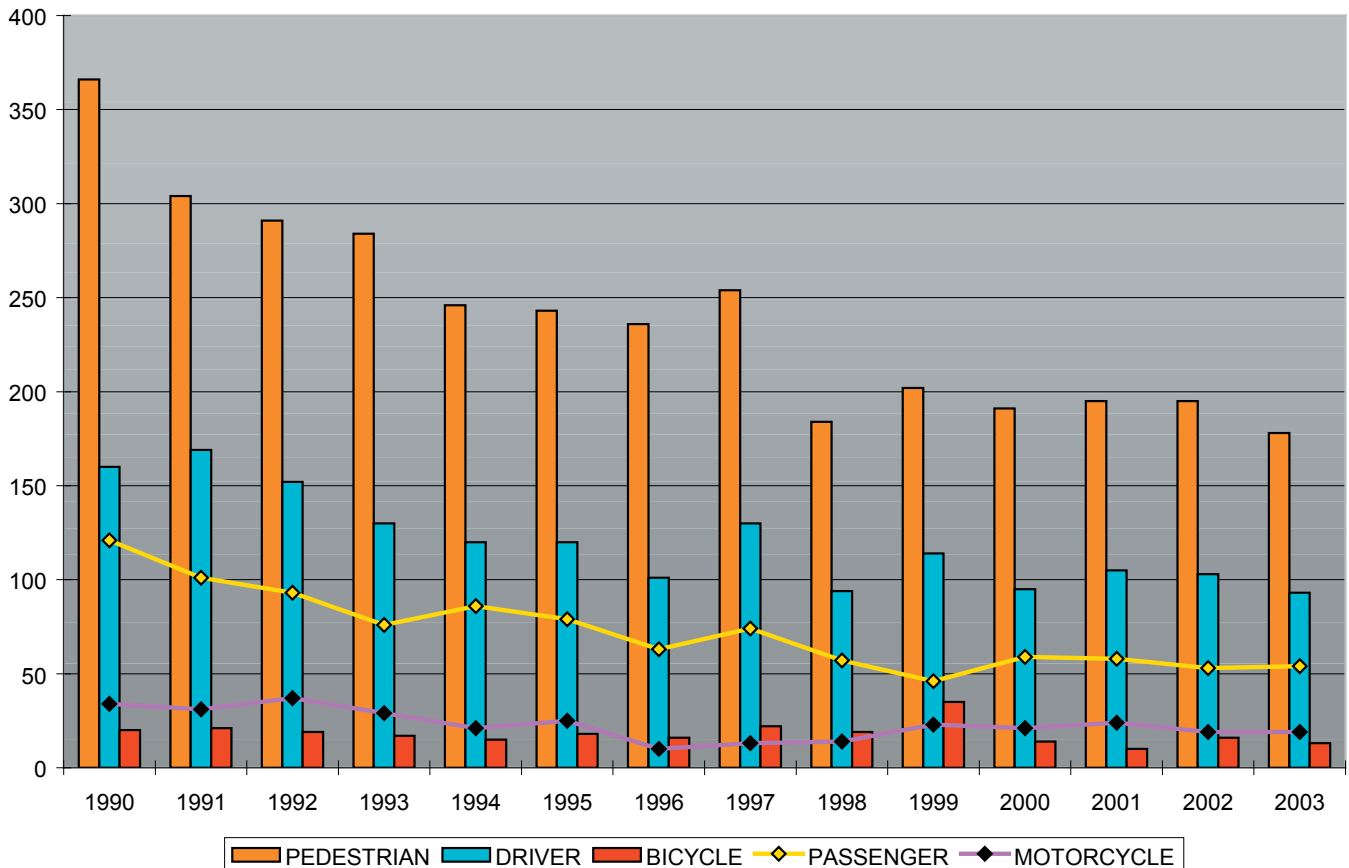
Data Source: *NYS DOT*

This downward trend in overall fatalities is further expanded in Table 2 and Chart 1 where fatalities by mode are detailed for the past 14 years. Over this period, all modes have followed a steady decline in the number of fatalities.

**TABLE 2
NEW YORK CITY FATALITIES # BY MODE 1990-2003**

YEAR	PEDESTRIAN	BICYCLE	DRIVER	PASSENGER	MOTORCYCLE	TOTAL
1990	366	20	160	121	34	701
1991	304	21	169	101	31	626
1992	291	19	152	93	37	592
1993	284	17	130	76	29	536
1994	246	15	120	86	21	488
1995	243	18	120	79	25	485
1996	236	16	101	63	10	426
1997	254	22	130	74	13	493
1998	184	19	94	57	14	368
1999	202	35	114	46	23	420
2000	191	14	95	59	21	380
2001	195	10	105	58	24	392
2002	195	16	103	53	19	386
2003	179	13	93	55	19	359
TOTAL	3370	255	1686	1021	320	6652

**CHART 1
TOTAL FATALITIES BY MODE 1990-2003**



Over this time period, fatalities as a percentage by mode has remained fairly consistent from year to year. However, even with the dramatic decrease in pedestrian fatalities, they continue to be the single largest at risk group as pedestrians are involved in approximately one-half of all fatal accidents. Table 3 illustrates these trends over the past 14 years.

**TABLE 3
NEW YORK CITY FATALITIES % BY MODE 1990-2003**

YEAR	PEDESTRIAN % of Total	BICYCLE % of Total	DRIVER % of Total	PASSENGER % of Total	MOTORCYCLE % of Total
1990	52.2%	2.9%	22.8%	17.3%	4.9%
1991	48.5%	3.4%	27.0%	16.1%	5.0%
1992	49.2%	3.2%	25.7%	15.7%	6.3%
1993	53.0%	3.2%	24.3%	14.2%	5.4%
1994	50.4%	3.1%	24.6%	17.6%	4.3%
1995	50.1%	3.7%	24.7%	16.3%	5.2%
1996	55.4%	3.8%	23.7%	14.8%	2.3%
1997	51.5%	4.5%	26.4%	15.0%	2.6%
1998	50.0%	5.2%	25.5%	15.5%	3.8%
1999	48.1%	8.3%	27.1%	11.0%	5.5%
2000	50.3%	3.7%	25.0%	15.5%	5.5%
2001	49.7%	2.6%	26.8%	14.8%	6.1%
2002	50.5%	4.1%	26.7%	13.7%	4.9%
2003	49.6%	3.6%	26.2%	15.3%	5.3%
% of Total 1990 - 2003	50.7%	3.8%	25.4%	15.3%	4.8%

High Accident Locations

Throughout New York City, there are several locations and/or intersections which consistently experience a high number of accident occurrences. While each of these locations is unique in its characteristics and layout, these locations are generally more accident prone due to one of three factors: 1) Physical environment (e.g., grade, road alignment, visibility, roadway conditions, lighting, wet pavement); 2) Human factors (e.g., driving under the influence, misjudgment, speeding, aggressive or inexperienced driving, illness, unlicensed driver); 3) Equipment (e.g., faulty vehicles, over or under loaded larger vehicles, defect.). Crashes usually involve a number of these factors.

Each year, the city ranks the top accident locations based upon available New York State Department of Transportation (NYSDOT) information. The Department uses the NYSDOT Accident Database for the rankings of accident locations as this database is the most complete and accurate source of processed accident information and 2001 represents the last year for which information is available for the entire year.

The citywide rankings for the Top 20 locations in 2001 is found in Table 4 (on the following page), as well as each intersection's ranking for the previous five years.



**TABLE 4
RANKING OF TOP 20 ACCIDENT LOCATION
1996-2001**

INTERSECTION	BOROUGH	2001	2000	1999	1998	1997	1996
Flatbush Avenue Extension / Tillary Street	Brooklyn	1	4	2	3	6	3
Hoyt Avenue North / 31 st Street	Queens	2	6	6	8	7	25
Linden Boulevard / Kings Highway / Remsen Avenue	Brooklyn	3	2	5	4	5	3
Flatbush Avenue / Eastern Parkway (Grand Army Plaza Circle)	Brooklyn	4	1	1	1	2	2
Bruckner Boulevard / E. 138 th Street	Bronx	5	11	13	24	8	9
Queens Boulevard / 59 th Avenue / Woodhaven Boulevard	Queens	6	8	4	5	3	4
Bowery / Canal Street	Manhattan	7	3	7	7	4	6
College Point Boulevard / Long Island Expressway (I-495) Service Road	Queens	8	10	20*	6	14*	18*
Linden Boulevard / Pennsylvania Avenue	Brooklyn	9	9	8	12	18	16
Allen Street / Delancey Street	Manhattan	10	13	10	9	35*	20*
Queens Boulevard / Van Dam Street / Thomson Avenue	Queens	11	7	3	2	1	1
2 nd Avenue / E. 59 th Street	Manhattan	12	5	9	11	12	11*
Bowery / Houston Street	Manhattan	13	33	18	13	13	11*
Atlantic Avenue / Pennsylvania Avenue	Brooklyn	13	24	24	22	42*	61*
Utica Avenue / Eastern Parkway	Brooklyn	15	21	12	18	27*	7
Atlantic Avenue / Eastern Parkway Extension	Brooklyn	16	24*	15*	41*	22	26*
Bruckner Boulevard / Hunts Point Avenue	Bronx	16	41*	31*	31	33	20*
3 rd Avenue / E. 57 th Street	Manhattan	18	23	58*	15*	39*	20*
3 rd Avenue / E. 59 th Street	Manhattan	19	104*	15*	19*	59	14
Tillary Street / Adams Street	Brooklyn	20	28*	18*	9	13	13

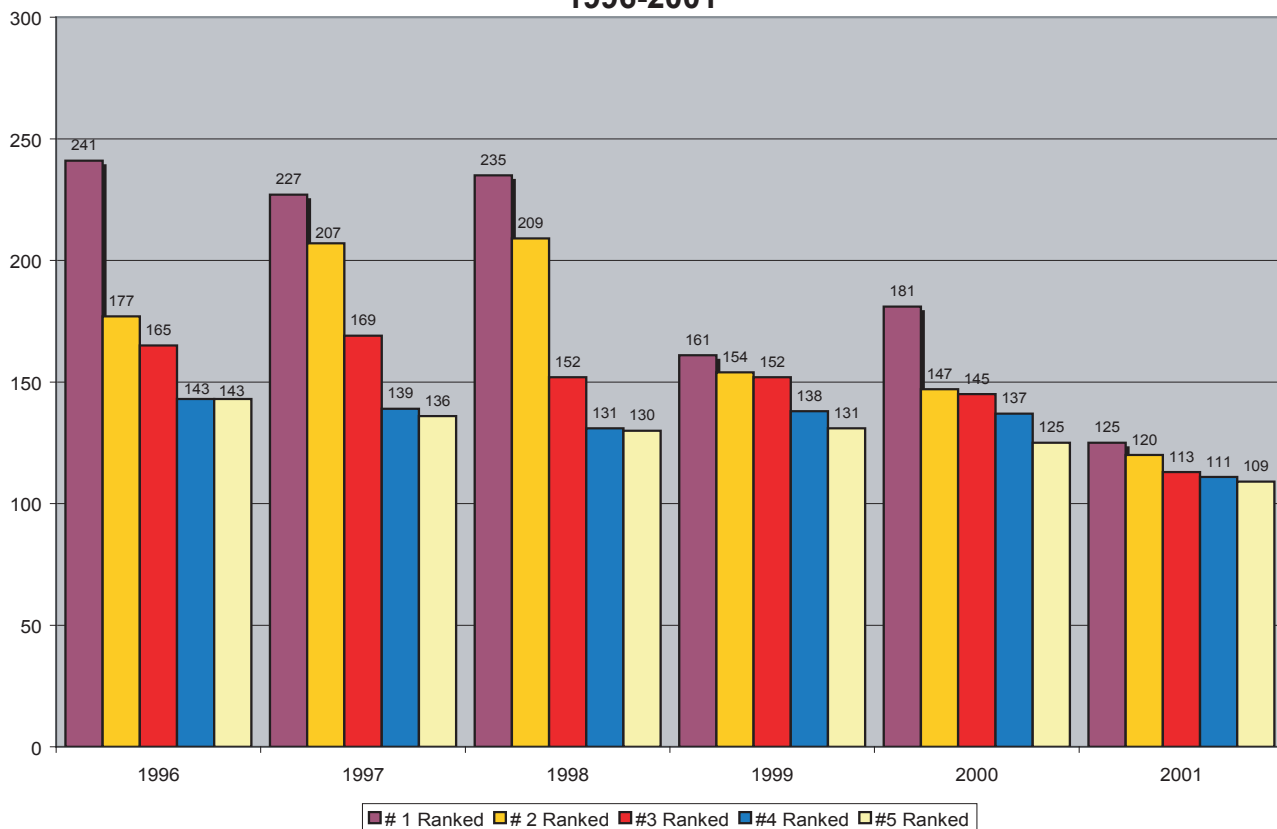
* indicates tie in ranking



The intersections that are among the high accident locations and their respective rankings have remained fairly consistent between 1996 and 2001. Most of the locations that are consistently ranked in the top 10 are locations that experience high traffic volumes and are focal points for vehicular trips, such as Flatbush Avenue and Tillary Street, where numerous vehicles are traveling to and from the Manhattan Bridge while converging with local traffic. While many locations remain on the top 20 listing from year to year, it is important to note that these rankings are not illustrative of the overall improvement in pedestrian and vehicular safety taking place at these locations or citywide. Annually, most, if not all of the locations on the top 20 list have progressively experienced a decline in the total number of accidents. This trend is similar to the overall decline in accidents and fatalities occurring citywide.

This downward trend is magnified when looking at the annual accident experience at each of the top five ranked locations since 1996. As indicated in Chart 2 below, accidents at each of the top five locations each year have been progressively declining. An even more striking trend is the dramatic decline at the highest ranked location each year. The top ranked location,

**CHART 2
COMPARATIVE ACCIDENT HISTORY OF TOP 5 CITYWIDE ACCIDENT LOCATIONS
1996-2001**



which has varied between Queens Boulevard/Van Dam Street/Thomson Avenue (1996,1997), Flatbush Avenue/Eastern Parkway/Grand Army Plaza Circle (1998,1999,2000) and Flatbush Avenue Extension/Tillary Street (2001) has exhibited a decline of nearly one-half since 1996 (to 125 at Flatbush Avenue Extension/ Tillary Street in 2001 from 241 at Queens Bouelvard/Van Dam Street/Thomson Avenue in 1996).

This annual decline can be better illustrated by the accident experience at the top ranked location citywide in 2001, the Flatbush Avenue Extension at Tillary Street. In 2001, this location experienced 125 accidents, which represented the lowest number of accidents at this location over the past five years. This number one ranking in 2001, would have been comparatively tied for sixth in 2000, sixth in 1999 and 1998 and seventh in 1997 and 1996. There are numerous other locations similar to this intersection where, although the location continues to rank high on the overall citywide list, the total number of annual accidents continues to be lower than in any of the preceding years.

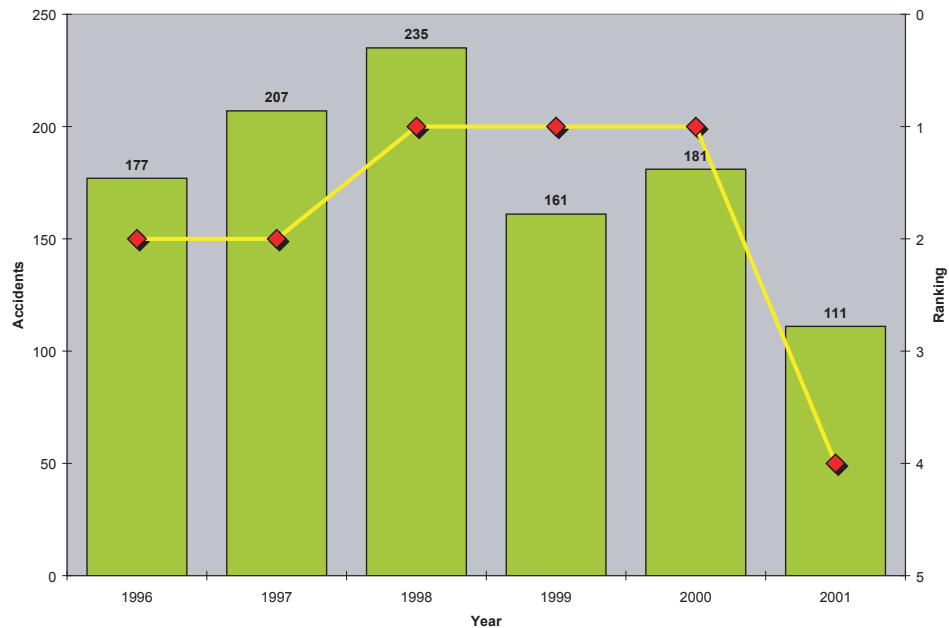
In addition, the range between the top twenty locations from year to year has also been shrinking. In 1996, the highest ranked location, the intersection of Queens Boulevard, Thomson Avenue and Van Dam Street, experienced 241 accidents, while the twentieth ranked location, Bruckner Boulevard and Hunts Point Avenue experienced 89 accidents. This accounts for a range of 152. Since then, the range between the top location and the twentieth has progressively gotten smaller. By 2001, the range between the top ranked (Flatbush Ave Extension and Tillary Street with 125 accidents) and twentieth ranked (Tillary Street and Adams Street with 73 accidents) location was only 52. Given the smaller range, and the significantly lower accident numbers, even if a location is ranked high in 2001, the annual accident experience at these locations is frequently lower than those in any of the preceding years. Cumulatively, these account for a significant reduction in total accidents at these locations.

While there are numerous locations throughout the city that are indicative of these trends, there are some more notable locations that have experienced a dramatic decline in their accident experience that can be directly related to the implementation of safety improvements and the declining overall trends. One of the more notable locations is the Grand Army Plaza Circle in Brooklyn.

At the Grand Army Plaza Circle, the Department has implemented an

ambitious program to improve vehicular safety. Implemented measures included new signage throughout the intersection and its approaches, signal modifications, improved street lighting, and new roadway markings. Historically, this location has held either one of the top two spots in accident occurrences (See Table 4 for accident history). Beginning with measures implemented in 1999, there has been a remarkable improvement in conditions at this intersection with accidents decreasing

Grand Army Plaza
Accident Experience and Citywide Ranking 1996-2001



sharply by 31.4 % (to 161 from 235) in 1999. Although accidents increased slightly to 181 in 2000, this was still below 1998 levels. In 2001, when many of the improvements were completed, total accidents decreased significantly by 52% (to 111 from 235 in 1998). Comparatively, with 111 accidents and a ranking of fourth, this location would not have ranked any worse than eighth in any of the preceding five years. Therefore, we believe this location is indicative of the overall trend in declining accidents in New York City as well as the impacts of the Department’s safety improvements.

Another location that has shown considerable improvement in safety over the past few years is the Grand Concourse corridor. Beginning with improvements implemented in 1992, the Grand Concourse represented the first corridor wide safety initiative the Department undertook to improve both pedestrian and vehicular safety along an entire corridor. This approach and several of the treatments that were implemented served as a model for other corridors in the city, most notably Queens Boulevard.

Beginning in 1993 and coinciding with our improvements made on the Concourse, annual fatalities (both vehicular and pedestrian) began to drop significantly. In 1993, total fatalities decreased 60% (to 6 from 15 in 1992) and pedestrian fatalities decreased 50% (to 5 from 10 in 1992). This downward

trend in fatalities has continued each year. In 2003, there was only one pedestrian fatality on the corridor. In comparing total fatalities for ten years prior to 1993 and ten years after, there is a dramatic decrease in fatalities which can be attributed to the improvements implemented. Between 1983 and 1992, there was a total of 120 fatalities (101 of which were pedestrian). Between 1993 and 2002, there was a total of 32 fatalities (28 of which were pedestrian).

Some of the initial treatments that were implemented during this phase included the installation of nearly 3,800 linear feet of pedestrian fencing in high pedestrian volume locations to discourage midblock crossing, the modification of traffic signal timing (to a 120 from a 90 second cycle length) to provide increased time for pedestrians to cross the Concourse, the installation of pedestrian signals at 25 intersections, the installation of red



Example of innovative treatments used as part of the Pedestrian Safety Demonstration Project

light cameras and the simplification of advance and exit directional signage for motorists traversing between service roadways and main roadways.

Over the next decade, the Department continually monitored and implemented improvements to enhance these earlier efforts. These treatments included numerous improvements to signage, markings and signals along the entire Concourse. Initiatives such as oversized street name signs, improved lane assignment treatments for turning movements, and additional signal improvements provided for a safer

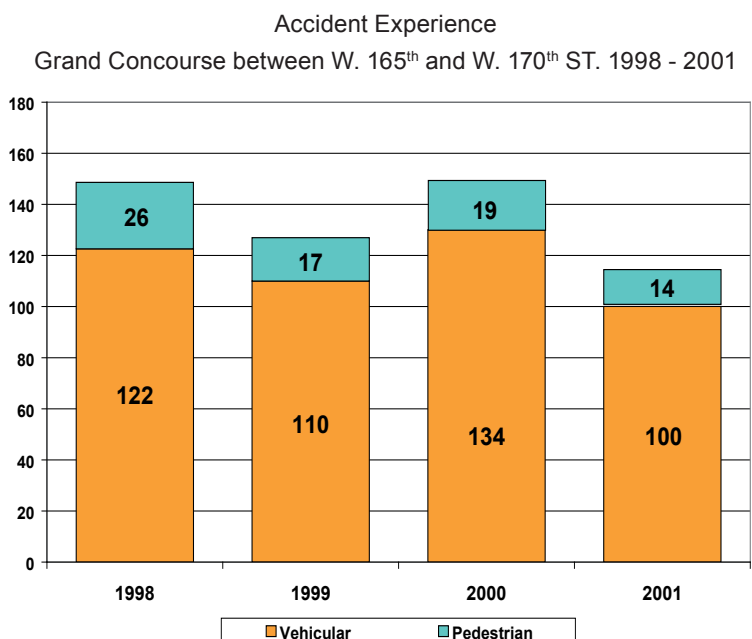
pedestrian and vehicular environment.

In 1998, the Department focused its efforts on improving pedestrian safety at specific locations along the Grand Concourse. This included a targeted Pedestrian Safety Demonstration Project between East 165th and 170th Streets, and at two high accident locations, East 170th Street and at East 183rd Street.

At both East 170th Street and East 183rd Streets, the Department implemented treatments to improve pedestrian safety. These treatments included high visibility crosswalks at all legs, larger red signal lenses and the installation of additional pedestrian signage. At East 170th Street, dual left turn signal phases were installed and at East 183rd Street, we increased the all red interval to ensure that left turning vehicles cleared the intersection. These improvements dramatically reduced the incidence of pedestrian accidents. At East 170th Street, pedestrian accidents decreased significantly by 63% (to 3 in 2001 from 8 in 1999). At East 183rd Street, pedestrian accidents also decreased significantly by 50% (to 3 in 2001 from 6 in 1999).

The Pedestrian Safety Demonstration Project between East 165th and East 170th Street was a more ambitious endeavor. This project narrowed the service roads in each direction to one moving lane by widening the medians from 10 to 18 feet through the use planters and the installation of a bicycle lane. Additional motorist advisory signage and roadway markings were also installed.

At this location, pedestrian accidents decreased by 46% (to 14 in 2001 from 26 in 1998). Due to its success, this project will be made permanent.



Identifying Locations for Improvement

As indicated above, many of the high accident locations throughout the city have benefited from the implementation of engineering improvements. Our most recent efforts have focused on both corridors and specific locations where the most recent three-year data suggests accidents continue to occur at an excessive rate. This may not always mean the location experiences an excessive amount of accidents. In these cases, the Department takes a proactive approach in

identifying problematic areas or developing trends and seeks to mitigate these factors and improve these locations before accidents worsen. Locations may also be identified by other governmental organizations, the New York City Police Department, elected officials, and the general public.

At each location selected for study, an extensive historical accident review is conducted to ascertain whether any particular type of accident was being repeated or if any other patterns existed. In addition, our work includes on-site surveys of each location to identify problems allowing immediate mitigation and those that will require longer and more involved scrutiny. Work that can be implemented in the near term might include the replacement of missing, defaced, or outdated signage or the installation of new signage, street lighting upgrades that require minimal repair work or bulb replacement, improving signal timing, phasing or displays, and identifying street markings that can be refurbished. Work that requires longer-term efforts usually involves roadway reconfiguration or capital work.

This report describes, in detail, the work undertaken in specific corridors and at locations that have been identified under this criteria and where improvements have been implemented. In many cases, improvements have been implemented over the course of several years, and the Department continues to monitor and improve these locations accordingly.



***THE
BRONX***

Grand Concourse

Background

The Department has performed considerable work in the last decade to improve vehicular and pedestrian safety on the Grand Concourse. In 1992, the Department initiated a safety study on a four-mile stretch of the Grand Concourse between East 161st Street and the Mosholu Parkway. This location was selected as the site for a Pedestrian Safety Engineering Demonstration Project because, at that time, it was identified as the signalized arterial with the most pedestrian fatalities citywide. This study included comprehensive traffic analyses and the implementation of safety improvements throughout the study area.

- Modification of traffic signal timing to increase time for pedestrians to cross the Grand Concourse, installation of pedestrian signals at 25 intersections, installation of dual left turn phasing at the East 167th Street and Mt. Eden Avenue intersections, installation of a red light camera at East 167th Street, installation of larger red signal displays, and an increase of the cycle lengths from 90 to 120 seconds to further improve pedestrian crossing during the midday period, at night, and on weekends.
- Installation of 3,750 linear feet (nearly $\frac{3}{4}$ -mile) of pedestrian barriers in high pedestrian volume locations to prevent midblock crossing.
- Simplification of advance and exit directional signs.
- Installation of thermoplastic pavement markings including the refurbishment of lane lines and all crosswalks, and new directional arrows, stop bars and peg-a-tracking that guides motorists making left turns, edge lines adjacent to raised medians.

These improvements (implemented in 1993) resulted in impressive accident reductions. A comparison of statistics for the three years before (1990-1992) and the three years after (1994-1996) the implementation of these measures showed a significant reduction in overall accidents (-27%) and a dramatic decrease in fatalities (-67%).

Additional Improvements

Additional improvements were implemented to enhance these earlier efforts. These are described below:

- Existing regulatory signs (e.g., Yield, One-Way Arrows, Stop, and turn restrictions) were refurbished and upgraded in September 1999 to meet current standards. In addition, 75 school crossing signs were refurbished as part of the citywide contract in March 2000.
- All crosswalks and Stop bar pavement markings were surveyed and refurbished in August 1999.
- All school crosswalk and School Crossing pavement messages were installed in October 2000 as part of the citywide contract.
- 140 feet of damaged pedestrian barriers were repaired in August 1999.
- Dual left turn signal phases were installed at the East 165th and East 170th Street intersections in September 1999.
- Additional pedestrian signals were installed on the center median at the East 183rd Street intersection in March 2000. These were upgraded to international pedestrian signals in October 2000.
- A study was conducted to determine the need for a left turn phase at the East Tremont Avenue intersection. Left-turn phases for both directions of the Concourse were approved and were installed in April 2001.
- A left turn signal phase for the southbound Grand Concourse at East 188th Street was installed in June 2000.
- A signing plan was completed to upgrade and site signs directing motorists to cross streets. Borough Engineering installed the signs in August 1999.
- Removed Trucks with Overweight Permit and Truck Restriction Ahead signs at seven locations along the Grand Concourse (southbound at East 196th Street, southbound at East 183rd Street, northbound at Mt. Eden Avenue, southbound at Morris Avenue, southbound at East 161st Street, southbound at East Kingsbridge Road, and northbound at East 170th Street).
- All crosswalks and Stop bar pavement markings were surveyed and refurbished in May 2002.
- All vehicle and pedestrian signals on the Grand Concourse between East 138th Street and East Tremont Avenue were upgraded to LED and international displays in March 2003.
- Left turn signals were installed in both directions of the Grand Concourse at

both East Tremont and East Burnside Avenues in September 2003.

- ***Older “Yield to Pedestrian” signage was upgraded to the newer “Attention, Drivers Yield to Pedestrian” signs in July 2004.***
- ***“Left Turn on Left Green Arrow” or Left Turn Signal signage was installed at intersections with left turn signals in July 2004.***
- ***All signage designating individual lanes for various traffic movements were installed at the following intersections in July 2004:***

- ***East 170th Street***
- ***East Tremont Avenue***
- ***East 161st Street***
- ***East 183rd Street***
- ***East Kingsbridge Road***
- ***Bedford Park***
- ***East 196th Street***
- ***East Mt. Eden Avenue***
- ***East Burnside Avenue***
- ***East 165th Street***
- ***East 192nd Street***
- ***East 181st Street***
- ***East 184th Street***
- ***East 198th Street***
- ***East 204th Street***
- ***Van Cortlandt Avenue East***

Pedestrian Separator Improvements

As part of the continuing efforts to improve pedestrian and vehicular safety, the Department repaired and replaced several pedestrian separators along the Grand Concourse in January 2003. In total, 275 linear feet of new fencing was replaced. The locations of these improvements include:

- East median north of East 183rd Street
- West median north of East 183rd Street

- West median in front of 1675, 2017, 2403, 2295 and 2039 Grand Concourse
- West median south of East 177th Street
- East median south of Echo Street
- East median north of Mt. Eden Avenue in front of Bronx Lebanon Hospital

Pedestrian Safety Demonstration Project

A targeted pedestrian safety demonstration project was implemented in November 1999 for the 0.7-mile stretch of the Grand Concourse between East 165th and East 170th Streets. The plan narrowed the service roads in each direction to one moving lane by widening the medians from 10 to 18 feet and adding a bicycle lane. The width of the service roads was reduced from 35-37 feet to a continuous 27 feet. Our intention was to further improve vehicular and pedestrian safety by reducing traffic speeds and pedestrian crossing distances, while increasing pedestrian refuge space. The plan, implemented as a pilot, included the following elements:

- **Roadway Markings:** Bicycle lane installation, median widening with striping, lane transitions prior to and at the end of the study area. In addition, existing striping on the service roads were scarified. The markings work was completed in mid-November 1999. The markings were refurbished in April 2002.
- **Sign Manufacture and Installation:** Left Lane Ends, Left Lane Ends 200 Feet, Left Lane Ends 500 Feet, Lane Transition, Bicycle Lane, Bike Lane Ahead and Bike Lane Ends signs were manufactured and installed in November 1999.
- **Planters and parking stops** delineating the widened median were installed in November 1999 (following completion of sign and marking work). This included the following:



Typical roadway planter used on Grand Concourse



Above: Grand Concourse Main Line and Service Road prior to implementation of safety project

Below: Grand Concourse / East 169th Street Service Road after implementation of safety project



- Placement of 24 concrete planters in six sections connected by bolts and plates, with three inches of stone placed in the bottom of each planter.
- Placement of 42 large plastic planters with three inches of stone placed in the bottom of each planter.
- Placement and bolting down of concrete (495 pieces) and plastic (367 pieces) parking stops.
- Fork lifts and flat bed trucks were used to install the planters and parking stops. Landscaping, including soil was provided by the Parks Department's "GreenStreets" Program. DOT provided gravel/millings for drainage.

A monitoring plan (completed in June 2000) was developed to evaluate the impacts of the demonstration project. This

included comparing "before" and "after" implementation levels of service, accident data, vehicle travel time runs and radar speed surveys. Our findings were quite encouraging. Speeds on the service roads are slower and, since significant numbers of vehicles have diverted to the main roadway, speeding on the main roadway has been reduced as well.

Key findings are shown below:

Accidents

Overall, the accident experience along this section of the Grand Concourse has shown a significant improvement in pedestrian and vehicular safety since 1998. In 1998, there were a total of 148 accidents, of which 26

involved pedestrians. In 1999, the year in which the pedestrian safety demonstration project was implemented (November), total accidents declined to 127, of which 17 involved pedestrians. For comparison purposes we are using the full year (1998) for “before” data because the project was not implemented until late 1999. In 2000, although total accidents increased to 153, pedestrian accidents decreased by 27% (to 19 from 26 in 1998). In 2001, total accidents fell 23% (to 114 from 148 in 1998) and pedestrian accidents to fell significantly by 46% (to 14 from 26 in 1998). In 1998, there was one fatality and in June 1999, there were two fatalities, both of which were the result of a single accident. Since 1999, there have been no fatalities along this portion of the Grand Concourse.



Overall, the Department believes the impacts of the treatments implemented at this location have been successful, especially in reducing the number of pedestrian accidents along this stretch of the Grand Concourse. The Department continues to support these treatments and is actively engaged in trying to make these safety improvements permanent.

Midday Speeds (11am–2pm)

- Northbound service road - 85th percentile speed decreased 33% (from 33 to 22 mph); average speed decreased 36% (from 28 to 18 mph).
- Southbound service road - 85th percentile speed decreased 12% (from 33 to 29 mph); average speed decreased 11% (from 28 to 25 mph).
- Northbound main road - 85th percentile speed decreased 10% (from 40 to 36 mph); average speed decreased 9% (from 33 to 30 mph).
- Southbound main road - 85th percentile speed decreased 8% (from 40 mph to 37 mph); average speed was unchanged (33 mph).

Evening Speeds (8–10pm)

- Spot speed surveys conducted on the northbound service road showed that the 85th percentile speed decreased 16% (from 37 to 31 mph).

Traffic Volumes

- Service road volumes decreased 40% (from 928 to 551 vehicles) in the AM peak hour and 29% (from 856 to 609 vehicles) in the PM peak hour.
- Main road volumes increased 19% (from 1293 to 1544 vehicles) in the AM peak hour and 15% (from 1233 to 1419) in the PM peak hour.
- Total volumes on the Concourse decreased 4% (from 2155 to 2062 vehicles).

Level of Service (LOS)

During the peak hour in the peak direction, LOS at East 167th Street declined but remained acceptable, especially given the substantial increase in main roadway volume and reduction in capacity on the service roads. The main roadway changed from LOS B in 1995 to LOS C, and the service roadways changed from LOS B to LOS D.

Bus Speeds

During the midday and PM peak periods, speeds decreased 9% (to 7.3 mph from 8.0 mph)

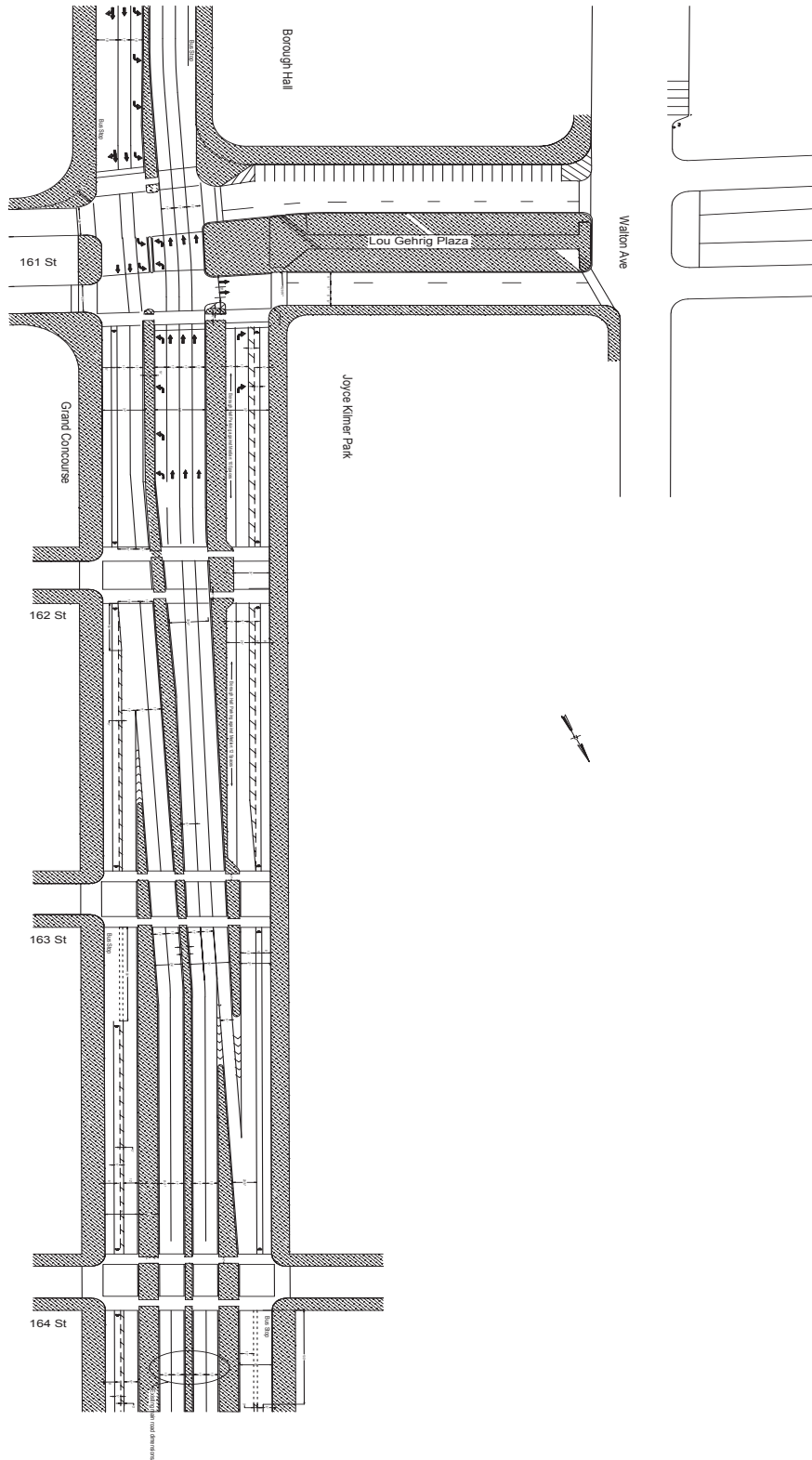
Observations

Traffic on the service roads flowed smoothly, but is occasionally stopped when a vehicle is illegally parked at a bus stop, or when a bus is unable to pull sufficiently into a bus stop.

Recommendations

- The one-lane service road design can be extended throughout the Grand Concourse from East 163rd Street to Mosholu Parkway with the exception of the East Fordham Road area which warrants further study. The width of the service road should be 28 feet (12 feet wide moving lane, five feet wide bicycle lane with a three feet wide channelized buffer separating the bike lane from motor vehicle traffic, and an eight feet wide parking lane). This is one foot wider than the test configuration to enable traffic to pass buses and other vehicles temporarily double parked.
- The section of the Concourse between East 161st Street and the Bronx Museum of the Arts (north of East 165th Street) will be reconstructed as part of the East 161st Street Bridge reconstruction project, beginning in **October 2006**. Additionally as part of the bridge reconstruction project, the Grand Concourse/ East 161st Street intersection, where the service and main roads merge in the center of the intersection resulting in multiple conflict points between vehicles and pedestrians and between vehicles with other vehicles, will be reconfigured. The plan shifts the northbound merge between the service and main roads to a midblock non-pedestrian location, and lengthens the merge for a smoother transition. The southbound merge between the service and main roads will be removed by forcing traffic on the service road to turn right onto westbound East 161st Street.

The proposed realignment is shown on the following page.



NOTE
 1. SEE DRAWING TRB-1 FOR BUFFER AND BUS STOP INSTALLATION DETAILS
 2. GRAND CONCOURSE RECONSTRUCTION CONTRACT ENDS AT E 163 STREET

REVISIONS		
DATE	APPROV	DESCRIPTION
3-27-13	AMT	

CITY OF NEW YORK DEPARTMENT OF TRANSPORTATION
 BUREAU OF TRAFFIC OPERATIONS
 28-11 Queens Plaza North
 L.I.C., N.Y. 11101

LOU GEHRIG PLAZA
 E 161 STREET BRIDGE OVER GRAND CONCOURSE

APPROVED	Drawn by	Checked by	DATE	DRAWING NO.
	Borough	Scale	3/19/13	
	14th	1"=50'		

High Pedestrian Accident Location Improvements

In addition to the work described previously, the Department has made numerous improvements at the following high pedestrian accident locations on the Grand Concourse.

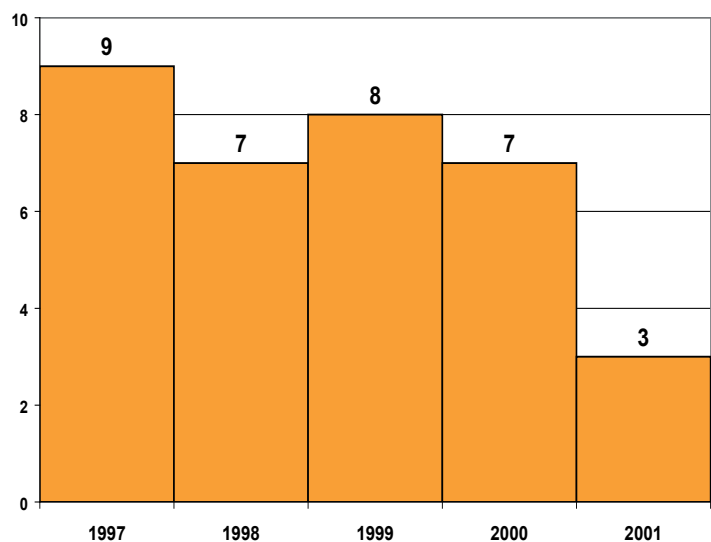
Grand Concourse/East 170th Street

Description

The intersection of East 170th Street and Grand Concourse is very wide signalized intersection (142 feet) on the Grand Concourse main roadway approach, there are two moving lanes and a left-turn lane in each direction and two moving lanes and one parking lane in each direction on the northbound and southbound service roads. There are raised medians between the main and service roads that provide refuge for pedestrians. The east side of East 170th Street has one moving lane in each direction separated by angle parking in the center. The west side of East 107th Street has one lane in each direction separated by the tunnel. The BX1 and BX2 busses run along the Grand Concourse and the BX11 and BX18 run along the East 170th Street. The C and D subway entrances are on the southwest and southeast corners of this intersection.

In terms of the accident experience, in 1997 this location ranked eighth amongst the top 20 pedestrian accident locations with a total of nine accidents involving pedestrians. Most of these accidents were the result of pedestrians crossing against the signal or negligent driving on the part of the vehicle operator. In 1998, pedestrian accidents decreased 22% (to seven from

Pedestrian Accident Experience 1997 - 2001



nine). In 1999 there were eight pedestrian accidents, which is 11% less than 1997. In 2000, pedestrian accidents decreased to seven, which is 22% less than 1997. ***In 2001, pedestrian accidents decreased significantly to three which is 67% less than 1997. The Department believes these treatments have improved safety at this location.***

Concerns

- Northbound articulated buses destined to far side bus stop spill back across intersection
- Pedestrians cross against signals
- Vehicle operators make U-turns on the main roadway
- Pedestrians cross mid-block on Grand Concourse
- Steep upgrade causes visibility problems on eastbound East 170th Street approaching Grand Concourse

Implemented Improvements

- Installed 12" Red Lenses on all signals
- Installed Peg-a-Tracs to guide traffic across wide intersection
- Replaced all missing signs (September 1999)
- Upgraded Yield to Pedestrian signs
- Installed additional No U-turn signs
- Upgraded all crosswalks to high visibility
- Installed pedestrian crossing signals on all medians and upgraded them to international pedestrian signals in October 2000
- Installed dual left turn signal phases (October 1999)
- Installed signs stating Left Turn on Green Arrow Only in coordination with the installation of the left-turn signal
- Installed Wait For Walk signs on all signal posts

Grand Concourse / East 183rd Street

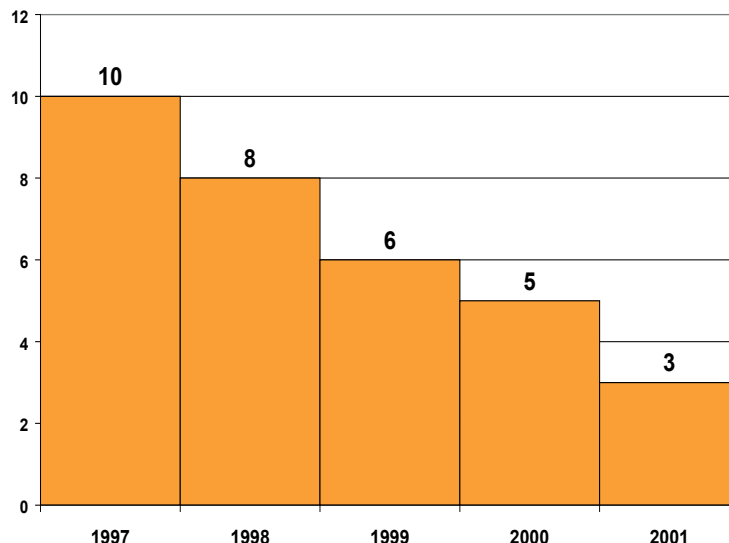
Description

The intersection of East 183rd Street and Grand Concourse is signalized. There are two moving lanes and a left-turn lane in each direction on the Grand Concourse main roadway approach and two moving lanes and one parking lane in each direction on the northbound and southbound service roads. There are two raised medians between the main and service roads that provide refuge for pedestrians. The east side of East 183rd Street has one moving lane in each direction and two parking lanes. The west side of East 183rd Street has one moving lane in each direction and two parking lanes. The BX1 and BX2 buses run along the Grand Concourse. In the northbound direction (just south of the intersection) on the Grand Concourse approaching East 183rd Street, there is a slip ramp from the service road to the main road. PS 115 is located one block east of the Grand Concourse. School 'ladder' crosswalks and school crossing signs are specified on the south and west legs and high visibility crosswalks are on the north and east legs.

One of the primary safety concerns at this location is pedestrians crossing against the signal, as well as the distance involved for pedestrians to cross the Grand Concourse. As such, the improvements implemented in 1999 were aimed at improving pedestrian safety at this location.

In terms of the accident experience at this location, in 1997 this intersection ranked sixth amongst the top 20 pedestrian accident locations for that year with a total of 10 accidents involving pedestrians. In 1998, pedestrian accidents decreased 20% (to eight from ten accidents). In 1999, pedestrian accidents decreased to six from eight accidents, which is 40% less than 1997. **In 2000, the first full year after the**

Pedestrian Accident History 1997 - 2001



treatments were installed, pedestrian accidents decreased to five, which is 50% less than 1997. In 2001, pedestrian accidents declined to three, which is 70% less than 1997.

Overall, there has been a remarkable decline in accidents since 1997 at this location. This decline can be attributed to the Department's ongoing efforts along the Grand Concourse corridor and the targeted pedestrian improvements made at locations along the corridor and at this location.

Improvements Implemented in 1999

- 12" red lenses on signal faces
- High visibility crosswalks installed at all four legs of the intersection
- Pedestrian barriers installed at medians to prevent mid-block crossings
- Modified the signal timing to allow for increased time for pedestrian crossing
- Replaced all missing signs
- Installed Wait for Walk Signal signs
- Installed pedestrian crossing signals on all medians and upgraded them to international pedestrian signals in October 2000
- Repaired three streetlights
- Increased the all-red interval to ensure that left-turning vehicles clear the intersection

South Bronx Churches

Description

South Bronx Churches (SBC) is a 15-year old organization whose membership includes area congregations and resident/tenant organizations. In the past few years, the housing stock, population and environment of the South Bronx has changed dramatically. SBC has constructed 146 new Nehemiah homes just south of St. Mary's Park in the past three years and traffic congestion has increased in the area.

Implemented Improvements

In October 2001, SBC submitted their recommendations to improve pedestrian and vehicular safety in the area bounded by East 138th Street and East 163rd Streets between Bruckner Boulevard and Willis Avenue. All recommendations were reviewed and the following improvements were implemented:

- Installed truck loading zones on St. Ann's Avenue between East 138th and East 139th Streets in January 2002.
- Installed an All-Way Stop control at the East 139th Street/Cypress Avenue intersection in February 2002.
- Installed No Parking Anytime signs on the east curb of Cypress Avenue between East 138th and East 139th Streets in January 2002.
- Installed Do Not Enter signs at Brook Avenue near the Major Deegan Expressway southbound exit ramp in January 2002.
- Installed bus stop on west curb of Bruckner Boulevard near the East 138th Street intersection in December 2001.
- Added five seconds (from 35 to 40 seconds) to cross Bruckner Boulevard at East 138th Street in February 2002.
- Installed Keep Intersection Clear signs at the Jackson Avenue/East 138th Street intersection in February 2002.
- Installed Dead End signs on Beech Terrace at St. Mary's Park South in December 2001.
- Removed one parking space on the northwest corner of Westchester Avenue in January 2002.

- Installed additional Yield to Pedestrian, curve warning and reduced speed signs on St. Mary's Park South in February 2002.
- Installed two speed humps on Tinton Avenue between East 150th and East 152nd Streets and one speed hump on Union Avenue between East 150th and East 151st Streets in February 2002.
- Daylighting was installed at the intersection of East 137th Street and Cypress Avenue in April 2002.
- A painted median was installed on Tinton Avenue between East 156th and East 152nd Streets to narrow the roadway width in September 2002.
- Two speed humps were installed on Jackson Avenue between East 147th and East 149th Streets in June 2002, and one speed hump was installed on East 140th Street between Cypress and St. Ann's Avenues in January 2003.
- Additional markings were installed or refurbished at the following locations:
 - Bruckner Boulevard/ East 138th Street - peg-a-tracs were installed in July 2002 to guide motorists across Bruckner Boulevard.
 - Tinton Avenue between East 152nd and East 156th Streets - a center median and a mid-block school crosswalk (along with necessary school crossing signs and word messages) was installed in October 2002.
 - East 152nd Street between Jackson and Union Avenues - a lane line was installed in August 2002 to better define the moving lanes.
 - Jackson Avenue/Westchester Avenue/East 152nd Street - high visibility crosswalks, school crosswalk, and school crossing messages refurbished in October 2002.
 - Westchester Avenue/Tinton Avenue/East 156th Street - pedestrian and school crosswalks refurbished and Stop lines installed in October 2002.
 - Tinton Avenue/East 152nd Street - school crosswalks, school crossing messages, Stop lines refurbished in October 2002.
 - Cypress Avenue/East 138th Street - pedestrian and school crosswalks, school crossing messages refurbished in August 2002.
 - Cypress Avenue/East 139th Street - school crosswalks, school crosswalk messages, Stop line, Stop messages refurbished in August 2002.
 - Cypress Avenue/East 139th Street – Installed All-way stop with 'Stop Ahead' and 'Stop' message in Winter 2003.
 - Cypress Avenue/East 137th Street – Completed daylighting of intersection in Winter 2003.

- Jackson Avenue/East 138th Street – Repositioned two ‘Keep Intersection Clear’ signs in January 2003.
- A two-way modified Class 3 bicycle route (signs and bike symbol pavement markings) was installed on St. Ann’s Avenue between East 135th and East 149th Streets (.8 miles in each direction) in April 2003. A Class 2 bicycle lane (signs and bike symbol and long line pavement markings) was installed on St. Ann’s Avenue between East 149th and East 161st Streets (.8 miles in each direction) in April 2003.

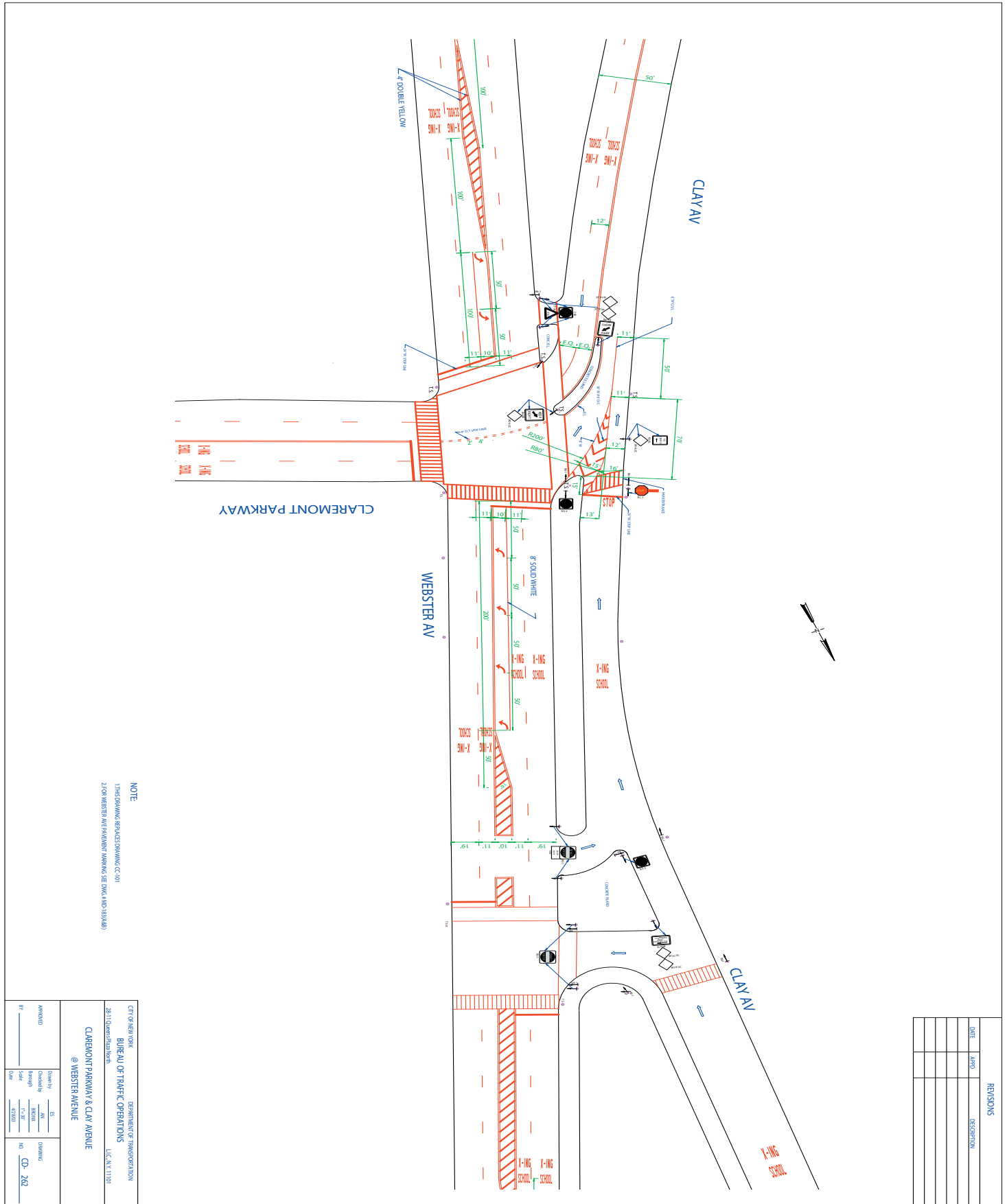
Street lighting improvements were completed in May 2003 at:

- Franklin Avenue between East 167th and East 168th Street
 - Upgraded four existing luminaries in this area to the newer, more efficient 250 watt High Pressure Sodium (HPS) fixtures. Added light pole with new 250 watt HPS directly in front of St. Augustine Church.
- Morris Avenue between 163rd and 164th Streets
 - Installed two new 250 (HPS) lighting fixtures to improve visibility.

Additional markings and signs were installed in the vicinity of Our Lady of Victory Church (the intersection of Claremont Parkway @ Webster Avenue) in May 2003. Implemented improvements include:

- Installed school crosswalk on the north leg of the intersection
- Installed stop word messages on the north service road
- Installed three school crossing messages on the north leg, two on the south leg, two on the main road, and one on the service road
- Added stop lines at all approaches
- Installed peg-a-track to guide turning vehicles through the intersection
- Added new yield markings
- At the intersection of Webster and Clay Avenues, installed stop lines on the north, south and west legs
- Installed new advance school crossing signs on the north and south legs

The improvements are shown on the following page.



NOTE
1) THE DRAWING REFLECTS DRAWING C-101
2) FOR WEBSTER AV PAVEMENT MARKINGS SEE DWG. A MD 1834A(B)

REVISIONS	
SHEET	DESCRIPTION

CITY OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF TRAFFIC OPERATIONS
26-31 Queens Plaza North
LIC. NY. 11101

CLAREMONT PARKWAY & CLAY AVENUE
@ WEBSTER AVENUE

APPROVED	DESIGNED BY	DATE	DRAWING NO.

East Fordham Road/ East Kingsbridge Road/ Bainbridge Avenue

Description

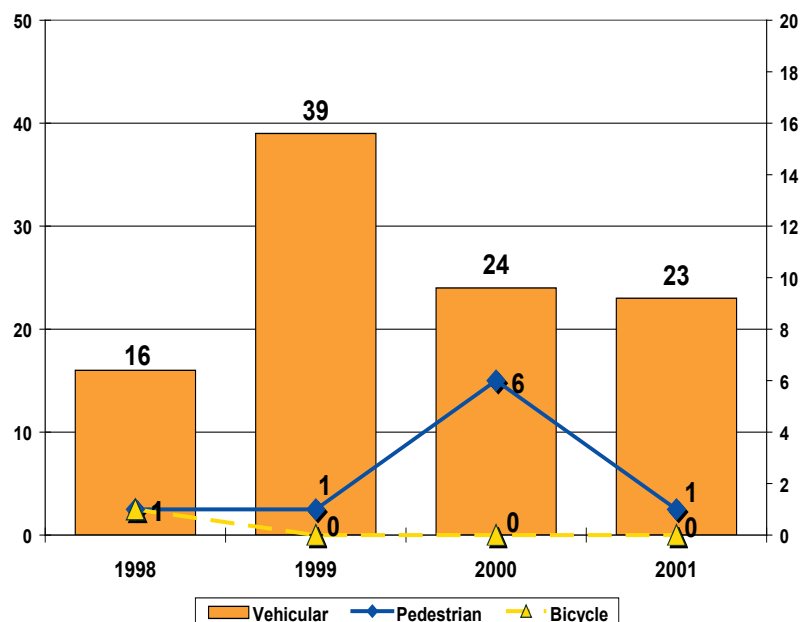
East Fordham Road/East Kingsbridge Road/Bainbridge Avenue is a graded irregularly aligned intersection located in the heart of the Fordham Road retail center and is surrounded by dense residential land use. There is a triangularly-shaped Parks Department GreenStreet located between Bainbridge Avenue and East Kingsbridge Road with several benches that are utilized by people waiting for the bus, as well as shoppers and area residents. There is a two-way (eastbound and westbound) slip off the mainline of East Kingsbridge Road that connects to East Fordham Road. East Fordham Road is a major bus route for both MTA and Liberty Line Westchester County buses. Many of the shoppers in the area use mass transit and pedestrian activity and volume is very high.

One of the primary concerns at this intersection is that even though the intersection is signalized, the geometry of the roadway guides pedestrians to cross diagonally creating unnecessarily risky vehicle/pedestrian conflicts.

In terms of the accident history for this location, there were a total of 18 accidents in 1998, of which one involved a pedestrian and one which involved a bicycle. Accidents more than doubled in 1999 to 40 total accidents, of which one involved a pedestrian. In 2000, accidents decreased 25% to 30 total accidents,

with pedestrian accidents increasing significantly to six. **Total accidents continued to decline in 2001 to 24, with pedestrian accidents declining significantly to one. Although the improvements were implemented in September 2002, the**

Accident Experience 1998 - 2001



improvements implemented at this location should continue the downward trend in accidents at this location since 1999.

Improvements Implemented in September 2002

- Converted the East Kingsbridge Road slip roadway to one-way westbound from East Kingsbridge Road to East Fordham Road mainline to reduce conflicts and improve safety
- Widened the triangular park to the west and north with pavement markings and flexible delineators to narrow the street, discourage double parking, increase pedestrian sidewalk space, and decrease crossing distance.



Flexible delineators and markings provide for increased pedestrian and vehicular safety

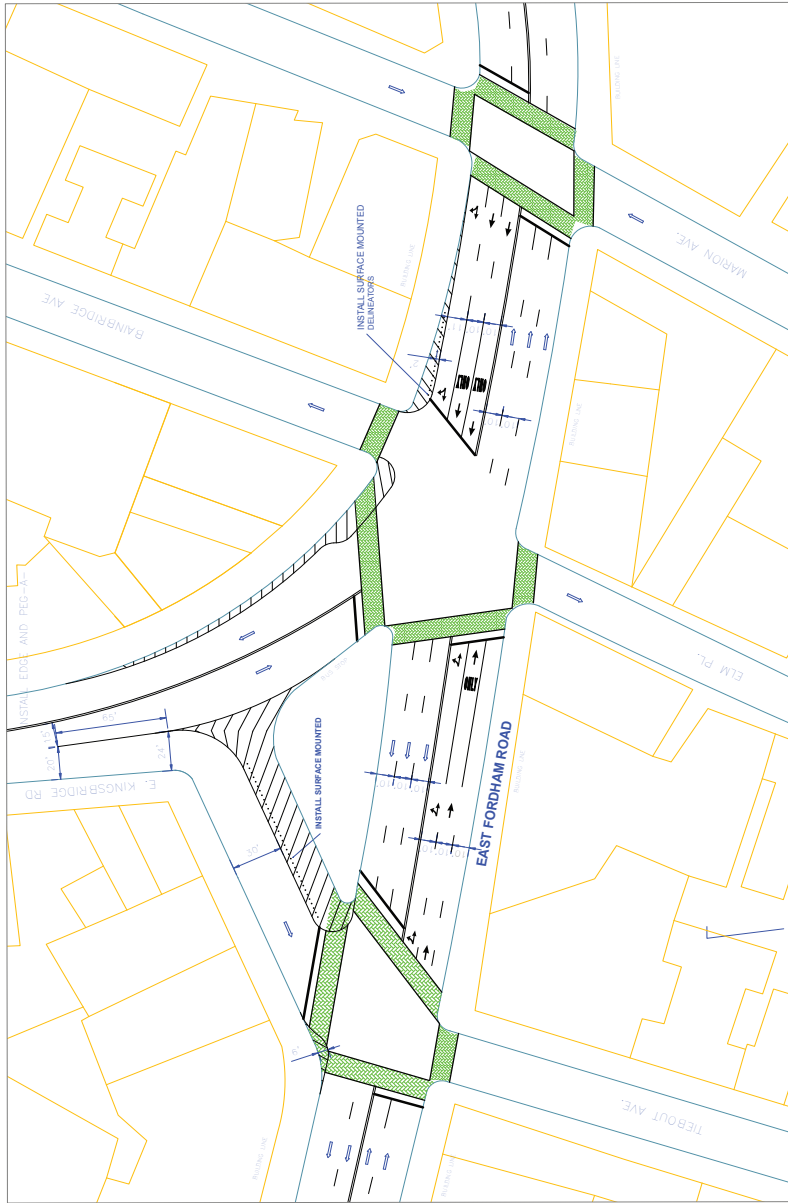
- Installed a modified neckdown on the northwest corner of the East Kingsbridge Road slip/East Fordham Road intersection to increase pedestrian sidewalk space and decrease crossing distance.
- Widened the East Fordham Road north sidewalk (and install delineators) approaching Bainbridge Avenue/East Kingsbridge Road and widen the east sidewalk of East Kingsbridge Road west of Bainbridge Avenue to reduce pedestrian crossing distance and provide more sidewalk space.
- Installed Stop bars, lane assignment arrows, and double yellow and lane lines as appropriate.
- Modified signal faces as appropriate.

The improvements are shown on the following page and were done in coordination with the installation of priority rush hour bus lanes (in both directions) on Fordham Road between University Avenue and Southern Boulevard.



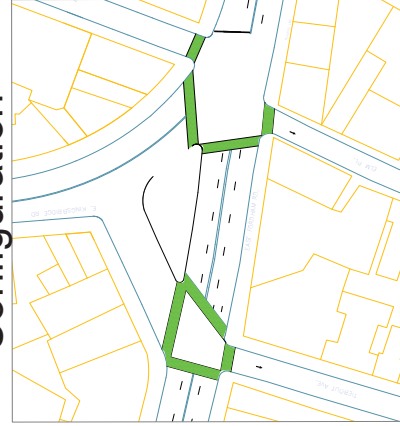
GENERAL NOTES:

- * INSTALL REFLECTIVE EDGE MARKINGS ON SIDES OF ZEBRA PAVERS TO IMPROVE VISIBILITY OF CROSSWALKS AT NIGHT TO APPROACHING MOTORISTS.
- * INSTALL STOP BARS ON ALL APPROACHES.
- * EXISTING ZEBRA PAVERS SHOWN TO REMAIN.



**Reconfigured
Intersection**

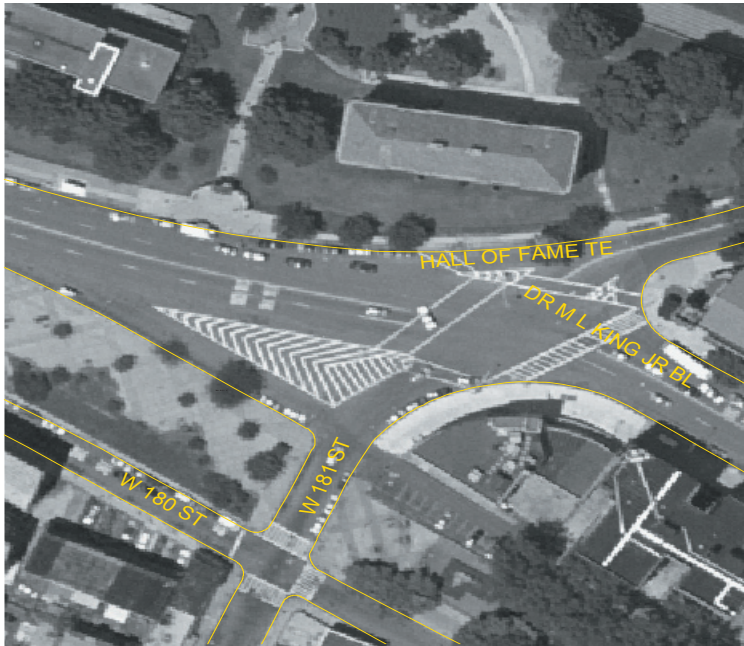
**Original
Configuration**



**East Fordham Road @ East Kingsbridge Road
Safety Improvements**

University Avenue/ West 181st Street/ Hall of Fame Terrace

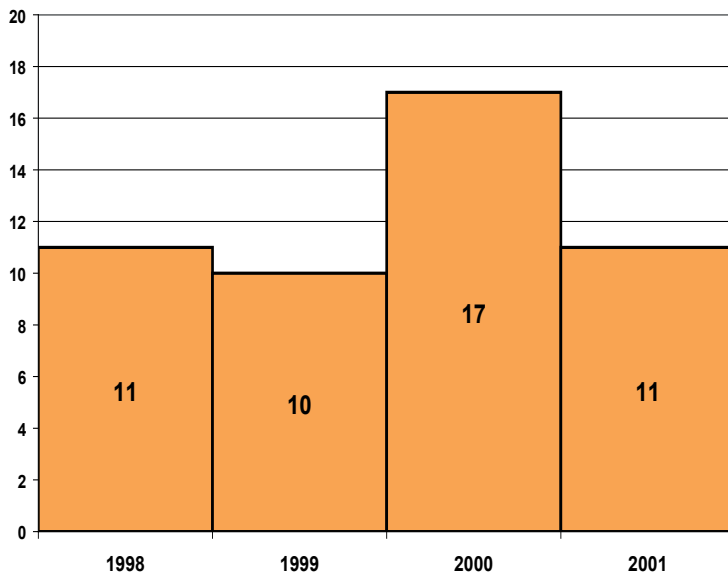
Description



Original Configuration of Roadway

In its original configuration, the intersection of University Avenue, West 181st Street and Hall of Fame Terrace was unusually wide. Due to this configuration, the roadway was configured with large painted islands that channelized traffic resulting in Stop controlled roadways and unusual approaches and turning movements. Hall of Fame Terrace is offset from West 181st Street across University Avenue and there is a steep grade on Hall of Fame Terrace approaching the intersection. Surrounding land uses include Bronx Community College, a park, a library and a church all generating high pedestrian activity.

Accident Experience 1998 - 2001



One of the primary concerns at this location is frequent jaywalking across University Avenue, (approximately 230 feet south of the signal) which is the result of a natural pedestrian path from a park on the east side of University Avenue to the entrance of Bronx Community College on the west. ***While not a high accident location, this intersection was of concern to the Department due to the surrounding land uses and increase in accidents in 2000, leading the Department to take a proactive***

approach at this location to address the safety concerns. In terms of the accident experience at this intersection, there were 11 accidents in 1998 and 10 accidents in 1999. In 2000, accidents increased to 17, a 70% increase. ***In 2001, although accidents returned to the previous level of 11 total accidents, this represented a decline of 35% from 2000 levels. Overall, the Department believes the improvements made at this intersection in October 2002 will greatly improve both pedestrian and vehicular safety.***

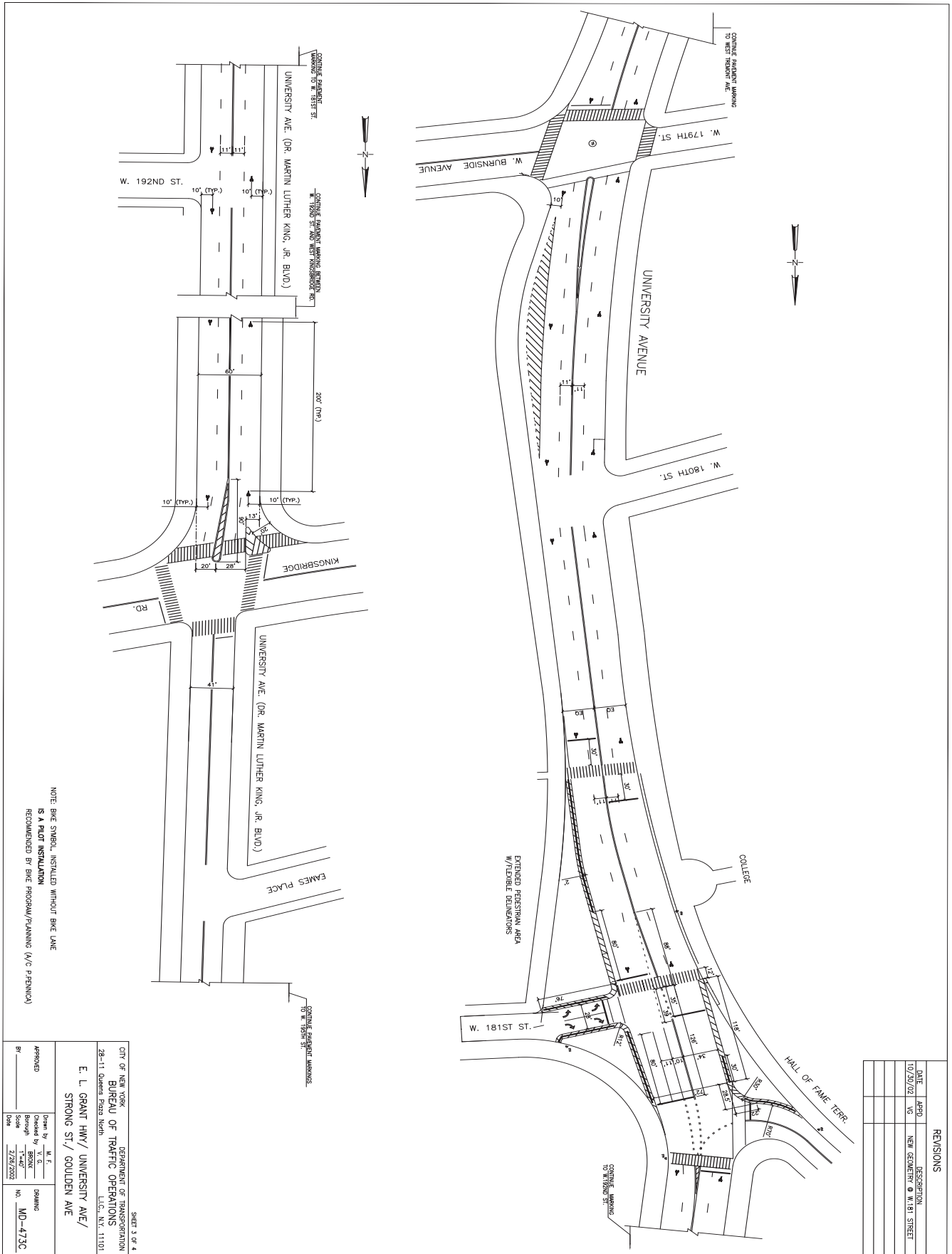
Improvements Implemented in October 2002

- Reconfigured the intersection with new channelization markings in combination with curb mounted delineators to create additional pedestrian space.
- Reconstructed the existing signal to conform to the new geometry. The signal provides separate phases for Hall of Fame Terrace and West 181st Street which now operate concurrently.
- Removed “Stop” controlled slip roadways to improve pedestrian safety.
- Installed a left turn lane for northbound University Avenue.
- Upgraded crosswalk markings to high visibility on the south leg of University Avenue and West 181st Street.
- Installed a new pedestrian crossing signal with a high visibility crosswalk (approximately 230 feet south of West 181st Street) at the park walkway.
- Installed a pedestrian separator on the west side of University Avenue (in front of the entrance/exit of Bronx Community College) to direct pedestrians to the signalized crossings.



Reconfigured intersection and the use of bollards provides refuge and space for pedestrians.

The improvements are shown on the following page.



NOTE: BIKE SYMBOL, INSTALLED WITHOUT BIKE LANE IS A PILOT INSTALLATION RECOMMENDED BY BIKE PROGRAM/PLANNING (N/C P-FENWICK)

REVISIONS	
DATE	DESCRIPTION
10/30/02	NEW GEOMETRY @ W. 181 STREET

SHEET 3 OF 4

CITY OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF TRAFFIC OPERATIONS
28-11 Queens Plaza North
L.I.C., N.Y. 11101

E. L. GRANT HWY/ UNIVERSITY AVE/
STRONG ST./ GOULDEN AVE

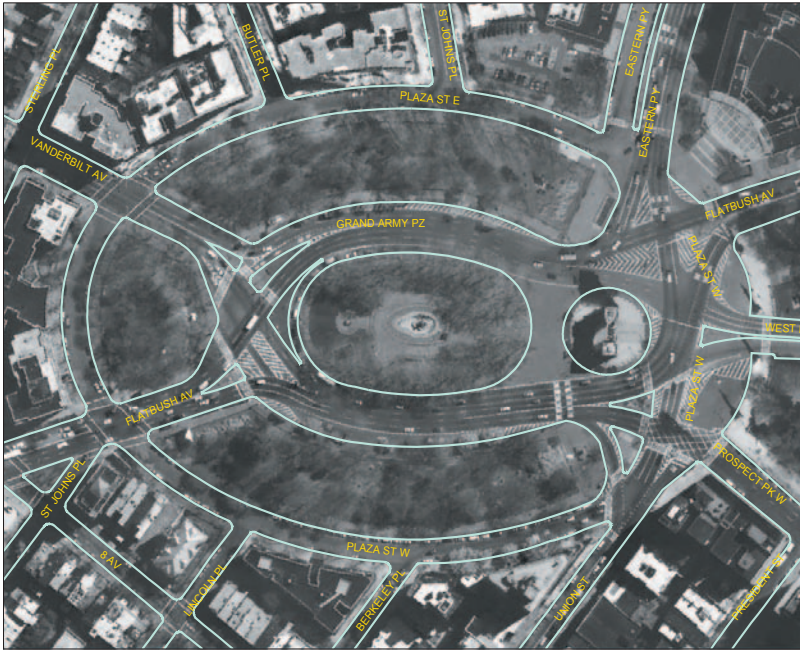
Drawn by	M. E.	Checked by	MD
Design	T-407	Scale	1"=40'
Date	7/26/2002	NO.	MD-473C



BROOKLYN

Grand Army Plaza

Description

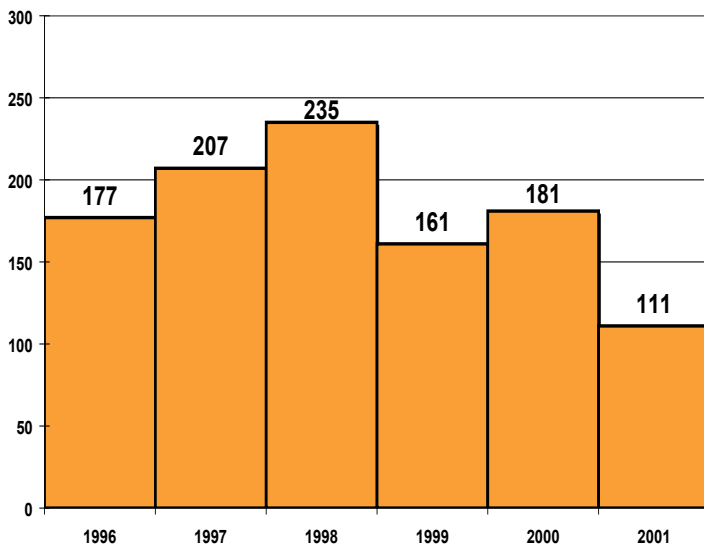


Aerial view of reconfigured intersection

Grand Army Plaza is a complex traffic circle where Flatbush and Vanderbilt Avenues, Eastern Parkway, Union Street and the Prospect Park Drive converge. Over the past several years, the Department has actively engaged in improving the operation and safety of the roadway for both motorists and pedestrians. Prior to the implementation of the Department's improvements in 1999, vehicles wishing to enter and exit the circle were forced to change lanes for the various approaches around the circle, contributing to significant

weaving movements throughout the circle. For pedestrians, the unusual geometry and wide roadway had encouraged pedestrians to move against or without signals. In addition, pedestrians were not always certain where to cross, as well as encountering medians that had little or no storage capacity.

Accident Experience 1996-2001



In the Spring of 1999, the Department conducted an in-depth analysis of the traffic conditions at Grand Army Plaza and the supporting roadways. At the time of the study, this location had consistently ranked as one of the highest overall accident locations in the city. In terms of the accident experience at this location, accidents were on an upward trend between 1996 and 1998, the year prior to the implementation of safety improvements. In 1996, there were 177 total accidents, which ranked second citywide. In 1997, accidents increased considerably to 207, which again ranked

second citywide. In 1998, accidents increased considerably, peaking at 235 total accidents. This increase made Grand Army Plaza the highest ranked accident location in the City.

In 1999, the Department implemented several measures aimed at improving vehicular and pedestrian safety throughout Grand Army Plaza. As such, the accident experience at this location improved substantially, with the total number of accidents at this location sharply decreasing by 31.4% (to 161 from 235) since 1998. In 2000, total accidents increased slightly to 181, but this still represented a 23% reduction in the number of accidents from 1998 levels. Despite the decline in the total number of accidents, this location remained the highest ranked accident location citywide. In 2001, total accidents at the intersection declined even more significantly, down 52% (to 111 from 235) from 1998 levels. For 2001, this location dropped to fourth citywide among high accident locations.

In addition to the decline in total accidents, pedestrian conditions within the Plaza have also improved. Between 1996 and 2001, there was one pedestrian accident in each of these years with the exception of 1997, when four pedestrian accidents occurred. 2001 represented the first year in which no pedestrian accidents occurred.

Based upon the consistent improvement in the accident experience at this location after the implementation of improvements in 1999, the Department has concluded that the measures implemented at this location have had a profound impact on improving the safety of both motorists and pedestrians. In addition, this location can serve as an example of the overall improvement in safety throughout the city. Although this location was ranked number one citywide in both 1999 and 2000, the total number of accidents at this location annually was still less than it was in the years prior to implementation of the safety measures. In addition, the trends in the rankings were influenced by the overall downward trend in accidents citywide.

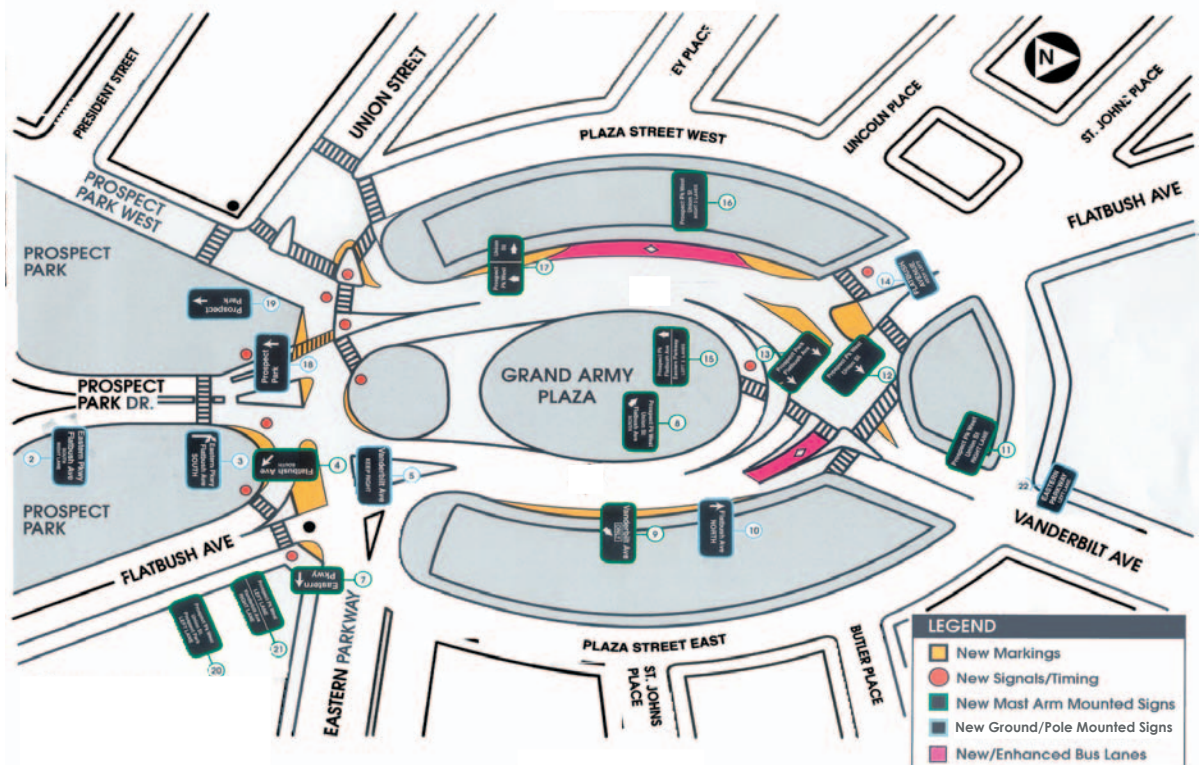
Improvements Implemented in August 1999 and December 2000

- Through signal adjustments, separated the Prospect Park exit from the northbound Flatbush Avenue movement.
- Through new markings and signal adjustments, modified stopping points and

clearance phase to eliminate conflict between southbound Flatbush Avenue and Union Street.

- Split the pedestrian crossing of Flatbush Avenue (from the park to the library). Pedestrians are now able to cross from the park to the center median during the Flatbush Avenue north movement, from the library to the center median during the Eastern Parkway movement, and have a continuous crossing during the Prospect Park movement.
- Installed new crosswalk facilitating pedestrian access to the monument. The pedestrian signals between the traffic island and the monument were modified to display “WALK” when the southbound traffic is stopped.
- Modified the push button actuated signal (on the inner roadway at the north end of the plaza) to flash amber instead of steady green. This was coordinated with the installation of Yield signs and word message where the inner roadway merges with traffic from southbound Flatbush Avenue/Vanderbilt Avenue.
- Improved roadway geometry by modifying and refurbishing pavement markings including channelization, skip lines, lane usage arrows, painted shoulders, buffer zones, reflective lane markers, and a ‘bus only lane for southbound traffic on the west side of the Plaza.
- Installed 20 signs (12 on mast arms) in advance of and around the Plaza. These are directional signs to properly guide motorists, reduce conflicts and minimize weaving movements. The locations of these signs are shown in the illustration below.

GRAND ARMY PLAZA SAFETY PROGRAM



- Installed a new crosswalk facilitating pedestrian access to the monument in coordination with the signal work.
- Installed 12 o'clock green arrows for southbound traffic destined for Prospect Park West.
- Installed a signal controlling southbound Flatbush Avenue at the north side of the Plaza to eliminate the conflicts with Vanderbilt Avenue and protect pedestrians.

Improvements Implemented in 2002 and 2003

- All markings were refurbished in May 2002.
- Modified the signal at the northern end of Grand Army Plaza to enhance pedestrian safety. The new operation provides a split crossing of Vanderbilt Avenue using the traffic island as a safety refuge. Pedestrians no longer have to negotiate the lengthy 120 foot crossing during the Flatbush Avenue [south] phase of the signal cycle. In addition the time to cross Flatbush Avenue was increased by approximately six seconds. This improvement was completed in August 2003.
- The raised concrete island separating Flatbush Avenue (north & south) and Eastern Parkway was upgraded in September 2003. This improvement provides additional refuge space for pedestrians when crossing Flatbush Avenue. At times during the signal cycle, pedestrians may only cross half way and must wait before completing their crossing of Flatbush Avenue.
- A street lighting upgrade consisting of the elements listed below was completed in November 2003:
 - 16 new pedestrian arms equipped with 150 watt high pressure sodium luminaries were installed on existing street light poles on the perimeter.
 - Two new street light poles were installed on the roadway at the inner circle.
 - Two shaft extensions each equipped with two 250 watt high pressure sodium luminaires were installed on existing traffic signal poles near the entrance to Prospect Park.

Improvements Implemented in 2004

- *School crosswalks were refurbished in June and July 2004.*

Improvements in the Vicinity of Eastern Parkway/Utica Avenue & Kings Highway/Linden Boulevard/Remsen Avenue

Over the past several years, the Department has been actively engaged in improving the safety and operability of numerous roadways in the northwest section of central Brooklyn. Some of the more notable roadways and intersections that have been a part of these efforts include the Eastern Parkway and Utica Avenue corridors, the intersection of Eastern Parkway and Utica Avenue itself and the intersection of Kings Highway, Linden Boulevard and Remsen Avenue. Many of the recommendations and subsequent improvements are a result of the early action plan of the Weeksville Utica Avenue Transportation Study. This study involved working closely with other agencies (e.g. Department of City Planning, MTA), community groups, elected officials and other interested parties to develop solutions to address pedestrian safety and mobility concerns, as well as quality of life issues. While many of the short-term mitigation measures (highlighted within this section) have been implemented, the Department is continuing to assess future traffic conditions (to 2010) to develop subsequent improvements. The Final Report is expected to be completed in early 2005.

To date, our efforts have focused on two primary areas of concern:

- the Eastern Parkway corridor, the intersection of Eastern Parkway and Utica Avenue and the surrounding areas and*
- the intersection of Kings Highway, Linden Boulevard and Remsen Avenue and the surrounding areas.*

Eastern Parkway

Description

Eastern Parkway is a landmark boulevard consisting of three eastbound and two westbound travel lanes on its main roadway and separate travel and parking lanes on each of its eastbound and westbound service roads. The main roadway is separated from the service road by landscaped promenades on both sides of the roadway. In its original configuration, the service roads operated as one travel lane and two parking lanes with alternate side parking requirements, effectively providing two travel lanes. Utica Avenue is a north-south arterial with two 10-foot lanes in each direction and substantial commercial land use on both sides of the roadway.

The intersection of Eastern Parkway and Utica Avenue is a center of intense pedestrian and motor vehicle activity serving the needs of thousands of commuters and others daily. The intersection also serves as an important intermodal transfer point for public transportation as three bus lines, two subway lines and numerous for-hire vehicles provide public transportation at the intersection. Of the three bus lines, the B14 and B17 begin their routes at the southwest corner, and the B46 passes through the intersection in the middle of its route. The B14 runs between Crown Heights and East New York via Pitkin and Sutter Avenues. The B17 runs between Crown Heights and Canarsie via Remsen Avenue. The B46 runs between Williamsburg and Kings Plaza via Utica Avenue.



Aerial view of reconfigured intersection

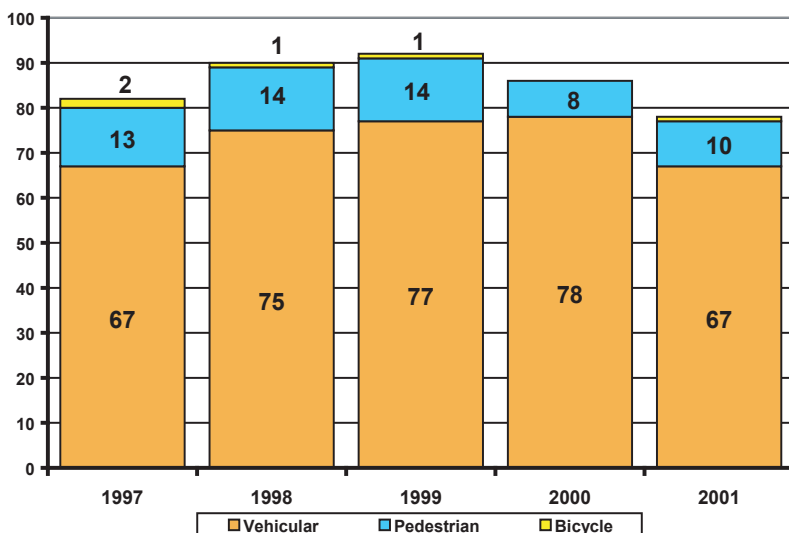
Two subway routes, the “3” and “4” stop at Utica Avenue. The “3” is a local that continues east to New Lots Avenue and the “4” is a heavily patronized express that terminates at Utica Avenue. This makes the intersection very active as commuters transfer between the subway and other transit modes to continue their journey. The subway station entrances are located on the promenade.

With the high volume of buses, for-hire vehicles and pedestrians, this intersection, especially along the eastbound service road of Eastern Parkway and Utica Avenue is often congested. In addition, the illegal use of bus stops by for-hire vehicles that do not comply with existing parking regulations and traffic control devices is problematic. These vehicles routinely stop to pick-up or drop-off fares in the bus stops located on the eastbound service road and on both sides of Utica Avenue. This leads to significant congestion during the evening peak hours.

An additional concern at this location is illegal turns by for-hire vehicles from the eastbound service road onto Utica Avenue. Right turns onto Utica Avenue are prohibited for all vehicles except buses, and left turns onto Utica Avenue are prohibited for all vehicles. For-hire vehicles also make illegal U-turns on Utica Avenue. These illegal movements contribute to the congestion and safety concerns for both pedestrians and motorists.

With the high volumes of pedestrian and vehicular traffic and the distinct roadway characteristics, this intersection has frequently rated high on both the citywide pedestrian and citywide total accident charts. In terms of pedestrian rankings, this location was ranked second amongst the top 20 pedestrian accident locations citywide in 1997 and 1998, with 13 pedestrian accidents in 1997 and 14 in 1998. **In 1999, this location held the highest ranking in the city with 14 pedestrian accidents. In 2000, pedestrian accidents decreased by nearly 43% to eight and was tied for tenth citywide. In 2001, pedestrian accidents increased slightly to 10 and moved up to fifth citywide.**

Accident Experience 1997- 2001



Although the ranking in 2001 jumped to fifth from tenth in 2000, this number is still less than the pedestrian accident experience between 1997 and 1999. In addition, there have been no fatalities at this intersection since 1998.

This location has also frequently been amongst the top 20 overall location citywide. In 1997, this location ranked 27th citywide with 82 total accidents. In 1998, accidents increased to 90 and the intersection moved up the

rankings to number 18th citywide. In June 1999, the Department began to implement several improvements to address identified concerns at this location. ***Although accidents peaked in 1999 with 92 total accidents (which corresponds to a ranking of 12th citywide), the accident experience since these measures were implemented has been encouraging. In 2000, total accidents decreased 7% to 86 accidents and the intersection ranking dropped to 22nd amongst the City's highest accident locations. Most encouraging about this decline was the 43% decline in pedestrian accidents (to 8 in 2000 from 14 in 1999). In 2001, total accidents continued to decline to 78 total accidents, a 15% decline from the 1999 peak of 92 accidents. In addition, vehicular accidents declined 14% to 67 from 78 in 2001. Citywide, this location was ranked 15th in 2001.***

The Department believes that the series of improvements that began in 1999 significantly improved safety at this location and along both corridors by providing for safer vehicular and pedestrian movements through the intersection, as well as improving the overall flow of traffic through these corridors. In addition, these trends parallel the overall improvements taking place citywide over this time period. The Department will continue to monitor the improvements at this intersection and expects that the future improvements resulting from the Weeksville/Utica Avenue Transportation Study will continue this downward trend in accidents at this location.

Improvements Implemented in June 1999

- Prohibition of right and left turns from the eastbound service road to Utica Avenue
- Periodic enforcement efforts against vehicles making illegal turns
- Prohibition of left turn (and removal of left-turn lane) from the westbound main roadway of Eastern Parkway to southbound Utica Avenue
- Addition of a westbound left-turn phase and lengthening of left-turn lane at the intersection of Eastern Parkway and Schenectady Avenue
- Relocation of STOP bar for northbound Utica Avenue and installation of new signal display at the STOP bar in advance of the intersection
- Installation of bus lanes on north and southbound Utica Avenue between Eastern Parkway and Union Street, effective Monday through Friday 7AM- 7PM
- Installation of signs (regulatory, advisory, warning)
- Refurbishment of all signs and markings

Improvements Implemented in 2001 and 2002

Since 2001, the Department has continued to focus upon improving conditions at this specific intersection while expanding its attention to other intersections along both the Eastern Parkway and Utica Avenue corridors. The most significant improvements are highlighted below:

- At nine locations on Eastern Parkway (Classon Avenue, Franklin Avenue, Rogers Avenue, Nostrand Avenue, New York Avenue, Brooklyn Avenue, Albany Avenue, Troy Avenue, Schenectady Avenue), the signal operation was modified by stopping the service roads approximately 15 seconds before the mainline as a pedestrian safety enhancement. These signal improvements were implemented in April 2001 at the intersections of Eastern Parkway at Nostrand Avenue and at Franklin Avenue, which are subway station locations that generate high volumes of pedestrians. Signal improvements at the remaining seven locations were completed in May 2001.
- In conjunction with the signal modifications, parking regulations were changed from alternate day, alternate side “No Parking 8AM - 6PM” to standard 1½ hour street sweeping regulations. This allows parking on both sides of the service roads, which tends to lower the incidence of speeding. This work was completed in May 2001.
- Extended the B46 southbound bus stop to the full length of the block between Eastern Parkway and Union Street to reduce conflicts with buses and vans. This work was completed in May 2001.
- Extended the bus stop/layover location for the B14 and B17 routes on the south curb of Eastern Parkway between Utica and Schenectady Avenues from 169 to 224 feet to allow the buses to pull up closer to the curb and make pedestrian movements safer. The work was completed in June 2001.
- Extended the existing priority bus lanes on both the east and west curbs of Utica Avenue between Eastern Parkway and Union Street to Carroll Street. In conjunction with this change, “No Standing 7-10 AM/4-7 PM Except Sunday” and “No Standing Except Trucks Loading and Unloading 10AM-4PM Except Sunday” regulations were installed on both the east and west sides of Utica Avenue between Union and Carroll Streets. This work involved the removal of all meters between Union Street and Carroll Street. This work was completed in July 2001.
- The centerline of Utica Avenue between Carroll Street and Empire Boulevard was offset to provide two travel lanes and one parking lane in each direction.

This work was completed in July 2001.

- Angle parking was installed on both the north and south curbs of President Street between Utica Avenue and Rochester Avenue to provide 52 additional parking spaces (from 56 to 108). This work was completed in July 2001.
- In coordination with the Department of Parks & Recreation, installed pedestrian barriers on the Eastern Parkway north and south medians for 320 feet west of Utica Avenue to discourage pedestrians from crossing midblock and to direct them to the intersection. This work was completed in April 2002.
- Signalized the service roads in conjunction with prohibiting right turns from both directions of the Eastern Parkway main roadway at Utica Avenue. This work was completed in June 2002.
- The signals facing both directions on the main roadway of Eastern Parkway were modified with straight ahead arrows (since no turns can be permitted). In conjunction with this signal modification, No Turns signs and straight ahead arrow pavement markings were installed. In addition, a No Left Turn sign was installed at the south service road eastbound approach to Eastern Parkway. All work was completed in July 2002.
- Installed mid-block crosswalks on the Eastern Parkway Service Roads (approximately 150 feet west of Utica Avenue) to improve access to the subway station. All work was completed in July 2002.



Pedestrian barriers along service road island prevent individuals from crossing service road midblock



Angle parking on President Street

Improvements Implemented in 2003

- All markings on Utica Avenue were refurbished in April 2003.
- To enhance pedestrian safety at the intersection of Utica Avenue and Avenue M, a Leading Pedestrian Interval (LPI) was added to the signal during Summer 2003. This allows pedestrians to start their crossing of Utica Avenue approximately five seconds prior to Avenue M getting a green indication.
- Due to the wide configuration of Eastern Parkway and the difficulty in viewing street names on corners, oversized street name signs were posted at the following 16 intersections in September 2003:



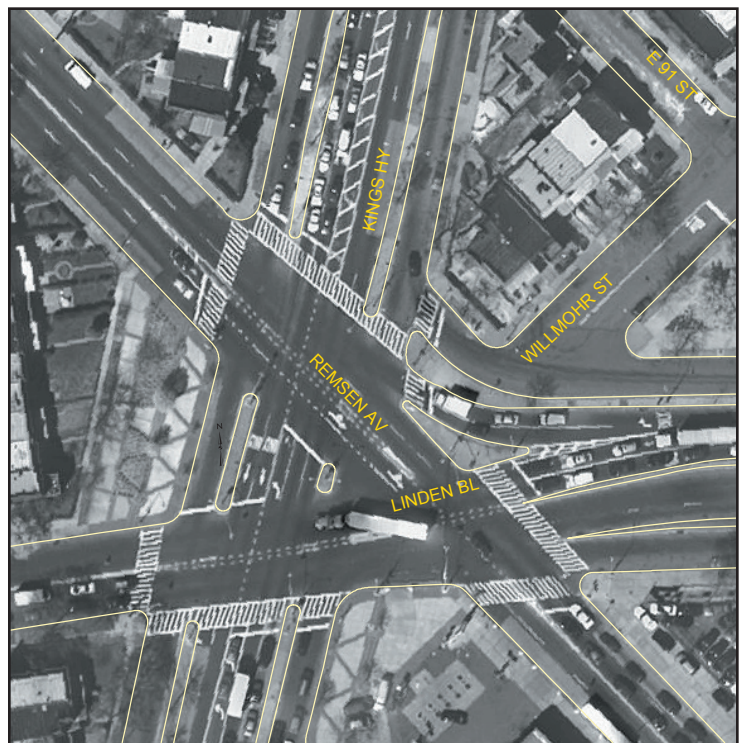
- Eastern Parkway @ Atlantic Avenue
 - Eastern Parkway @ Rockaway Avenue
 - Eastern Parkway @ Howard Avenue
 - Eastern Parkway @ Rochester Avenue
 - Eastern Parkway @ Schenectady Avenue
 - Eastern Parkway @ Troy Avenue
 - Eastern Parkway @ Albany Avenue
 - Eastern Parkway @ Kingston Avenue
 - Eastern Parkway @ Brooklyn Avenue
 - Eastern Parkway @ New York Avenue
 - Eastern Parkway @ Nostrand Avenue
 - Eastern Parkway @ Rogers Avenue
 - Eastern Parkway @ Fulton Street
 - Eastern Parkway @ Franklin Avenue
 - Eastern Parkway @ Bedford Avenue
 - Eastern Parkway @ Washington Avenue (Installed August 2003)
- Markings on Eastern Parkway were refurbished in October 2003.

Kings Highway/ Linden Boulevard/ Remsen Avenue

Description

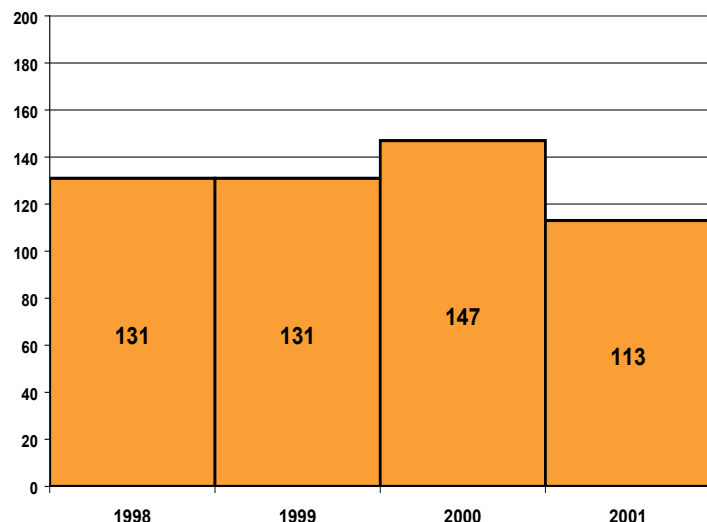
This complex intersection is often a point of conflict where three major high volume corridors converge. Kings Highway is an 80-foot wide north/south arterial that has the highest traffic volumes of the three corridors. The roadway is configured with three moving lanes on the main roadway and one moving lane and one parking lane on the service road. Linden Boulevard (west of Kings Highway) runs east/west and has one moving lane and one parking lane in each direction. East of Kings Highway, Linden Boulevard is configured with two moving lanes on the main roadway and one moving lane and one parking lane in each direction. Remsen Avenue runs southeast and northwest and has two moving lanes in each direction.

Due to the complexity of this multi-legged intersection, there is a high accident rate. Left turn, rear end, and overtaking are the primary causes of these accidents. In 1998 and 1999, there were a total of 131 accidents (each year) at this location. However, total accidents increased 12% to 147 in 2000. ***In 2001, the Department began to implement numerous improvements at this location. As***



Aerial view of intersection

Accident Experience 1998 - 2001



such, total accidents decreased by 23% (to 113 from 147 in 2000). The Department believes this decrease can be attributed to the improvements implemented at this location. In addition, the work implemented in 2002 should continue to improve both pedestrian and vehicular safety at this intersection.

Implemented Improvements

- In September 2000, a left turn signal phase was installed for westbound Linden Boulevard to southbound Kings Highway, and the timing was modified at the Linden Boulevard/East 58th Street intersection to improve coordination for westbound Linden Boulevard.
- In July 2001, most of the crossings controlled by pedestrian signals were upgraded to high visibility crosswalk markings.
- In June 2001, the All-Red clearance (at the end of the Remsen Avenue phase) was extended to six seconds to clear the movement from southbound Remsen Avenue to eastbound Linden Boulevard.
- In June 2001, “No Standing 7-10AM Monday-Friday” regulations were installed on the east curb of Remsen Avenue between Kings Highway and East 58th Street.
- In August 2001, 19 oversized street names signs (42” x 18”) were installed for Linden Boulevard (seven), Kings Highway (six), and Remsen Avenue (six).
- In October 2001, No Parking Anytime signs were installed on both curbs of Linden Boulevard between Kings Highway and East 58th Street to maintain two moving lanes.
- In October 2001, a trailblazer sign was installed on westbound Linden Boulevard (between East 92nd and 93rd Streets) directing motorists destined to northbound Kings Highway to use the service road.
- In November 2001, the length of the near side bus stop was extended (by approximately 100 feet) on southbound Remsen Avenue at Kings Highway and the bus stop between Lenox Road and East 55th Street was eliminated to better accommodate the two bus lines (B17, B78).
- In November 2001, the northbound Remsen Avenue far side bus stop was relocated approximately 60 feet downstream to eliminate spillback at the intersection.
- Kings Highway was repaved by DDC in 2001.
- Left turns from southbound Kings Highway to Linden Boulevard and Remsen Avenue were prohibited. In coordination with this turn restriction, a left-turn signal

phase (for Kings Highway) was installed at Church Avenue to enable motorists to access southbound Remsen or Ralph Avenues. The existing left turn bay at Kings Highway was modified to a flush painted median in order to provide a pedestrian refuge. Median markings were extended north to 92nd Street to eliminate the lane merge in advance of the intersection. The southbound left turn bay on Kings Highway at Church Avenue was extended to 180 feet from 100 feet. Additionally, three trailblazer signs were installed: 1) to Linden Boulevard (12 o'clock arrow) at Remsen and Church Avenues, 2) to Remsen Avenue/Linden Boulevard (12 o'clock arrow) at Ralph and Church Avenues and 3) to Ralph Avenue/Remsen Avenue/Linden Boulevard (9 o'clock arrow) at Kings Highway. All work was completed in March 2002.

- A left turn signal phase was installed for southbound Remsen Avenue to eastbound Linden Boulevard. A new signal pole was installed on the southwest corner (of Linden Boulevard and Remsen Avenue) to improve the visibility of the signals for southbound Remsen Avenue motorists. To accommodate the additional turning phase, a specialized solid state signal controller was installed. The signal cycle will remain at 120 seconds in peak periods but will be increased from 90 to 120 seconds during all off-peak periods. In coordination with this left-turn signal phase, through and left pavement arrows will be installed on southbound Remsen Avenue prior to eastbound Linden Boulevard. Most pavement marking modifications were installed in November 2001 and some further enhancements were completed in January 2002. The signal work was completed in March 2002.



New markings, turning lanes and signage were installed to improve safety

- The westbound Linden Boulevard main road (east of the intersection) was restriped to provide an additional moving lane (from three to four). Additionally, two lanes were designated for Remsen Avenue and two lanes for Linden Boulevard (currently, only one lane is designated for Remsen Avenue and two lanes for Linden Boulevard), and five signs were installed (four overhead, one ground-mounted) directing motorists to appropriate lanes. Mast arm poles were installed to support overhead lane assignment signs. All signal work was completed March 2002. Most pavement marking modifications were installed in

November 2001 with some further enhancements completed in January 2002.

- Cycle lengths on adjacent signals on both Kings Highway and Linden Boulevard were increased from 90 to 120 seconds (during off-peak hours) to maintain coordination. All work was completed in March 2002.
- A new signal timing plan was installed at Remsen and Ralph Avenues (discontinuing the previous fixed time operation) for improved coordination. All work was completed in March 2002.
- Additional pedestrian signals were installed to better designate the Linden Boulevard crossing (east of Remsen Avenue). All work was completed in March 2002.
- Selected signals (facing north and east) at Linden Boulevard and Kings Highway were louvered to minimize confusion. All work was completed in March 2002.

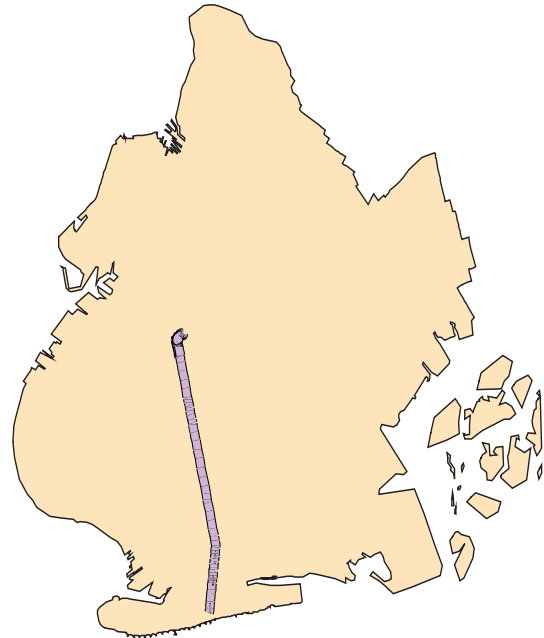
The following short-term bus stop improvement measures were implemented in coordination with New York City Transit in June 2002:

- Move the northbound B7 bus stop from the near side of the main road to the far side of the service road to provide additional storage for through vehicles (southbound stop remains near side).
- Relocate the main road near side bus stops (both directions) at Church Avenue to the service road on the far side of the intersection.

Ocean Parkway

Description

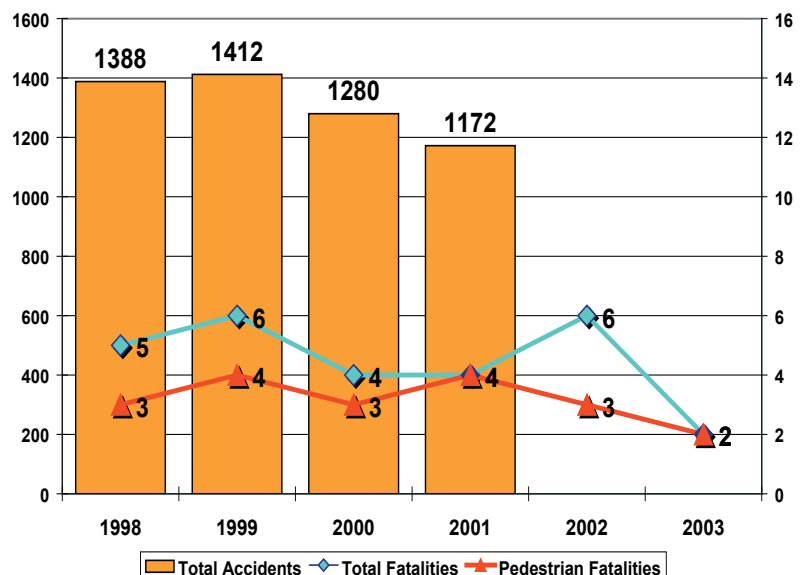
Ocean Parkway is a major north-south corridor that traverses the length of Brooklyn from the southern terminus of the Prospect Expressway south into Coney Island and ending at the waterfront. The main roadway consists of three northbound and three southbound lanes separated by a striped center median. There are also northbound and southbound service roads characterized by one traffic lane and two parking lanes. The service roads are separated from the main roadway by landscaped promenades, including a protected bike lane in the western promenade. At several major intersections, there are left turn bays on the main roadway to facilitate turning movements.



For pedestrians crossing Ocean Parkway, they must cross seven lanes of traffic, plus the two service roads. In general, traffic on the service road is stop controlled while each intersection of the main roadway is signal controlled. In 1998, there were 1,388 total accidents along the entire stretch of Ocean Parkway. In 1999, the total number of accidents increased to 1,412. Beginning in 2000, accidents along the Ocean Parkway corridor declined to 1,280 and continued to decline in 2001 with 1,172 total accidents, a 17% decrease from 1999 levels. This trend parallels the overall reduction in accidents citywide during this time period.

Over the past six years, most of the fatalities along the Ocean Parkway corridor have involved pedestrians.

Accident Experience 1998 - 2003



Between 1998 and 2001, overall fatalities and pedestrian fatalities remained fairly consistent. In 2002, although there were six fatalities, of which three were pedestrians, none of these occurred in the second half of the year. This trend corresponds to the improvements made along the Ocean Parkway corridor during the year. In 2003, total fatalities were significantly lower with only two, both of which involved a pedestrian.

Implemented Improvements

- In order to improve pedestrian safety and increase crossing time, the cycle length of all off-peak timing patterns was increased from 90 to 120 seconds in January 2002. As a result, the crossing time for Ocean Parkway was increased at all 34 signalized locations (from Church to Sea Breeze Avenues). Most of the intersections provided an additional 12 seconds of crossing time with others provided an additional six to 17 seconds.
- Of the 34 intersections along Ocean Parkway, 16 had left-turn signal phases prior to 2002. In January 2002, it was determined that left turn signal phases would be added to the remaining 18 intersections. As of April 2002, work was completed at 16 of the 18 intersections. The last two intersections were completed in May 2002. Each intersection along the corridor now has left turn signal phases.
- In February 2002, a contract was initiated to replace all vehicle signals with LED displays and all pedestrian signals with international LED displays. Ocean Parkway was the first corridor completed (in March 2002) under this contract.
- Markings on Ocean Parkway were refurbished in May 2003.

In April 2003, URS consultants completed a study on behalf of the Department to evaluate traffic conditions on Ocean Parkway between Church Avenue and Avenue J. The purpose of the study was to analyze both the existing traffic signal operation which utilized “protected/permitted” left turn phases and an alternative “protected only” mode.

Their short term recommendation was to maintain existing signal timing and phasing with the exception of Ocean Parkway and Parkville Avenue where they suggested that the existing left turn phase be switched from a leading to a lagging operation. DOT implemented this recommendation in July 2003. Their long term recommendation was to optimize the existing “permitted/protected” operation by modifying signal splits and offsets. This recommendation is not being implemented because it would require reductions in the time currently allocated for pedestrian crossings at several locations.

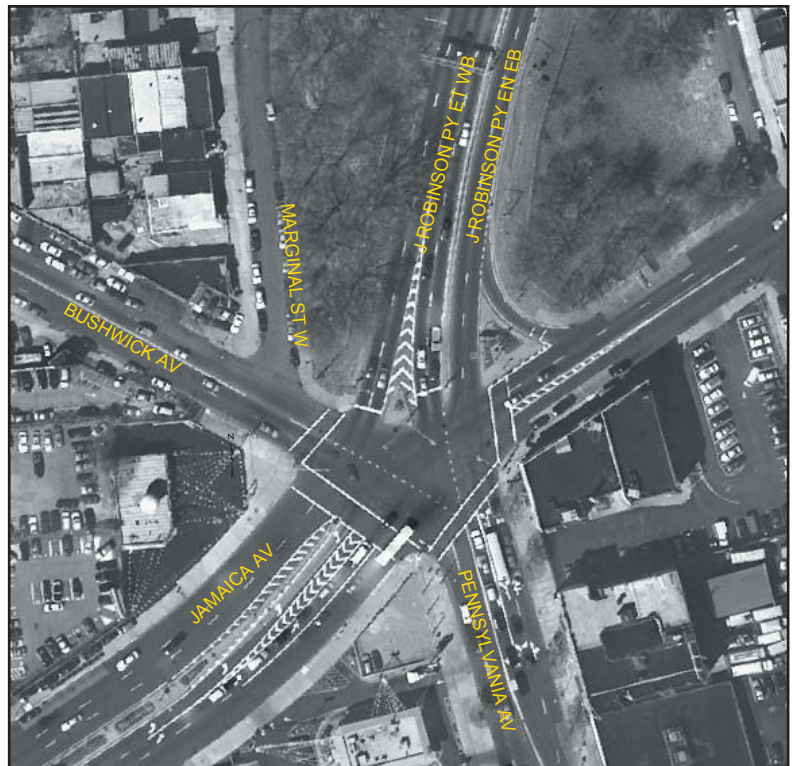
Bushwick Avenue/ East New York Avenue/ Jackie Robinson Parkway

Description

This is a complex multi-legged intersection. Bushwick Avenue (runs east/west) approaches this intersection from the west and terminates, Pennsylvania Avenue (runs north/south) also ends at this intersection, Jamaica Avenue (runs east/west) becomes East New York Avenue two blocks west of the intersection, and the Jackie Robinson Parkway (runs north/south) has its southern terminus at this intersection.

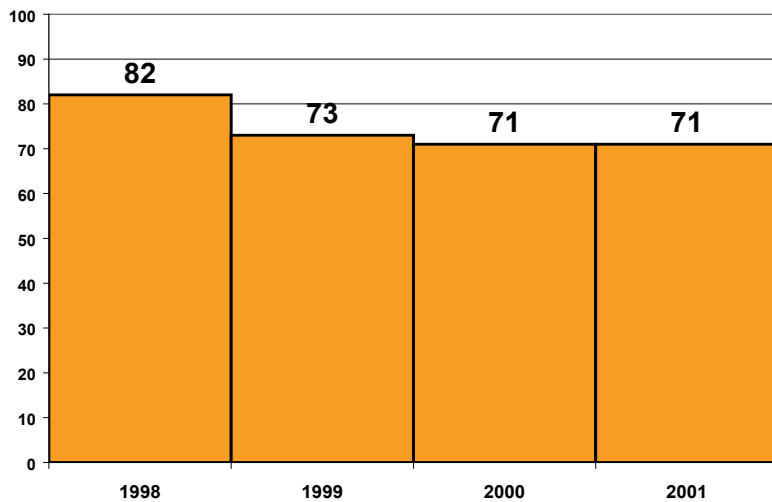
There is a four phase signal operation at this location. During the first signal phase, motorists (predominantly buses) are permitted to make a left turn (almost a “V”-turn) from Pennsylvania Avenue onto westbound Jamaica Avenue. During the second signal phase, right and thru movements are permitted from northbound Pennsylvania Avenue. Motorists exiting the Jackie Robinson Parkway (southbound) can also move at this time. The third phase is exclusively for motorists westbound on Jamaica Avenue. The fourth phase is exclusively for eastbound Jamaica Avenue motorists.

Pennsylvania Avenue has three lane designations: an exclusive left turn lane, a thru/left turn lane, and a thru/right turn lane. Prohibited movements include: the left turn from eastbound Bushwick Avenue onto the Jackie Robinson Parkway; Jackie Robinson Parkway southbound motorists in the left two lanes can only proceed straight to Pennsylvania Avenue (no right or left turns are permitted).



Aerial view of intersection

Accident Experience 1998 - 2001



Previously, there were two sets of rumble strips on the southbound Jackie Robinson approach to the intersection. There is also channelization that designated lanes for motorists approaching westbound Jamaica Avenue and lanes approaching Pennsylvania Avenue. The width of the approach immediately before the channelization is 44 feet.

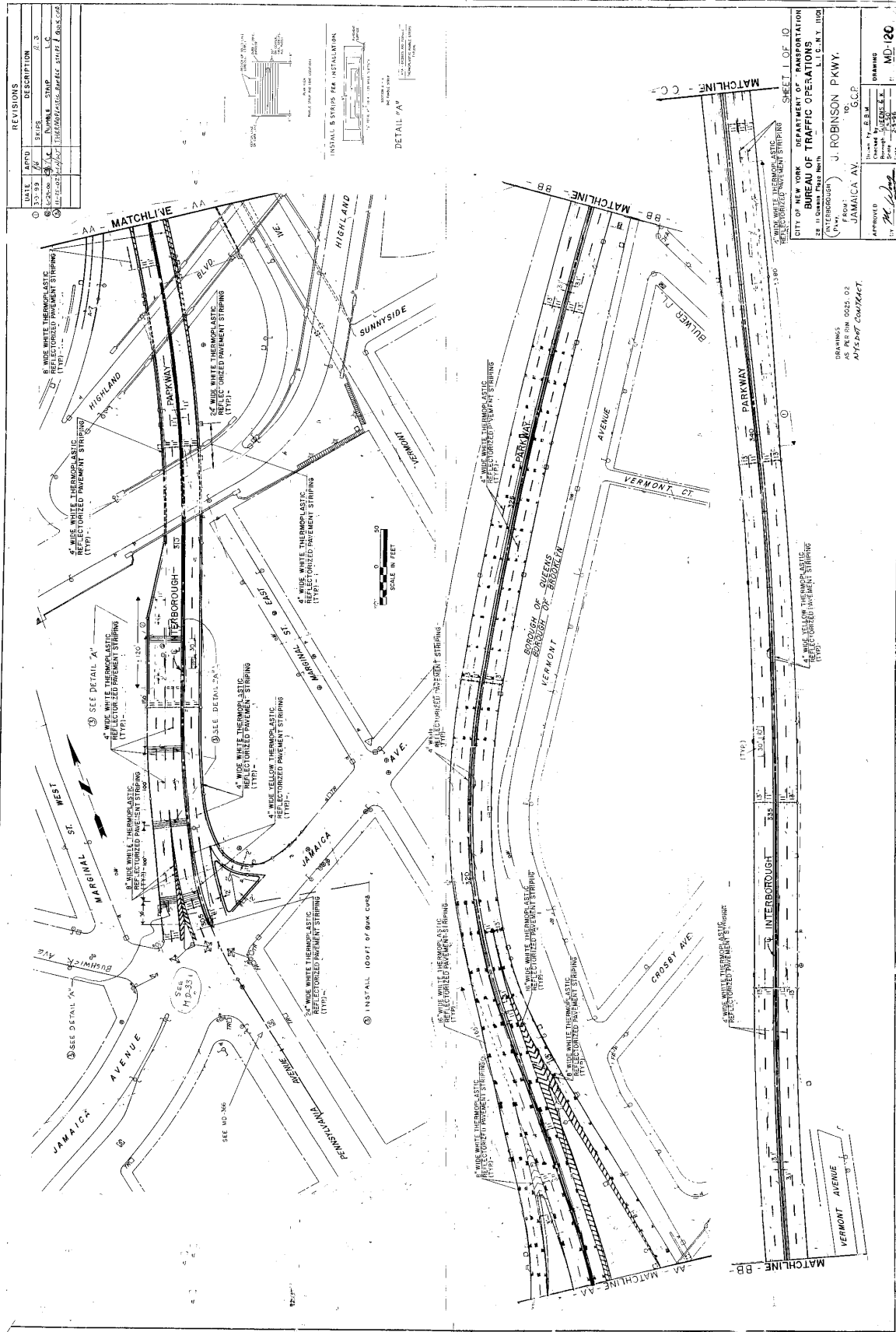
Based upon a three-year total of accidents (1998, 1999, 2000), this

location ranked fifth in the Borough of Brooklyn with respect to vehicular accidents. There were 82 accidents in 1998, 73 accidents in 1999, and **71 accidents in both 2000 and 2001. No fatalities have been reported in the last six years (1998-2003).**

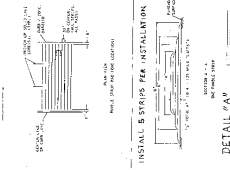
Implemented Improvements

- Oversized turn prohibition signs were installed in May 2000 replacing the standard sized signs at the intersection.
- New signage (e.g., “Rumble Strips Ahead”, “Speed Zone Ahead”, and speed limit signs) were installed on the Jackie Robinson Parkway exit ramp at Bushwick Avenue/Jamaica Avenue in April 2002.
- Thermoplastic rumble strips were installed on the Jackie Robinson Parkway exit at Pennsylvania Avenue in March 2003. In addition, two straight arrows were installed and stop bars and outside lines of channelization were refurbished.
- An electronic speed detection board was installed in June 2003 at the terminus of the Jackie Robinson Parkway approaching Jamaica Avenue on an existing gantry (approximately 300 feet north of the intersection).
- Qwick Kurb was installed on the center channelization of southbound Jackie Robinson Parkway at Bushwick Avenue in April 2003.
- Advanced directional street signs were installed in July 2003.

The improvements are shown on the following two pages.



DATE	APP'D	DESCRIPTION
03-25-89	AK	STRIPS
08-12-89	AK	PAVING STRIP
01-12-92	AK	THEORETICAL CENTER STRIP
01-12-92	AK	THEORETICAL CENTER STRIP

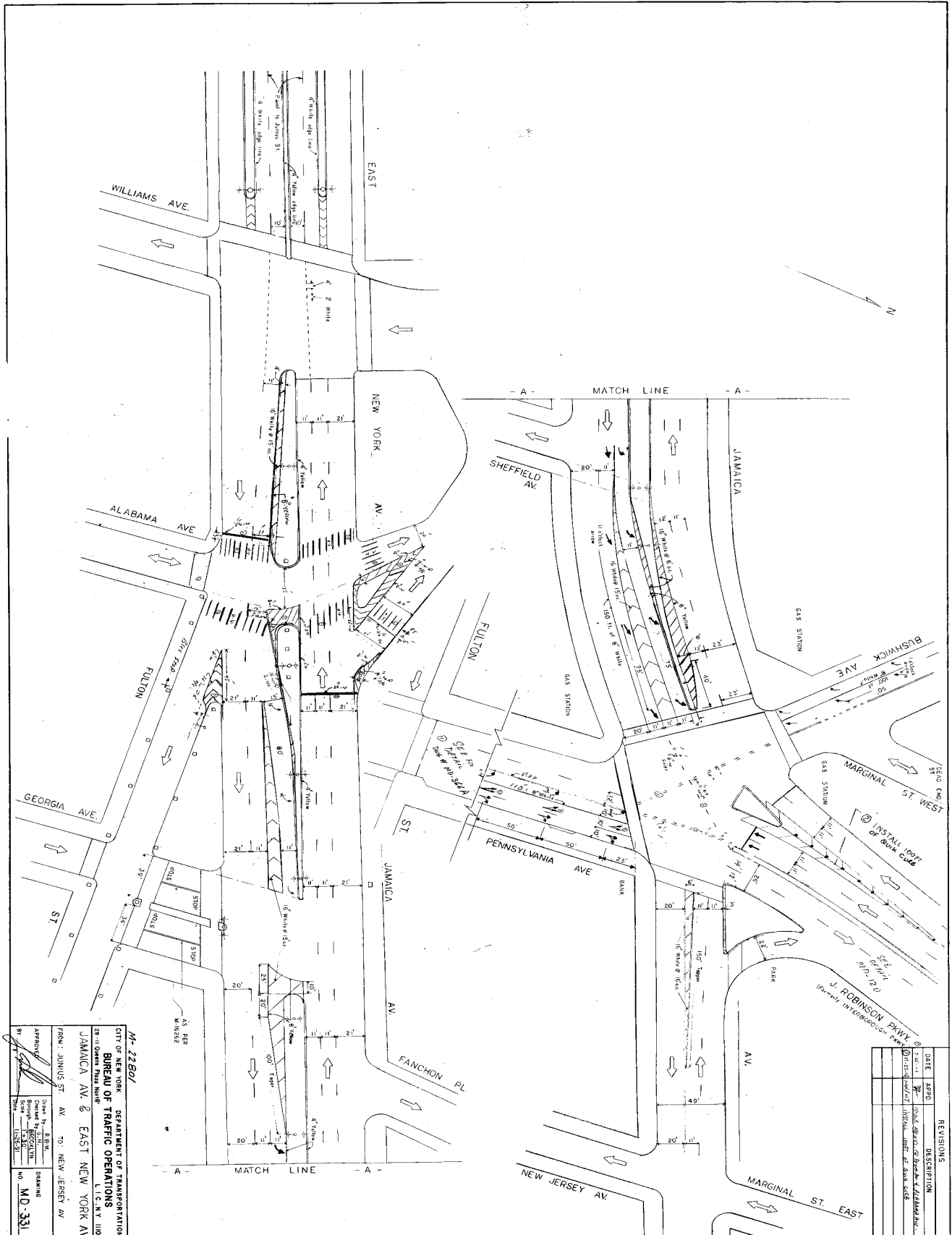


CITY OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF TRAFFIC OPERATIONS
2211 Grand Street North
(Brooklyn)
L.I.C., N.Y. 11203

APPROVED: J. ROBINSON PKWY.
JAMAICA AV.
G.C.P.

Drawn by: E.B.M.
Checked by: J.L.G.S.E.
Reviewed by: J.L.G.S.E.
Date: 11/14/89

MD-180



M-22601
CITY OF NEW YORK
BUREAU OF TRAFFIC OPERATIONS
18-11-Drawing From Book
JAMAICA AV. & EAST NEW YORK AV.
FROM JAMINUS ST. AV. TO NEW JERSEY AV.
DESIGNED BY: E.B.T.
CHECKED BY: J.B.T.
DRAWING NO. MD-331

REVISIONS	
DATE	DESCRIPTION
1/20/12	INSTALL 100 FT OF BULK HEAD
1/20/12	INSTALL INTERMEDIATE PUMP
1/20/12	INSTALL 100 FT OF BULK HEAD
1/20/12	INSTALL INTERMEDIATE PUMP