Safe Streets for Seniors

Sheepshead Bay, Brooklyn

FINAL REPORT

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NEW YORK CITY DOT

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GPI

Safe Streets for Seniors
Sheepshead Bay, Brooklyn
TABLE OF CONTENTS

EXHIBITS

APPENDICES

PROJECT DESCRIPTION

Since 1990 the number of pedestrian fatalities in New York City has decreased by 56%. Moreover, prior to 1950, pedestrians accounted for ¾ of all traffic fatalities and since then, that percentage has decreased to account for about ½ of all traffic fatalities. Despite these statistical improvements, pedestrians continue to be the largest at risk mode – with older adults more likely to suffer serious injuries or fatalities from traffic crashes than other pedestrians. The rate of pedestrian fatalities for every 100,000 persons in the City has decreased by nearly half since 1991 – to 2.0 from 3.8 – while the rate of senior pedestrian fatalities per 100,000 seniors has decreased even more sharply – to 6.6 from 13.1. Nevertheless, while seniors make up only 12% of the population in New York City, they still comprise 39% of pedestrian fatalities. The recognition of the disproportional representation of the senior population among severe pedestrian injuries and fatalities led to the development of the Department's **Safe Streets for Seniors** (SSS) program.

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

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

In this report the Sheepshead Bay SPFA located in Brooklyn has been studied, evaluated and addressed.

Background

BACKGROUND

Land-use in the Sheepshead Bay Study Area includes a mixture of commercial, retail and residential buildings. A majority of the commercial buildings are located along the corridors of Avenue U and Coney Island Avenue. These commercial buildings are typically multi-storied with ground level retail and residential uses on the upper levels. The residential buildings within the study area range from single story houses to apartment buildings with about six stories. It is a densely populated section of Brooklyn.

The Avenue U subway station, which is located between E 15th Street and E 16th Street, is served by the Q subway line. This is a local subway line that carries a significant number of peak hour commuters and off-peak hour passengers to Manhattan and Queens on a daily basis. Bus operations within the study area include the B3, B49, B68, and BM3 lines. Typical pedestrian trips within the area are generated by retail, commercial and residential activity, as well as by several schools that are located within and around the study area. These schools include: PS 153, JHS 234, PS 255, PS 206, Windmill Montessori School, St. Edmund Elementary/High School, Yashivat Or Hatorah and Soille Bais Yaakov High School. Senior pedestrian activity is also generated by the Jay Senior Center, which is located at 2600 Ocean Ave, Brooklyn, NY 11229.

The Sheepshead Bay Study Area has all of the dominant elements typical of an urban environment including vehicular, bus, subway and pedestrian modes of transportation. These multiple travel modes often compete with each other for the limited available right-of-way. This often results in conflicts with the vulnerable senior pedestrian commuters utilizing the crosswalks and sidewalks in their travels. This project will provide recommendations to improve senior pedestrian safety within the study area.

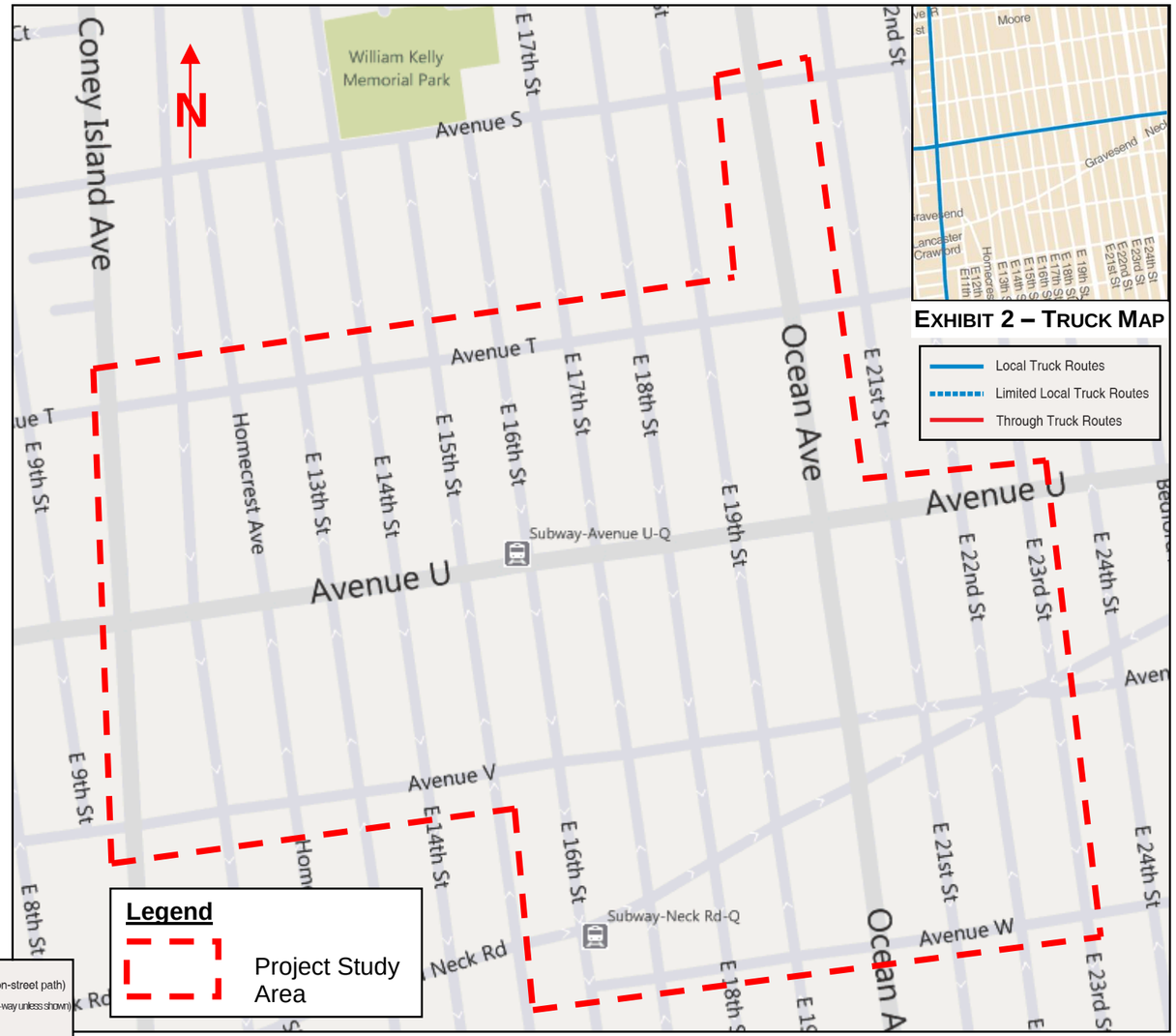


EXHIBIT 2 – TRUCK MAP

EXHIBIT 1 – ROADWAY MAP OF THE STUDY AREA

EXHIBIT 3 – TRANSIT MAP

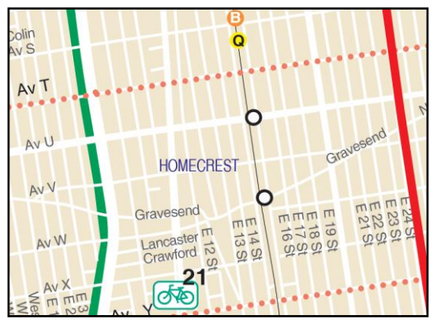
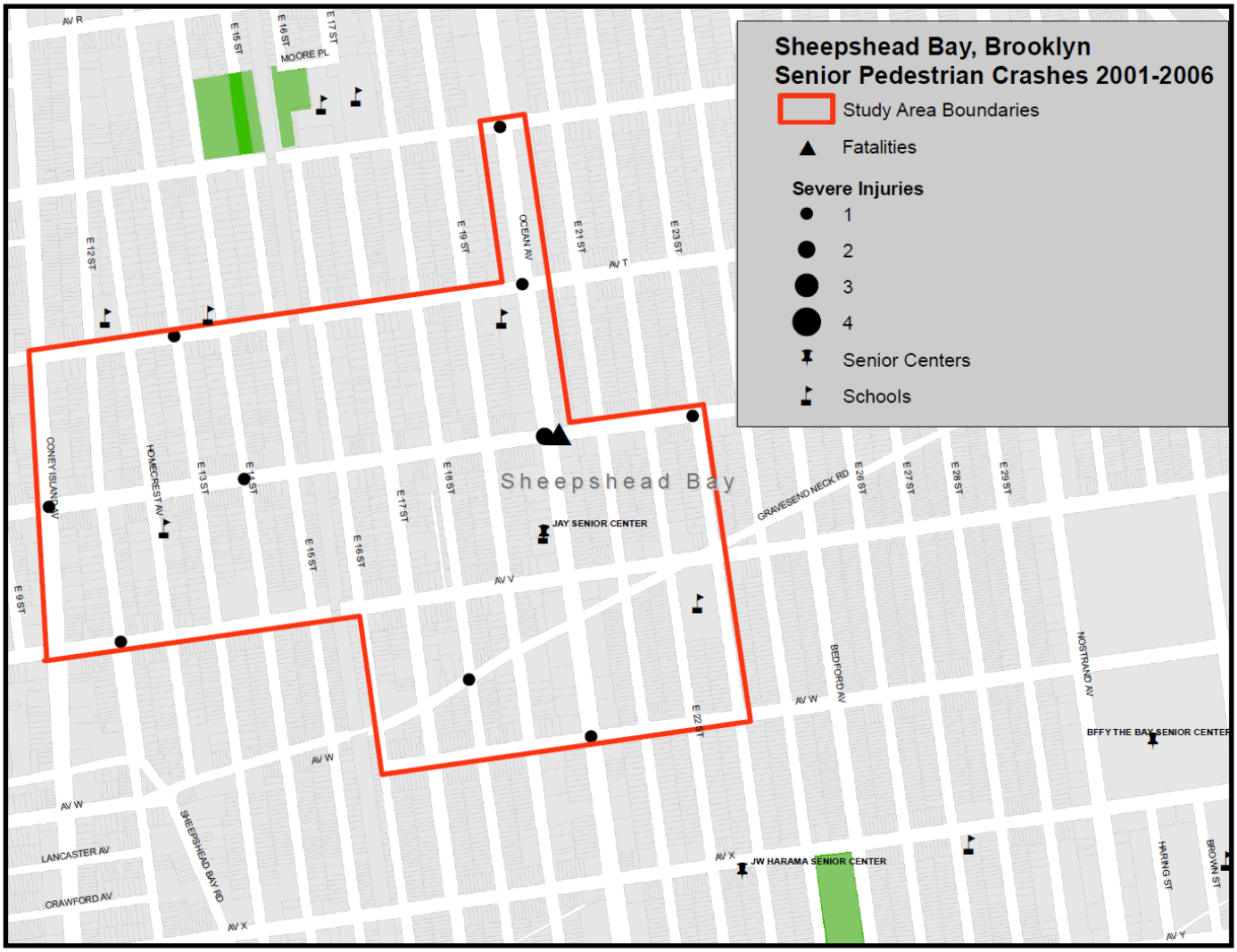


EXHIBIT 4 – BICYCLE ROUTE MAP

EXHIBIT 5 – PEDESTRIAN CRASH STATISTICS (2001-2006)



EXISTING CONDITIONS

The Sheepshead Bay Senior Pedestrian Focus Study Area was selected for senior pedestrian improvements because it was identified as having a history of senior pedestrian crashes. This study area includes five east-west roadway segments: Avenue T, Avenue U, Avenue V, Gravesend Neck Road and Avenue W. The study area also includes small segments of Ocean Avenue and Coney Island Avenue, which provide north-south access to, and through, the study area. All of these roadways have different roadway characteristics, with Avenue U, Ocean Avenue and Coney Island Avenue classified as major arterials and all other roadways operating as minor arterials and local residential streets. Within the study area, these roadways are located mainly within residential areas and provide access to local and through traffic. Exhibits 1, 2, 3 and 4 provide area-wide bus, subway and designated truck route information, as well as a roadway map and a bicycle map of the study area. Exhibit 5 provides the statistics for senior pedestrian crashes occurring within the study area between 2001 and 2006.

In order to determine, evaluate and recommend measures associated with the safety issues faced by senior pedestrians, numerous site visits and interviews with senior pedestrians were conducted. The issues that were repeatedly observed during field visits and noted during these interviews are listed below:

- Insufficient pedestrian crossing time
- Faded or missing crosswalk striping
- Turning vehicles not yielding to pedestrians with right-of-way at intersections
- Speeding motorists
- Insufficient pedestrian signs
- Sidewalk and crosswalk obstructions
- Missing or non-standard ADA pedestrian ramps
- Potholes and poor roadway surface conditions at crosswalks

A photo log of the site visits is included in Appendix A, while the field investigation forms are presented in Appendix B.

It was noted during the site visits that these operational and geometric issues, coupled with high traffic volumes and significant pedestrian activity (including school children and seniors), have made it difficult for these pedestrians to safely cross various roadways within the study area. A description of these observations and findings are discussed below, with appropriate safety recommendations.

In addition to the recommendations proposed in this SPFA report which are geared towards senior pedestrian safety improvements, the NYCDOT is concurrently involved in a similar project which is intended to improve pedestrian

safety in the immediate vicinity of 135 “priority” elementary and middle schools located throughout the five boroughs of New York City. One such “priority” school located within the Sheepshead Bay SPFA is St. Edmund Elementary School, located on Avenue T; however, this school has not yet been studied for pedestrian safety improvements.

RECOMMENDATIONS

Avenue T


Avenue T (looking east)

Photo No. 1

The study segment of Avenue T is approximately 0.51 miles long and intersects 11 cross streets. The avenue is a two-way arterial providing east-west access, with one moving lane in each direction and a parking lane along each curb side (Photo No 1). Parking is generally permitted on both sides of the arterial within the study area. Most of the cross streets that intersect Avenue T are one-way streets providing north-south access, and are generally categorized as local neighborhood roadways. Avenue T also intersects Ocean Avenue and Coney Island Avenue, which are major arterial routes providing north-south access within the study area. Avenue T does not provide bus services nor is it a designated through-truck route; however, the cross streets do provide bus service via the B49, B68, and BM3 lines. Avenue T is located adjacent to predominantly residential neighborhoods with public schools located at either end of the study area, and is a planned bike route.

The field observations and evaluation of traffic data made within this corridor have resulted in various corridor-wide, as well as localized intersection-specific recommendations. These recommendations are shown in the Site 1 illustrations and are described below.

Avenue T Corridor-Wide Recommendations

- Install high visibility crosswalks as well as advanced stop bars at key intersections.
- Install oversized street name signs at key intersecting roadways.
- Install new ADA (Americans with Disabilities Act) compliant pedestrian ramps at various intersections.
- Relocate and/or remove sidewalk and crosswalk obstructions at various intersections.
- Install neck-downs and pedestrian refuge islands at key intersections to reduce pedestrian crossing time. In addition, install new ADA-compliant pedestrian ramps at proposed neck-down locations.

Intersection-Specific Recommendations

The intersection-specific recommendations are in addition to some of the above noted corridor-wide recommendations.

Avenue T and Coney Island Avenue


Avenue T & Coney Island Avenue (looking northwest)

Photo No. 2

- Under the present condition, this intersection is signalized with all crosswalks striped and designated as school crossings. It is recommended that the stop bars be relocated 10 feet in advance of these crosswalks. This relocation will help to improve driver and pedestrian visibility at crosswalks and help prevent "multiple threat" pedestrian-vehicular crashes. The pedestrian ramps at this intersection meet current standards, so there is no need to replace ramps or install new ramps (Photo No 2). During various field visits, this intersection was observed to be one of the major locations subjected to significant traffic and pedestrian activity. Therefore, it is recommended that oversized street name signs be installed for both Coney Island Avenue and Avenue T. It is also recommended that a neck-down be installed on the northwest corner of Coney Island Avenue to reduce pedestrian crossing time at this location. It is anticipated that these measures will provide positive guidance to drivers and will improve pedestrian safety by helping to reduce vehicular-pedestrian conflicts.

Avenue T and E 19th Street

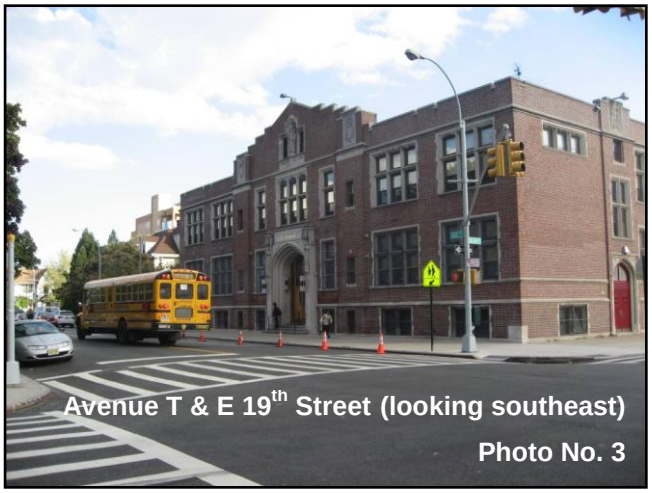

Avenue T & E 19th Street (looking southeast)

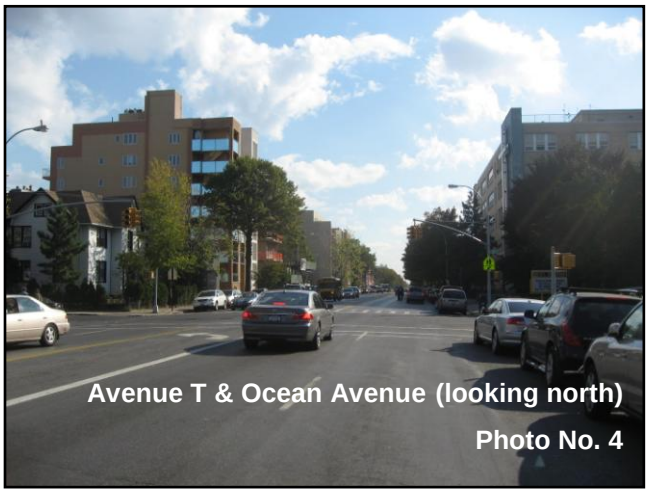
Photo No. 3

- St. Edmund's Elementary School is situated in the southeast quadrant of this intersection (Photo No. 3). At the present time, "No Parking Any Time" signs are located along the south curb of Avenue T and "No Parking 7am-4pm, School Days" signs are located along the east curb of E. 19th Street (in front of

the school building). Under the existing condition, in order to discourage illegal parking in front of the school, traffic cones are often placed along these curbsides. It is recommended that these "No Parking Any Time" signs be replaced with "No Standing Any Time" signs, and that the "No Parking 7am-4pm, School Days" signs be replaced with "No Standing 7am-4pm, School Days". This measure will open up the curb space for vehicular drop-off and pick-up operations in front of the school and will also help to improve pedestrian safety and discourage double parking.

Avenue T and Ocean Avenue

- Presently, this intersection is signalized with standard crosswalks located on the north side and school crosswalks located on the east, west and south sides of this intersection (Photo No. 4). During field observations, the need to reduce the crosswalk length on the Ocean Avenue approaches was noted (particularly for the senior pedestrians). Thus, it is recommended that curb extensions or neck-downs be provided on the northwest, northeast and southeast corners of this intersection. New pedestrian ramps shall also be installed at these proposed neck-down locations. In addition, it is recommended that a pedestrian refuge island be installed in the median on the south leg of this intersection to help senior pedestrians safely cross Ocean Avenue. Construction details for this refuge island are provided in Appendix F. This intersection is also subjected to significant vehicular and pedestrian movements. Therefore, it is further recommended that oversized street name signs be installed for both Ocean Avenue and Avenue T. It is anticipated that these measures will provide positive guidance to drivers and will help to improve pedestrian safety. Traffic counts conducted at this intersection are presented in Appendix D.



Avenue T & Ocean Avenue (looking north)

Photo No. 4

Avenue U

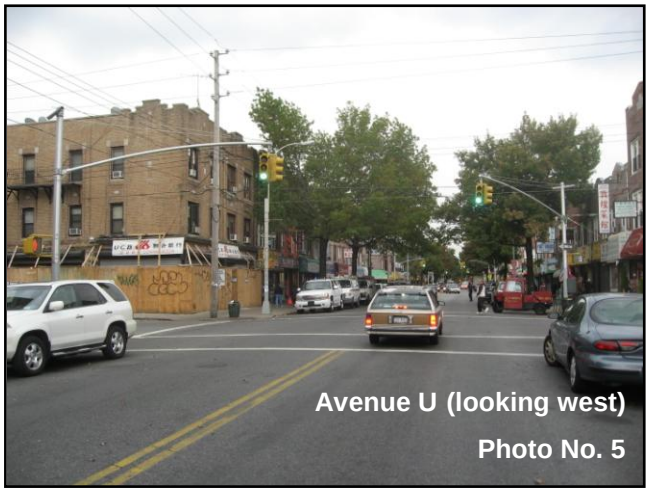

Avenue U (looking west)

Photo No. 5

The study segment of Avenue U is located one block south of Avenue T. It is 0.67 miles long and intersects 14 cross streets. Within the study segment, Avenue U is a two-way arterial providing east-west access with one moving lane in each direction and a metered parking lane along each curb side (Photo No. 5). Most of the cross streets that intersect Avenue U are one-way streets and are generally categorized as local neighborhood roadways providing north-south access. Avenue U also intersects Ocean Avenue and Coney Island Avenue, which are major arterial routes also providing north-south access through the study area. This street is a designated local truck route and provides bus service via the B3 bus line. The cross streets within the study area provide bus services via the B49, B68, and BM3 lines. Avenue U also has a local subway train stop (Q line) between E 15th Street and E 16th Street. The Q subway line provides convenient services to Manhattan and Queens. Avenue U is located along a predominantly commercial strip with a broad range of retail and residential land-use activities that attracts a significant number of pedestrians, including senior citizens.

The field observations and evaluation of traffic data made within this corridor have resulted in various corridor-wide recommendations as well as intersection-specific recommendations. These recommendations are shown on the Site 2 illustration and are also described below.

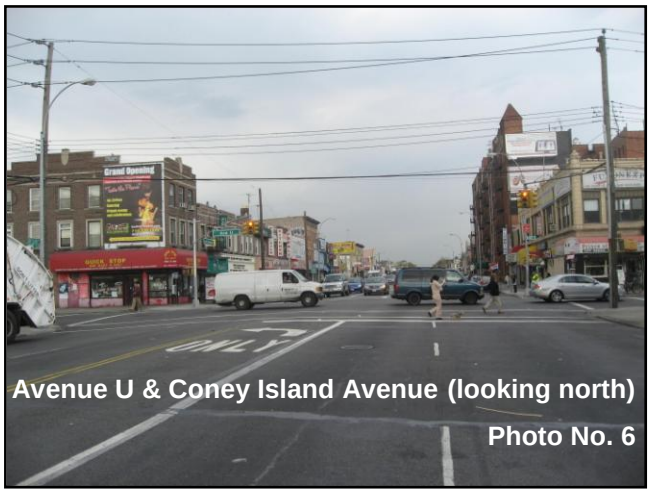
Avenue U Corridor-Wide Recommendations

- Install high visibility crosswalks as well as advanced stop bars at key intersections.
- Install new ADA (Americans with Disabilities Act) compliant pedestrian ramps at various intersections.
- Install neck-downs at key intersections to reduce pedestrian crossing time. In addition, install new ADA-compliant pedestrian ramps at proposed neck-down locations.
- Relocate and/or remove sidewalk and crosswalk obstructions at various intersections.

Intersection-Specific Recommendations

The intersection-specific recommendations are in addition to some of the above noted corridor-wide recommendations.

Avenue U and Coney Island Avenue



Avenue U & Coney Island Avenue (looking north)

Photo No. 6

- Under the present condition, this intersection is signalized with standard crosswalks provided on all of its approaches (Photo No. 6). Traffic counts conducted at this intersection have indicated significant pedestrian activity during various peak traffic hours. There is also the potential for a significant amount of bus-to-bus transfers. During field observations, it was noted that crosswalks on Coney Island Avenue were lengthy and thus, provision of strategically placed curb extensions or neck-downs would help reduce the pedestrian exposure to vehicular traffic, as well as reduce the crosswalk length. Thus, it is recommended that double curb neck-downs be installed on Coney Island Avenue at the northeast and southwest corners. Installation of these neck-downs would also require new pedestrian ramp installations. Traffic counts conducted at this intersection are presented in Appendix D.

Avenue U and E 14th Street


Avenue U & E 14th Street (looking south)

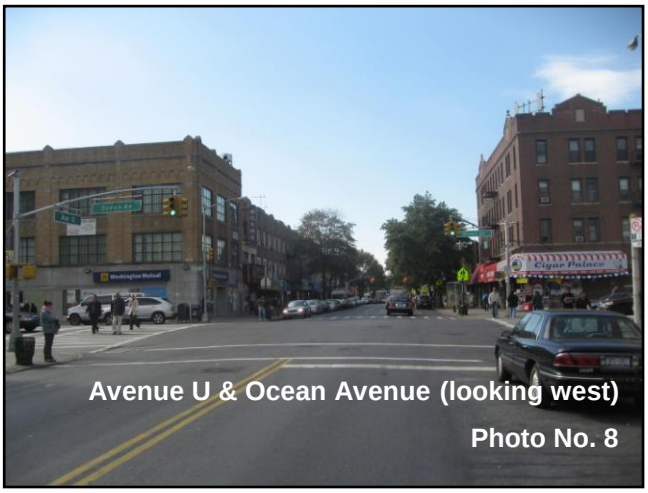
Photo No. 7

- Presently, this intersection is signalized with standard crosswalks provided on all of its approaches (Photo No. 7). It is recommended that the existing crosswalk striping be replaced by high visibility crosswalk striping on all four approaches. In addition, stop bars on the north, east and west approaches should be relocated 10 feet in advance of the newly

striped crosswalks. It is also recommended that a "Yield to Pedestrian" sign with appropriate turn arrow be installed on the southbound approach at this intersection. These measures will provide positive guidance to the drivers and will help to improve overall pedestrian safety.

Avenue U and Ocean Avenue

- Under the present condition, this intersection is signalized, with a standard crosswalk located on its east approach and school crosswalks located on the north, south and west approaches (Photo No. 8). At this intersection, field observations have indicated the need to reduce the crosswalk length on the Ocean Avenue approaches so that senior pedestrians can safely cross the roadway within a traffic signal cycle. Thus, it is recommended that curb extensions or neck-downs be installed at this intersection. These neck-downs are recommended for the northwest and southeast corners of Ocean Avenue. New pedestrian ramps should also be installed at these locations. The installation of neck-downs will give less exposure to pedestrians in order to avoid conflicts with turning vehicles. These measures will help to improve pedestrian safety at this intersection. Traffic counts conducted at this intersection are presented in Appendix D.



Avenue U & Ocean Avenue (looking west)

Photo No. 8

Avenue V


Avenue V (looking west)

Photo No. 9

The study segment of Avenue V is approximately 0.68 miles long and intersects 14 cross streets. Within the study segment, Avenue V is a two-way local roadway providing east-west access with one vehicular lane and a curb-side parking lane along both sides (Photo No. 9). The cross streets that intersect Avenue V are mainly one-way streets and are categorized as local neighborhood roadways providing north-south access. Avenue V also intersects Ocean Avenue and Coney Island Avenue, which are major arterial routes also providing north-south access to the study area. While Avenue V does not provide any transit or through-truck route services, the cross streets do provide bus services via the B49, B68, and BM3 lines. This corridor is located adjacent to predominantly residential surroundings with single family houses and a few apartment buildings up to seven stories high.

The field observations made within this corridor have resulted in various corridor-wide, as well as localized intersection-specific recommendations. These recommendations are shown on the Site 3 illustration and are also described below.

Avenue V Corridor-Wide Recommendations

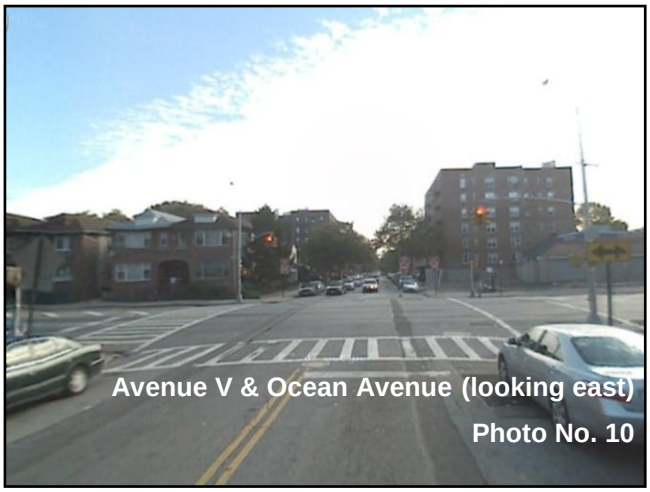
- Install high visibility crosswalks as well as advanced stop bars at key intersections.
- Install oversized street name signs at key intersecting roadways.
- Install new ADA (Americans with Disabilities Act) compliant pedestrian ramps at various intersections.
- Install neck-downs at key intersections to reduce pedestrian crossing time. In addition, install new ADA-compliant pedestrian ramps at proposed neck-down locations.
- Relocate and/or remove sidewalk and crosswalk obstructions at various intersections.

Intersection-Specific Recommendations

The intersection-specific recommendations are in addition to some of the above noted corridor-wide recommendations.

Avenue V and Ocean Avenue

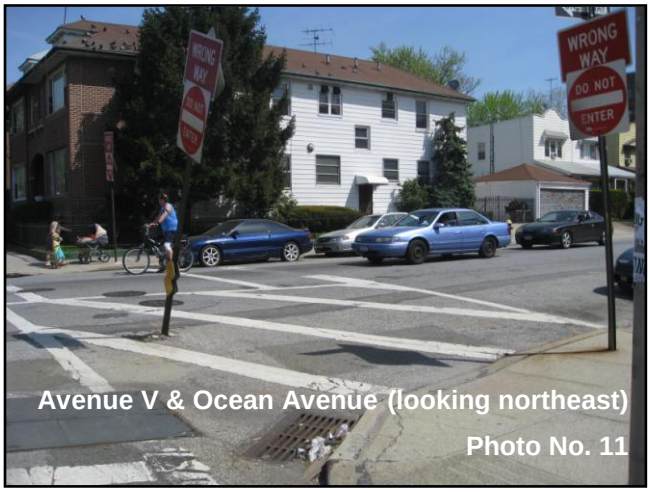
- Currently, this intersection is signalized with standard crosswalks located on the south and east sides and school crosswalks located on the north and west sides of this intersection (Photo No. 10). Field observations have indicated the need to reduce the crosswalk length on the Ocean Avenue approaches so that senior pedestrians can safely cross the roadway within a single traffic signal cycle. Thus, it is recommended that curb extensions or neck-downs be provided at this intersection; however, due to adjacent bus stop locations and curb-side driveways, a neck-down is only proposed on the northwest corner along Ocean Avenue. In addition, it is recommended that the existing striped median on the north side of this intersection be replaced with a pedestrian refuge island. Construction details for this refuge island are provided in Appendix F.



Avenue V & Ocean Avenue (looking east)

Photo No. 10

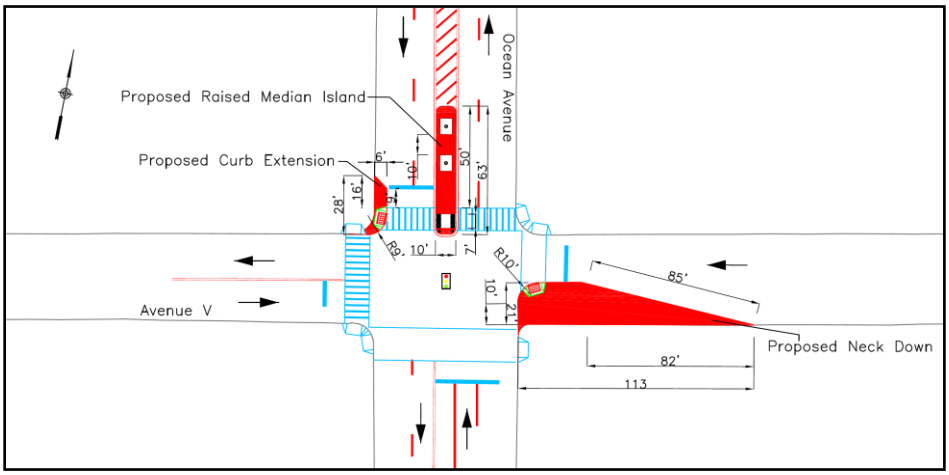
The westbound approach to this intersection is one-way while the eastbound approach accommodates two-way traffic (Photo No. 11). Thus, in order to prevent eastbound drivers from entering into the one-way westbound leg of this intersection, pavement markings in the form of a neck-down as well as the appropriate traffic signs are presently in place. It is recommended that the existing neck-down pavement markings located on the westbound approach be replaced with a raised concrete neck-down, which will create a physical barrier to eastbound traffic and help to reduce



Avenue V & Ocean Avenue (looking northeast)

Photo No. 11

the potential for wrong-way accidents. New pedestrian ramps shall also be installed at this proposed neck-down location. The schematics of the proposed intersection recommendations are presented below.



Proposed Recommendations at Avenue V and Ocean Avenue Intersection

It is further recommended that oversized street name signs be installed at this intersection as well as 'Two-Way Traffic Ahead' signs on the westbound approach. These measures will help to improve pedestrian safety at this intersection.

Avenue V/Gravesend Neck Road between E 22nd Street and E 23rd Street

- Under the present condition, these intersections are signalized. PS 206 (Joseph A. Lamb School) is located on the south side between these two signalized intersections on Avenue V/Gravesend Neck Road. Both of these intersections are six-legged, complex intersections with three approaching legs and three receiving legs. The intersection at E 22nd Street has school crosswalks on the north, south and east sides and a standard crosswalk on its west side (Photo No. 12). Similarly, the intersection at E 23rd Street has school crosswalks on the north, south and west sides and a standard crosswalk on the east side. In order to provide positive guidance to

Avenue V & E 22nd Street (looking east)

Photo No. 12

motorists, it is recommended that “No Left Turn” signs be installed on the westbound approach of Avenue V as it intersects E 22nd Street and on the eastbound approach of Gravesend Neck Road as it intersects E 23rd Street.

During the initial field visit, speeding vehicles were observed within this school block which is used on a regular basis by senior pedestrians as well as school children. As a result of this initial observation, spot speed surveys were conducted during the AM, Midday and PM peak hours (see Appendix E for spot speed study). A review of these spot speed results has indicated the 85th percentile speed is between 22 mph and 27 mph. This is generally in compliance with the posted speed limit of 30 mph; however, about 1% to 6% of the vehicles (during the survey period) were observed operating at a higher speed than the posted speed limit. Thus, consideration should be given to studying the possible installation of speed humps or speed zone speed limit signs on Avenue V and Gravesend Neck Road in the vicinity of the above noted school.

Gravesend Neck Road

Gravesend Neck Road (looking east)

Photo No. 13

The study segment of Gravesend Neck Road is located one block south of Avenue V. The segment is approximately 0.39 miles long and intersects eight north-south cross streets. Within the study area, Gravesend Neck Road is a one-way local roadway with one moving lane and a parking lane along each curb (Photo No. 13). This roadway provides eastbound access to the surrounding neighborhood. The cross streets that intersect Gravesend Neck Road are mainly one-way streets and are categorized as local neighborhood roadways providing north-south access. Gravesend Neck Road also intersects Ocean Avenue, which is a major arterial route providing north-south access through the study area. While no bus lines operate along Gravesend Neck Road, the cross streets do provide bus service via the B49 and BM3 bus lines. The study segment is located within a residential area, predominantly surrounded by two story houses.

The field observations made within this corridor have resulted in various corridor-wide as well as localized intersection-specific recommendations. These recommendations are shown in the Site 4 illustration and are also described below.

Gravesend Neck Road Corridor-Wide Recommendations

- Install advanced stop bars at various intersections.
- Relocate existing “Stop” signs in advance of the crosswalk adjacent to the proposed stop bar at various intersections. Restripe the word “STOP” on the pavement in advance of the stop bar.
- Install neck-downs at key intersections to reduce pedestrian crossing time. In addition, install new ADA-compliant pedestrian ramps at the proposed neck-down locations.
- Install new ADA (Americans with Disabilities Act) compliant pedestrian ramps at various intersections.
- Install oversized street name signs at key intersecting roadways.

Intersection-Specific Recommendations

The intersection-specific recommendations are in addition to some of the above noted corridor-wide recommendations.

Gravesend Neck Road and Ocean Avenue


Gravesend Neck Road & Ocean Avenue
(looking east) Photo No. 14

- Under the current condition, this intersection is signalized with standard crosswalks on the north and east sides and school crosswalks on the south and west sides (Photo No. 14). Field observations have indicated the need to reduce the crosswalk length on the Ocean Avenue approaches so that senior pedestrians can safely cross the roadway within a single traffic signal cycle. Thus, the installation of neck-downs on the northwest and southwest corners of this intersection is recommended. In addition, it is recommended that the existing striped median on the south leg of this intersection be replaced with a pedestrian refuge island. This will help to improve pedestrian safety. Construction details for this refuge island are provided in Appendix F. It is further recommended that oversized street name signs be installed at this intersection.

Avenue W


Avenue W (looking west)

Photo No. 15

This study segment is approximately 0.37 miles long and intersects eight north-south cross streets. Within the study segment, Avenue W is a two-way east-west roadway with one moving lane and a parking lane along each curb-side (Photo No. 15). The cross streets that intersect Avenue W are mainly north-south one-way streets and are categorized as local neighborhood roadways. Avenue W also intersects Ocean Avenue, which is a major arterial route also providing north-south access to the study area. Avenue W does not provide transit services or a through truck route. The cross streets provide service to the B49 and BM3 bus lines. The study segment is located within a residential area, predominantly surrounded by two- to six-story houses and apartment buildings.

The field observations made within this corridor have resulted in various corridor-wide as well as localized intersection-specific recommendations. These recommendations are shown in the Site 5 illustration and are also described below.

Avenue W Corridor-Wide Recommendations

- Install high visibility and standard crosswalks as well as advanced stop bars at key intersections.
- Relocate existing “Stop” signs in advance of the crosswalk adjacent to the proposed stop bar at various intersections. Restripe the word “STOP” on the pavement in advance of the stop bar.
- Install neck-downs at key intersections to reduce pedestrian crossing time. In addition, install new ADA-compliant pedestrian ramps at proposed neck-down locations.
- Install oversized street name signs at key intersecting roadways.

Intersection-Specific Recommendations

The intersection-specific recommendations are in addition to some of the above noted corridor-wide recommendations.

Avenue W and Ocean Avenue

- Presently, this intersection is signalized with standard crosswalks on all of its approaches (Photo No. 16). It is recommended that the existing crosswalk striping be replaced by high visibility crosswalk striping on all four approaches. In addition, stop bars should be relocated 10 feet in advance of the newly striped crosswalks. During field observations, the need to reduce the crosswalk length on the Ocean Avenue approaches was noted (particularly for the senior pedestrians). Thus, it is recommended that curb extensions or neck-downs be provided at this intersection. These neck-downs are recommended to be installed on the northwest and southeast corners of Ocean Avenue. New pedestrian ramps shall also be installed at these proposed neck-down locations. In addition, it is recommended that pedestrian refuge islands be installed on the north and south approaches to this intersection. This will help to improve pedestrian safety. Construction details for these refuge islands are provided in Appendix F. It is further recommended that oversized street name signs be installed at this intersection.

Avenue W & Ocean Avenue (looking south)

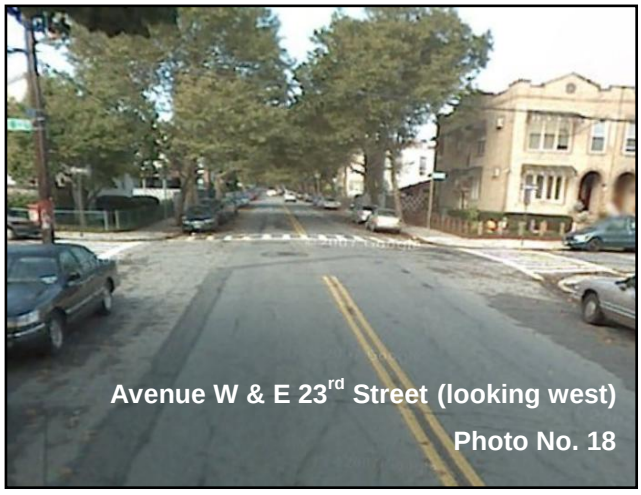
Photo No. 16

Avenue W and E 22nd & E 23rd Streets

- Under the present condition, these intersections are unsignalized and are controlled by "Stop" signs installed on the minor intersecting approaches (E 22nd and E 23rd Streets). Thus, at these intersections, traffic on Avenue W has the right-of-way and operates under uncontrolled or prevailing speed conditions (Photos No. 17 & 18). In addition to the school crosswalks that are presently located on the stop-controlled minor streets, the intersection of Avenue W and E 22nd Street has a school crosswalk on the uncontrolled east leg of Avenue W, and the intersection of Avenue W and E 23rd Street has a school crosswalk on the uncontrolled west leg of Avenue W. It is important to note that the school crosswalks on Avenue W are provided with advance school crossing warning signs; however, it is recommended that these school crossing warning signs be replaced with more stringent "Stop" signs. This will make these intersections all-way stop-controlled. This measure will improve senior pedestrian safety and will help increase the stop compliance at these school crossings. It is also recommended that standard crosswalks be installed on the west leg at the intersection of Avenue W and E 22nd Street and on the east leg at the intersection of Avenue W and E 23rd Street. Stop bars should also be striped 10 feet in advance of the crosswalks on Avenue W. These measures will help to improve pedestrian safety at these intersections.

Avenue W & E 22nd Street (looking west)

Photo No. 17



Avenue W & E 23rd Street (looking west)

Photo No. 18

Other Key Locations

Avenue S and Ocean Avenue

Avenue S & Ocean Avenue (looking north)

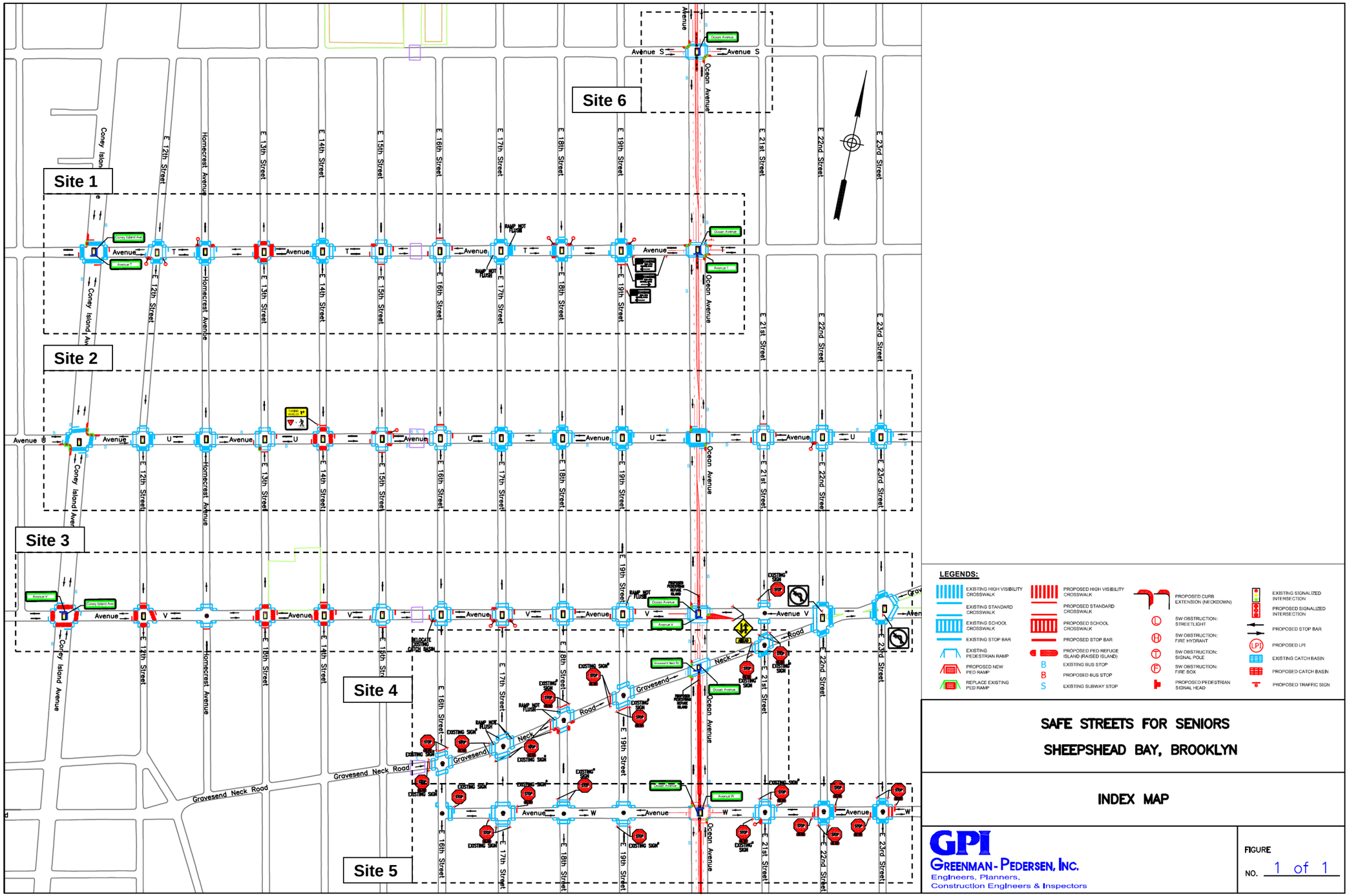
Photo No. 19

- Under the current condition, this intersection is signalized with a standard crosswalk on the south approach and school crosswalks on the north, east and west approaches (Photo No. 19). Traffic counts conducted at this intersection have indicated moderate pedestrian activity during various peak traffic hours. During field observations, the need to reduce the crosswalk length on the Ocean Avenue approaches was also noted (particularly for the senior pedestrians). Thus, it is recommended that curb extensions or neck-downs be provided at this intersection. These neck-downs are to be installed on the northwest and southeast corners of Ocean Avenue. New pedestrian ramps should also be installed at these proposed neck-down locations. In addition, it is recommended that pedestrian refuge islands be installed on the north and south approaches to this intersection. This will help to improve pedestrian safety. Construction details for these refuge islands are provided in Appendix F. It is further recommended that oversized street name signs be installed at this intersection. Traffic counts conducted at this intersection are presented in Appendix D.

It is anticipated that the proposed recommendations, when implemented within each corridor of the Sheepshead Bay SPFA, will help to improve senior pedestrian safety.

INDEX

Illustrating the Solution



LEGENDS:

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

SAFE STREETS FOR SENIORS

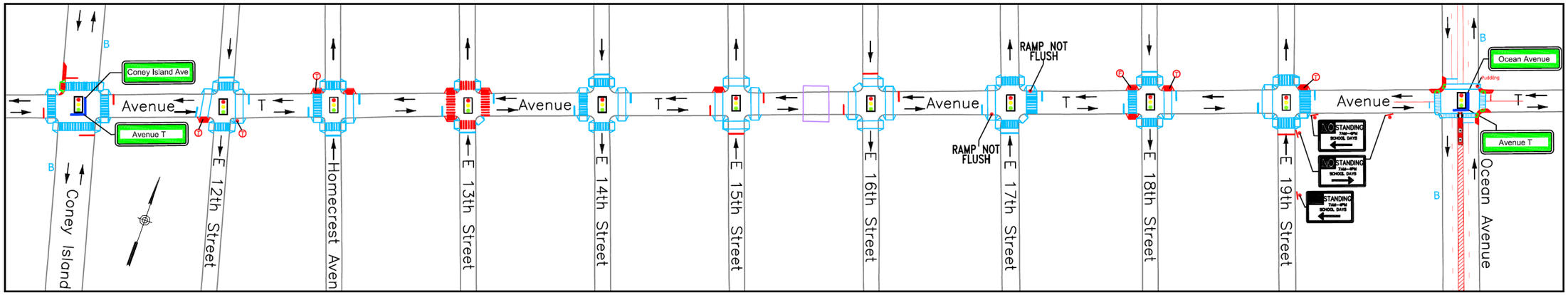
SHEEPSHEAD BAY, BROOKLYN

INDEX MAP

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

FIGURE NO. 1 of 1

SITE 1: AVENUE T (FROM CONEY ISLAND AVENUE TO OCEAN AVENUE)



LEGENDS:

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

Pedestrian concerns in this area:

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

Traffic Analysis:

- Turning movement counts at
  - Avenue T and Ocean Avenue

Traffic count data is shown in Appendix D

Additional Information:

- Parking regulations for the project area have been collected and are shown in Appendix C
- Details of pedestrian refuge island and neck-down construction are shown in Appendix F
- This study area was visited on October 21st, 2008

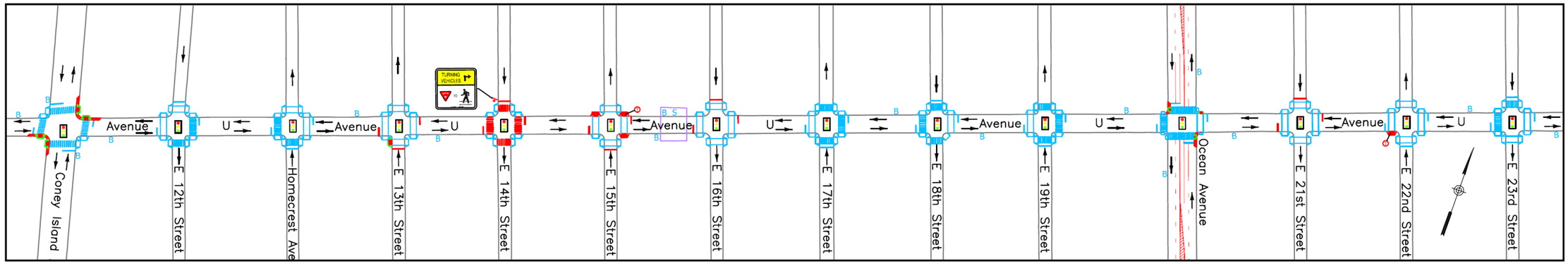
Recommended improvements include:

- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks
- Install new advanced stop bars
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
- Install new 'No Standing 7am-4pm School Days' sign as shown in the illustration
- Install new pedestrian refuge island in the median on the south leg of the intersection of Avenue T and Ocean Avenue
- Install oversized street name signs at the intersections of Avenue T and Coney Island Avenue and Avenue T and Ocean Avenue. The signs are to be located on the signal mast arm facing all four approaches at both intersections
- Relocate sidewalk obstructions:
  - Signal poles on southeast and southwest corners of Avenue T and E 12th Street
  - Signal pole on northwest corner of Avenue T and Homecrest Avenue
  - Signal pole on northeast corner and fire box on northwest corner of Avenue T and E 18th Street
  - Signal pole on northeast corner of Avenue T and E 19th Street
- Install a neck-down or a curb extension:
  - On the northwest, northeast and southeast corners of Avenue T and Ocean Avenue. This may require the removal of one parking space from the existing curb-side parking
  - On the northwest corner of Avenue T and Coney Island Avenue. This may require the removal of one parking space from the existing curb-side parking

Illustrating the Solution

Illustrating the Solution

SITE 2: AVENUE U (FROM CONEY ISLAND AVENUE TO E 23RD STREET)



LEGENDS:

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

Pedestrian concerns in this area:

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

Traffic Analysis:

- Turning movement and pedestrian counts at
  - Avenue U and Coney Island Avenue
  - Avenue U and Ocean Avenue

  Traffic count data is shown in Appendix D

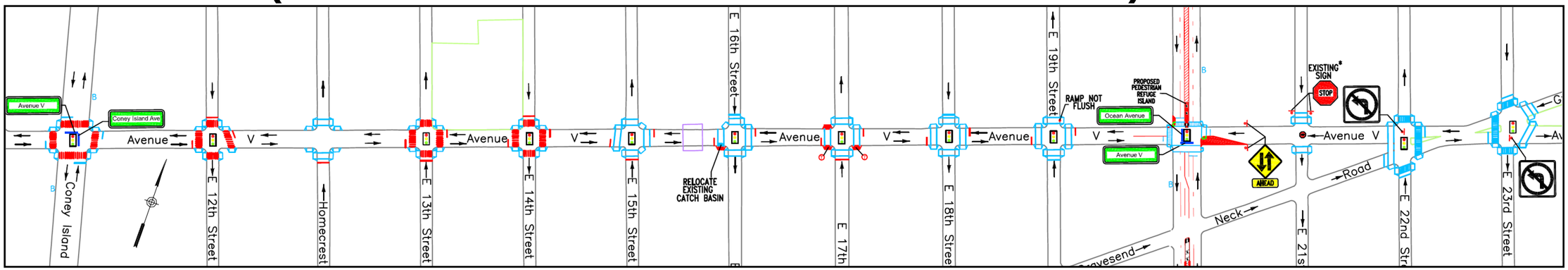
Recommended improvements include:

- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks
- Install new advance stop bars
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
- Install new “Yield to Pedestrian” sign at the intersection shown in the illustration
- Relocate sidewalk obstructions:
  - Signal pole on the northeast corner of Avenue U and E 15th Street
  - Signal pole on the southwest corner of Avenue U and E 22nd Street
- Install a neck-down or a curb extension:
  - On the northwest and southeast corners of Avenue U and Ocean Avenue. This may require the removal of one parking space from the existing curb-side parking
  - On the northeast and southwest corners of Avenue U and Coney Island Avenue. This may require the removal of one parking space from the existing curb-side parking

Additional Information:

- Parking regulations for the project area have been collected and are shown in Appendix C
- Details of neck-down construction are shown in Appendix F
- This study area was visited on October 21st, 2008

SITE 3: AVENUE V (FROM CONEY ISLAND AVENUE TO E 23RD STREET)



LEGENDS:

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

Additional Information:

- Parking regulations for the project area have been collected and are shown in Appendix C
- Details of neck-down construction are shown in Appendix F
- This study area was visited on October 21st, 2008

Pedestrian concerns in this area:

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

Traffic Analysis:

Speed study on Avenue V and Gravesend Neck Road between E 22nd Street & E 23rd Street

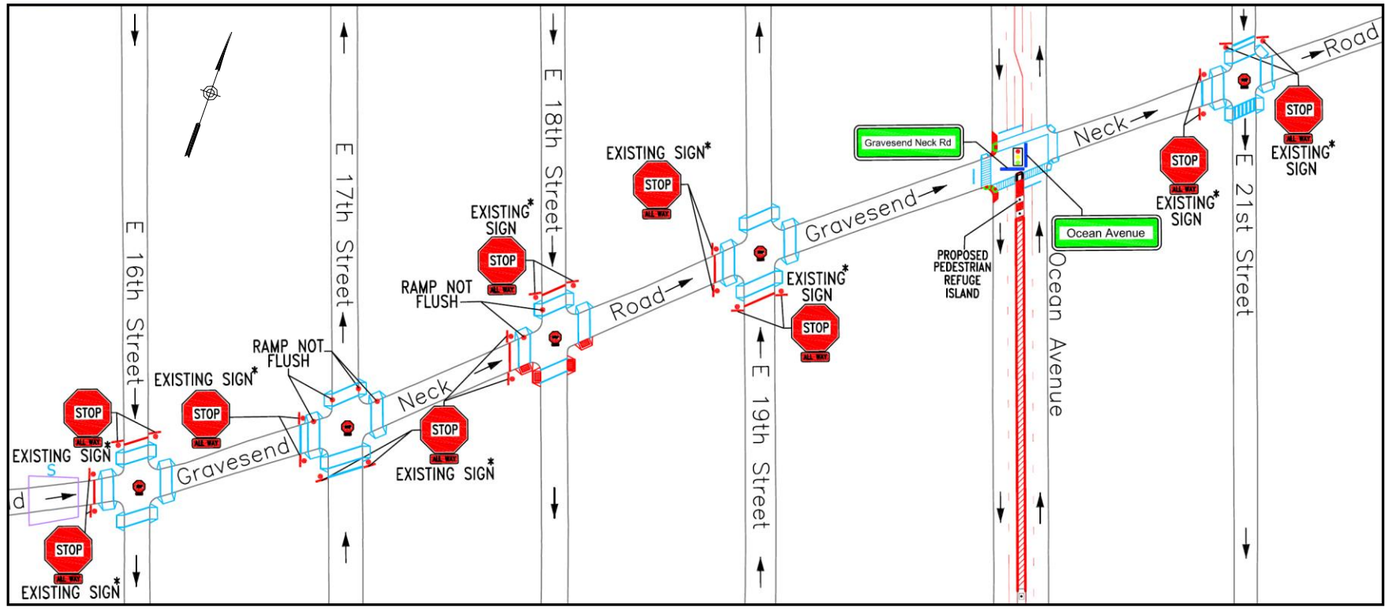
- 85th Percentile = 27 mph (eastbound), 26 mph (westbound)
  Spot Speed Data is shown in Appendix E

Recommended improvements include:

- Time all signals for seniors and where feasible, the crossing time will be extended
- Install new high visibility crosswalks
- Install new advanced stop bars
- * At these locations, relocate the existing “Stop” signs in advance of the crosswalk and adjacent to the stop bar
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
- Install oversized street name signs at the intersections of Avenue V and Coney Island Avenue and Avenue V and Ocean Avenue. The signs are to be located on the signal mast arm facing all four approaches at both intersections
- Install a new pedestrian refuge island (raised median) by replacing the existing striped median island on the north leg of the intersection of Avenue V and Ocean Avenue
- Relocate sidewalk obstructions:
  - Signal poles on the southeast and southwest corners of Avenue V and E 17th Street
- Install a neck-down or a curb extension:
  - On the northwest and southeast corners of Avenue V and Ocean Avenue. This may require the removal of one parking space from the existing curb-side parking
- Install new ‘No Left Turn’ signs at Avenue V and E 22nd Street facing Avenue V and at Gravesend Neck Road and E 23rd Street facing Gravesend Neck Road
- Install new ‘Two-Way Street Ahead’ signs facing the westbound approach at Avenue V and Ocean Avenue

Illustrating the Solution

SITE 4: GRAVESEND NECK ROAD (FROM E 16TH STREET TO E 21ST STREET)



LEGENDS:

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

Recommended improvements include:

- Install new advanced stop bars
- Install new pedestrian ramps. Where proposed, align the ramps with the crosswalks
- Install oversized street name signs at the intersection of Gravesend Neck Road and Ocean Avenue. The signs are to be located on the signal mast arm facing all four approaches
- Install a neck-down or a curb extension:
  - On the northwest and southwest corners of Gravesend Neck Road and Ocean Avenue. This may require the removal of one parking space from the existing curb-side parking
- Install a new pedestrian refuge island (raised median) by replacing the existing striped median island on the south leg at the intersection of Gravesend Neck Road and Ocean Avenue
- * At these locations, relocate the existing “Stop” signs in advance of the crosswalk and adjacent to the stop bar
- On Gravesend Neck Road and cross-streets with stop control, restripe ‘STOP’ on the pavement in advance of the stop bar according to the MUTCD standards

Additional Information:

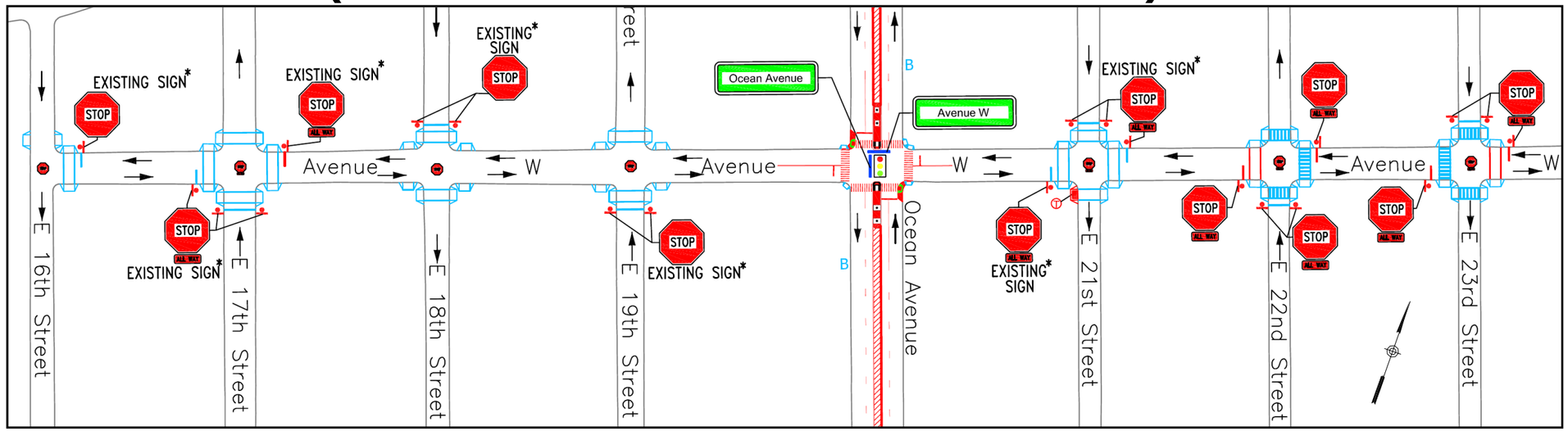
- Parking regulations for the project area have been collected and are shown in Appendix C
- Details of pedestrian refuge island construction are shown in Appendix F
- This study area was visited on October 21st, 2008

Pedestrian concerns in this area:

- Non-standard pedestrian ramps
- Turning vehicles not yielding to pedestrians

Illustrating the Solution

SITE 5: AVENUE W (FROM E 16TH STREET TO E 23RD STREET)



LEGENDS:

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

Pedestrian concerns in this area:

- Non-standard pedestrian ramps
- Turning vehicles not yielding to pedestrians

Additional Information:

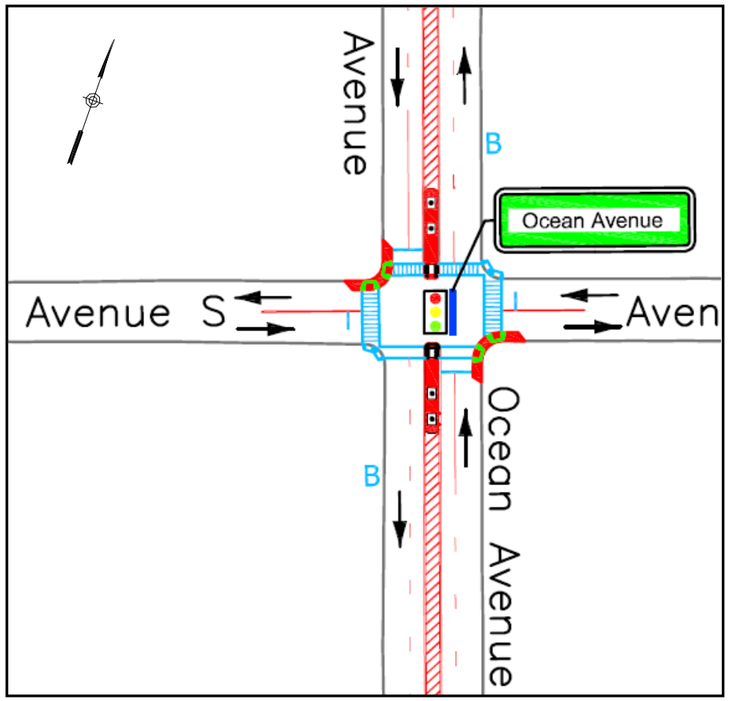
- Parking regulations for the project area have been collected and are shown in Appendix C
- Details of pedestrian refuge island construction are shown in Appendix F
- This study area was visited on October 21st, 2008

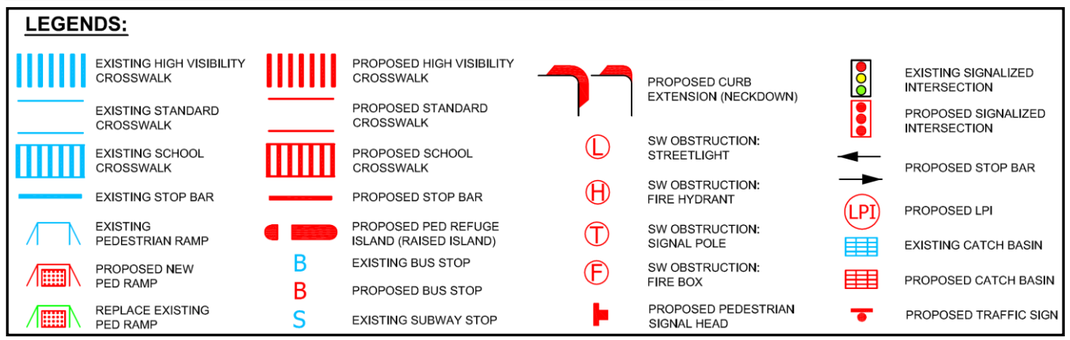
Recommended improvements include:

- Install new high visibility and standard crosswalks
- Install new advanced stop bars
- Install oversized street name signs at the intersection of Avenue W and Ocean Avenue. The signs are to be located on the signal mast arm facing all four approaches
- Relocate sidewalk obstructions:
  - Signal pole on the southwest corner of Avenue W and E 21st Street
- Install a neck-down or a curb extension:
  - On the northwest and southeast corners of Avenue W and Ocean Avenue. This may require the removal of one parking space from the existing curb-side parking
- Install new pedestrian refuge islands in the median on the north and south approaches to the intersection of Avenue W and Ocean Avenue
- Install new 'STOP' sign with 'ALL WAY' supplement sign at Avenue W and E 22nd Street and at Avenue W and E 23rd Street intersections. Add 'ALL WAY' supplement signs to the existing 'STOP' signs at these cross streets.
- * At these locations, relocate the existing "Stop" signs in advance of the crosswalk and adjacent to the stop bar
- On Avenue W and cross-streets with stop control, restripe 'STOP' on the pavement in advance of the stop bar according to the MUTCD standards

Illustrating the Solution

SITE 6: AVENUE S & OCEAN AVENUE





Recommended improvements include:

- Time signal for seniors and where feasible, the crossing time will be extended
- Install new pedestrian ramps at neck-down locations. Where proposed, align the ramps with the crosswalks
- Install oversized street name sign at the intersection of Avenue S and Ocean Avenue. The sign is to be located on the signal mast arm facing the eastbound and westbound approaches
- Install new pedestrian refuge islands in the median on the north and south approaches to the intersection of Avenue S and Ocean Avenue
- Install a neck-down or a curb extension:
  - On the northwest and southeast corners of Avenue S and Ocean Avenue. This may require the removal of one parking space from the existing curb-side parking

Additional Information:

- Parking regulations for the project area have been collected and are shown in Appendix C
- Details for pedestrian refuge island and neck-down construction are shown in Appendix F
- This study area was visited on October 21st, 2008

Traffic Analysis:

- Turning movement counts at
  - Avenue S and Ocean Avenue

Traffic count data is shown in Appendix D

Pedestrian concerns in this area:

- Turning vehicles not yielding to pedestrians
- Signal timing (insufficient crossing time)

Illustrating the Solution