4. TRAFFIC AND TRANSPORTATION

4.1 Introduction

The study area is bounded by Kings Highway on the north, Riegelmann Boardwalk on the south, Bay Parkway and West 37th Street on the west, and Coney Island Avenue and West End Avenue on the east. It has grid-like arterial network structure with two distinct grid systems coming together at Stillwell Avenue at a 45° angle. Surf Avenue, Mermaid Avenue, Neptune Avenue, the Shore (Belt) Parkway, and Kings Highway are the main east/west corridors traversing the Study area, with Coney Island Avenue, Ocean Parkway, McDonald Avenue/Shell Road, and Stillwell Avenue running north/south. Cropsey Avenue and 86th Street which form the other grid system run in a north west/south east direction with Bay Parkway at right angle in the north east/south west direction. Figure 4-1 illustrates the access routes to the study area and its main corridors.

The street network provides very good vehicular access to and from the study area. The Belt Parkway is the only regional facility that passes through the area. It provides access to Staten Island, Long Island, Queens and Brooklyn. It is a major east-west six-lane uninterrupted flow facility located in the southern portion of the study area with four entrance and exit ramps at Bay Parkway, Cropsey Avenue, Ocean Parkway and Coney Island Avenue. The Shore (Belt) Parkway is the main highway (non-commercial traffic only) serving southern Brooklyn from Gowanus Expressway to the west and the Southern State Parkway in Nassau County to the east, and it also provides access to John F. Kennedy International Airport. The characteristics of the major local arterials are as follows:

Surf Avenue is an east-west arterial street extending from West 37th Street to Ocean Parkway, and it is the southernmost arterial in the study area running near to the shore line. Typically, Surf Avenue comprises of two moving lanes and one parking lane in each direction, with a painted median (10 feet wide) for emergency vehicle use. There are residential and commercial as well as major recreational/entertainment centers located along this corridor.

Figure 4-1: Main Access Routes to Study Area

Legend

Study Area
Major Corridor

Mermaid Avenue which is a collector street runs parallel to (and between) Surf and Neptune Avenues from West 37th Street to Stillwell Avenue. It has one moving lane with a parking lane in each direction. There is a mixture of residential and commercial/retail land uses along this corridor.

Neptune Avenue is another east-west collector that extends from West 37th Street to West End Avenue. It has two moving lanes and a parking lane in each direction, and exclusive left-turn lanes at key intersections. Land use along this corridor includes residential, commercial, industrial and institutional (school) uses.

Kings Highway is an east-west collector street that extends from Bay Parkway in Bensonhurst to Eastern Parkway in Weeksville. It has one moving lane and a parking lane in each direction in the study area. There is a mixture of commercial/retail and residential uses along this corridor in the study area.

Coney Island Avenue is a north-south collector street running from Fort Hamilton Parkway (near Prospect Park) to Riegelman Boardwalk. In the study area, it has two moving lanes and one parking lane in each direction. There is a mixture of commercial/retail and residential uses along this corridor in the study area.

Ocean Parkway is a major two-way arterial for non-commercial traffic that runs from the Prospect Expressway to Surf Avenue in Coney Island. It has a main line and service roads with three moving lanes in each direction and left-turn lanes on the main line and one moving lane and parking lane on the service roads. The service roads are separated from the main line by a landscaped median with pedestrian and bicycle paths. There are only residential and institutional (schools, religious gathering places, and a hospital) along this corridor.

Stillwell Avenue is another north/south collector that traverses the study area from Avenue P to Surf Avenue. It has one moving lane in each direction under the train viaduct; but, outside the

viaduct, there is an additional moving lane in each direction. Along Stillwell Avenue there is a mixture of residential, commercial/retail and industrial uses.

Cropsey Avenue runs diagonally through the study area from Bay Parkway to Neptune Avenue. Between Bay 50th Street and Neptune Avenue, Cropsey Avenue has three moving lanes in each direction, serving a high volume of vehicles entering and exiting the Shore Parkway. South of Neptune Avenue, Cropsey Avenue becomes West 17th Street and it terminates after two blocks at Surf Avenue. West 17th Street is a two-way collector street and has one moving lane and one parking lane in each direction. North of the Belt Parkway there are primarily residential uses while south of the Belt Parkway there is a mixture of industrial and commercial uses.

Bay Parkway runs diagonally from Kings Highway to Shore (Belt) Parkway in the study area. It has two moving lanes with one parking lane in each direction. It collects traffic from the parkway and distributes it through out the study area. There is a mixture of residential, commercial/retail, and institutional uses along Bay Parkway.

McDonald Avenue is a north/south collector that extends from Avenue P/Quentin Road and Avenue X in Gravesend. It becomes Shell Road between Avenue X and the Belt Parkway. McDonald Avenue has one moving lane in each direction and runs under the viaduct of the F train. Outside the viaduct, there is an additional moving lane and a parking lane in each direction. There is a mixture of residential, commercial, and industrial uses along McDonald Avenue and Shell Road.

Eighty-sixth (86th) Street is a collector that extends from Shore Parkway to McDonald Avenue. It runs under the subway viaduct of the M and D lines within the study area. It has one moving lane in each direction under of viaduct and outside of the viaduct columns; there is an additional moving lane and a parking lane in each direction. Along 86th Street there is a mixture of residential and commercial uses.

4.2 Activity Centers and the Transportation Network

Peak hour vehicular trips in the study area are distributed between work and personal activities. The origin of trips leaving the area during the AM peak hour (home based trips or origins) are distributed through out the study area. The destinations, however, tend to be in a few activity centers where employment, commercial/retail activities, and services are concentrated. In the summer months, there is an evening peak associated with the amusement park/recreational activity. The study area street network does not process high volumes of through traffic, except along the Belt Parkway. Almost all the traffic in the area has an origin or destination within Coney Island, Gravesend and Brighton Beach.

There are basically eight activity centers in the study area. The four major ones are concentrated in the southwest section of the study area and the four smaller centers on the north and eastern periphery. Figure 4-2 shows the activity centers which are described below:

- *Activity Center #1* is located along Cropsey Avenue between the Belt Parkway and Neptune Avenue. Its main attractions are a big-box retail store (Home Depot) and a Pathmark supermarket. It also includes a site which is currently occupied by Linens N Things. This location is very accessible by private auto and is also served by the B82 and X28 buses.

- *Activity Center #2* is located along Surf Avenue between West 17th Street and West 8th Street. It is comprised primarily of amusement and recreational activity centers as well as the beach. It includes the New York Aquarium, Coney Island Amusement Park, Keyspan Park (a minor league baseball stadium), and Nathan's. This area is well served by public transportation with train stops at Stillwell Avenue and West 8th Street as well as the X28, X29, B36, B68, and B74 buses.

- *Activity Center #3 is* the Coney Island Hospital. It is located on Ocean Parkway and Avenue Z just north of the Shore Parkway. Coney Island Hospital is the largest medical facility in southern Brooklyn. The hospital has 440 in-patient beds and an extensive ambulatory care program, which includes a hospital-based primary care center and an outreach site at the Community Health Center in Coney Island. The hospital provides a full range of general and

specialty ambulatory care services, as well as full emergency and in-patient services. It is adequately served by transit with three public bus lines (B1, B4, and B36) that stops adjacent to the hospital, and it is easily accessible by automobile.

- *Activity Center #4* is the Ceasar's **Bay** Mall that is located south of the Shore Parkway Service Road and east of Bay Parkway. It consists of approximately 49,000 square feet of commercial/retail space with approximately 812 parking spaces. It includes major retailers such as Kohl's, Radio Shack, Toys R Us, Best Buy, and Modell's. There are two public bus lines (B6 and B82) that stop at or near the Mall.

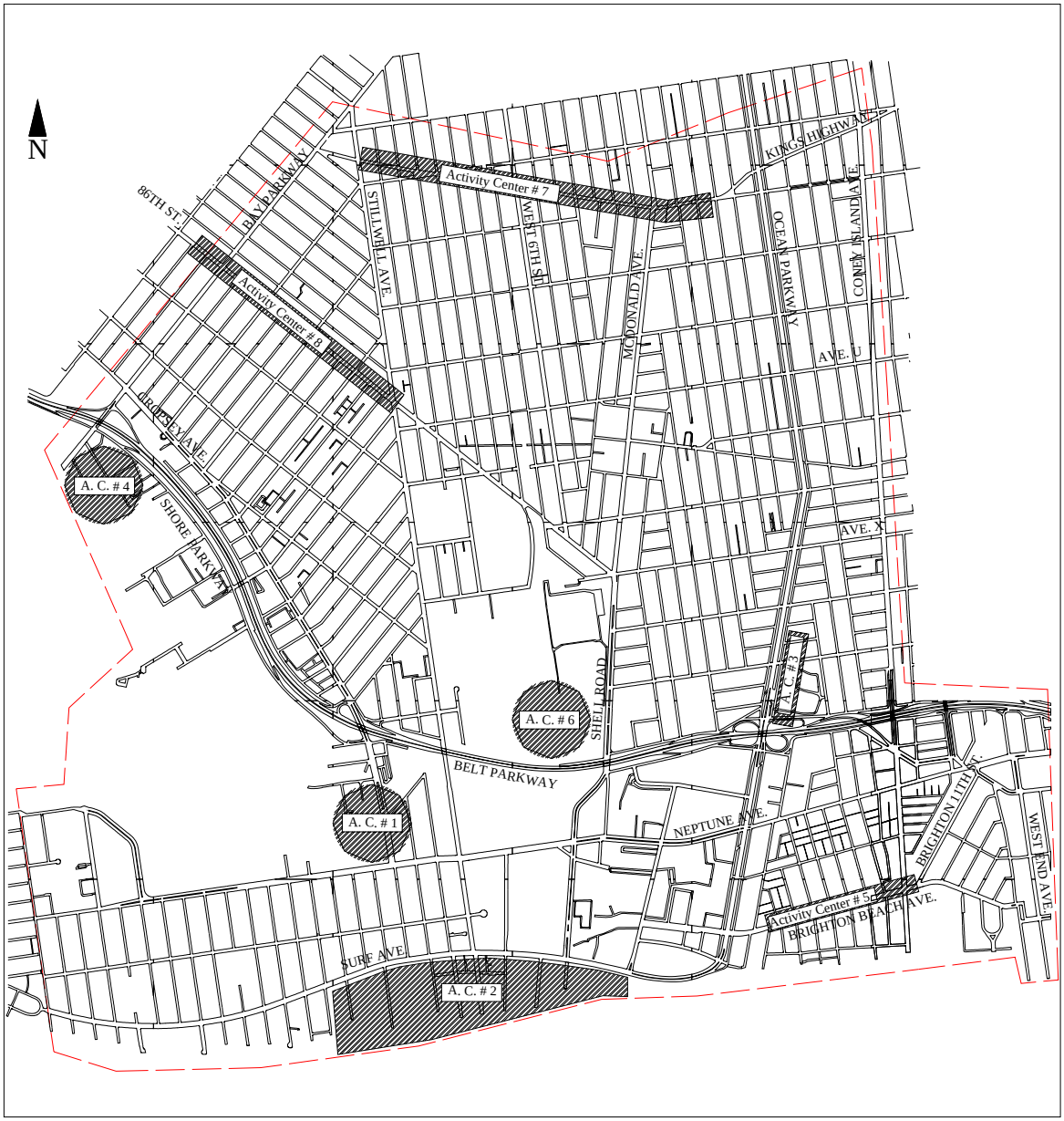
- *Activity Center #5* is located along Brighton Beach Avenue in the south-eastern tip of the study area. It includes retail stores (shoes, clothing, and pharmacy), grocery stores and supermarkets, entertainment (restaurants and clubs), and banking.

- *Activity Center #6* is the only major industrial activity center in the study area. It is located north of the Belt Parkway between Shell Road and Stillwell Avenue. It includes the New York City Transit rail yard as well as a number of automobile repair shops.

- *Activity Center #7* includes a strip of local retail stores along Kings Highway from Ocean Parkway to Stillwell Avenue.

- *Activity Center #8* is similar to Activity Center #7; it includes local retail stores along 86th Street between Bay Parkway and Stillwell Avenue.

Figure 4-2: Activity Centers in Coney Island/Gravesend



Legend

Activity Center

4.3 Data Collection & Traffic Operations

Traffic Network

Existing traffic conditions were defined through field surveys conducted from April to June 2002, and supplemented with information from recent environmental impact statements (EIS) projects within the study area, as well as from other previous studies such as Cropsey Avenue Home Depot FEIS, The Baseball Stadium at Park (Keyspan Park), and Bayside Theaters EA.

Traffic volume counts included vehicle classification, turning movements and pedestrian counts for three midweek days (Tuesday, Wednesday, and Thursday) during the AM, midday, and PM peak hours; as well as the Saturday peak hour. New Automatic Traffic Recording (ATR) machines were installed at six locations to collect daily volumes for the duration of seven days. Additional ATR data was obtained from NYSDOT and NYCDOT archives.

The ATR locations are as follows:

1. Shell Road @ Avenue X
2. Neptune Avenue @ West 6th Street
3. 86th Street @ Avenue U
4. Ocean Parkway @ Avenue Z
5. Bay Parkway between Cropsey Avenue and Bath Avenue
6. Belt Parkway Ramps at Bay Parkway

Figure 4-3 shows the traffic count locations and Figure 4-4 shows the traffic controls in the study area.

Figure 4-3: ATR, Manual, and Pedestrian Count Locations

Legend

- Turning Movement Counts
- Automatic Traffic Recorder (ATR)
- Pedestrian Counts

Figure 4-4: Type of Traffic Control System

Legend

- Signalized Intersection
- Unsignalized Intersection

Vehicle classification and turning movement counts were conducted for the various peak periods at the following locations:

1. Kings Highway @ Ocean Parkway, signalized
2. Kings Highway @ McDonald Avenue, signalized
3. Kings Highway @ Coney Island Avenue, signalized
4. Kings Highway @ Stillwell Avenue, signalized
5. Bay Parkway @ 86th Street, signalized
6. 81st Street @ 23rd Avenue, unsignalized
7. 84th Street @ 23rd Avenue, signalized
8. Bay 32nd Street @ Benson Avenue, signalized
9. Bay 35th Street @ Benson Avenue, unsignalized
10. Bay 35th Street @ Bath Avenue, signalized
11. 86th Street @ Stillwell Avenue, signalized
12. Harway Avenue @ Cropsey Avenue, unsignalized
13. Bay 48th Street @ Cropsey Avenue, signalized
14. Bay 49th Street @ Stillwell Avenue, signalized
15. Harway Avenue @ Stillwell Avenue, signalized
16. Avenue Z @ West 15th Street, unsignalized
17. Bay 54th Street @ Cropsey Avenue, signalized
18. West 11th Street @ Avenue S, unsignalized
19. West 7th Street @ Avenue S, unsignalized
20. West 9th Street @ Avenue T, signalized
21. West 5th Street @ Avenue T, signalized
22. West 11th Street @ Avenue U, signalized
23. West 7th Street @ Avenue U, signalized
24. Ocean Parkway @ Avenue W, signalized
25. McDonald Avenue @ 86th Street & Avenue X, signalized
26. Avenue X @ West 3rd Street, signalized
27. Avenue Y @ West 3rd Street, unsignalized
28. Avenue Y @ East 2nd Street, unsignalized

29. Avenue Y @ East 3rd Street, unsignalized
30. Ocean Parkway @ Avenue X , signalized
31. Ocean Parkway @ Avenue Z, signalized
32. Shell Road @ Avenue Z, signalized
33. Shell Road @ Neptune Avenue, signalized
34. Coney Island Avenue @ Neptune Avenue, signalized
35. West 12th Street @ Neptune Avenue, signalized
36. Cropsey Avenue @ Neptune Avenue &West 17th Street, signalized
37. Memaid Avenue @ Stillwell Avenue, signalized
38. Surf Avenue @ Stillwell Avenue, signalized
39. West 8th Street @ Surf Avenue, signalized
40. West 17th Street @ Mermaid Avenue, signalized
41. West 21st Street @ Mermaid Avenue, unsignalized
42. West 31st Street @ Bay View Avenue, unsignalized
43. West 37th Street @ Neptune Avenue, unsignalized
44. West 37th Street @ Surf Avenue, unsignalized
45. Coney Island Avenue @ Belt Parkway Entrance/Guider Avenue, signalized
46. Ocean Parkway @ Brighton Beach , signalized
47. Brighton Beach @ Coney Island Avenue, signalized
48. Ocean Parkway @ Neptune Avenue, signalized
49. Bay Parkway @ Cropsey Avenue, signalized
50. Brighton Beach @ Brighton 11th Street, signalized
51. Neptune Avenue @ Brighton 10th Street, signalized
52. Neptune /Emmons Avenue @ East 14th Street/Shore Parkway, signalized
53. Brighton Beach @ Brighton 4th Street, signalized

Pedestrian Data

During the summer months there is heavy pedestrian traffic in certain parts of the study area due to the presence of the amusement park, recreational facilities, and the beach. Two sets of pedestrian counts were conducted. Pedestrian counts were conducted at the locations listed

below during the summer recreation period, as well as when regular manual turning movement counts were being collected.

Summer Pedestrian Count Locations:

1. West 21st Street @ Surf Avenue
2. West 5th Street @ West Brighton Avenue
3. West 17th Street @ Surf Avenue
4. West 8th Street @ Surf Avenue
5. West 5th Street @ Surf Avenue
6. Mermaid Avenue @ Stillwell Avenue
7. Mermaid Avenue @ West 17th Street
8. Brighton Beach Avenue @ Ocean Avenue
9. Ocean Parkway @ Brighton Beach Avenue
10. Stillwell Avenue @ Surf Avenue

Pedestrian Count Locations used in LOS analysis:

1. Kings Highway @ Ocean Parkway
2. Kings Highway @ McDonald Avenue
3. Bay Parkway @ 86th Street
4. Bay 35th Street @ Bath Avenue
5. Harway Avenue @ Stillwell Avenue
6. West 7th Street @ Avenue U
7. Ocean Parkway @ Avenue W
8. McDonald Avenue @ 86th Street & Avenue X
9. Avenue X @ West 3rd Street
10. Ocean Parkway @ Avenue X
11. Ocean Parkway @ Avenue Z
12. Coney Island Avenue @ Neptune Avenue
13. Cropsey Avenue @ Neptune Avenue &West 17th Street
14. Memaid Avenue @ Stillwell Avenue

15. Surf Avenue @ Stillwell Avenue
16. West 8th Street @ Surf Avenue
17. West 17th Street @ Mermaid Avenue
18. Coney Island Avenue @ Belt Parkway Entrance/Guider Avenue

Traffic Control Devices

An inventory of traffic control devices including signal timing, phasing, and control type (such as stop and yield signs) was conducted.

Parking Data

Data was collected for off-street parking facilities as well as on-street meter parking and non-meter parking.

Accident Data

Accident data for 27 intersections for the years 1996-2000 from NYSDOT and DMV records was analyzed to identify patterns in the study area.

4.4 Network Traffic Volumes

A balanced traffic network for the various peak periods was prepared using the ATRs and the manual turning movement counts. This information has been plotted on traffic flow maps for the AM peak hour (8:00 - 9:00), midday peak hour (1:00 - 2:00), and PM peak hour (5:00 - 6:00). Figures 4-5, 4-6, and 4-7 show the network volumes for the AM, midday, and PM peak hours, respectively.

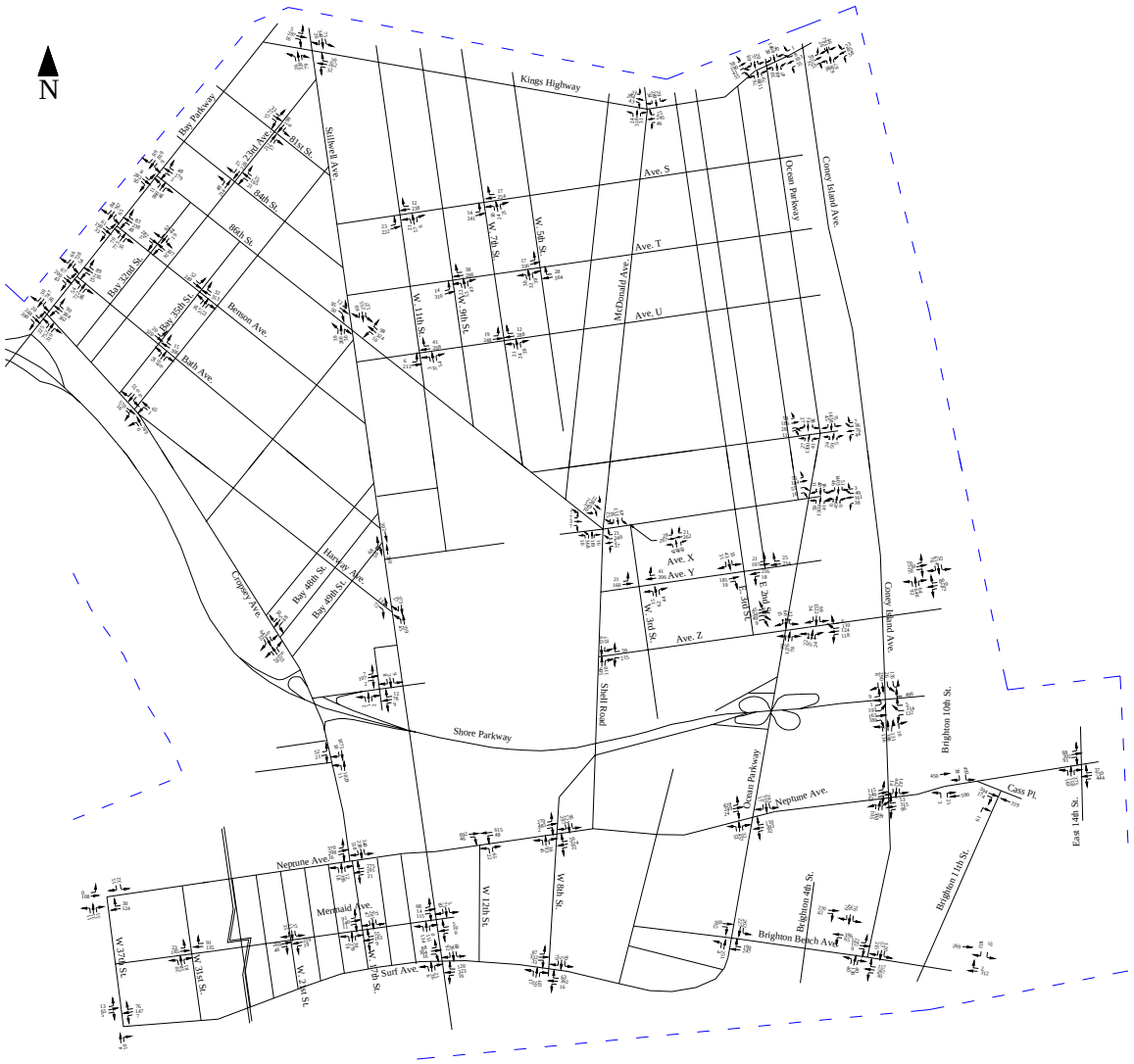
Data collected from the Automatic Traffic Recording (ATR) machines showed that Ocean Parkway processed the highest number of vehicles for all peak periods in the study area. The ATR machines showed the following:

1. Shell Road @ Avenue X - southbound traffic volume was approximately 828, 661, and 809 vehicles per hour (vph) in the AM, midday, and PM peak hour, respectively. Northbound

Exhibit 4-5: AM Peak Hour Volume

Figure 4-6: Midday Peak Hour Volume

Figure 4-7: PM Peak Hour Volume



traffic volume was approximately 686, 645, and 720 vph in the AM, midday, and PM peak hour, respectively.

2. Neptune Avenue @ West 6th Street - eastbound traffic volume was approximately 491, 682, and 616 vehicles per hour in the AM, midday, and PM peak hour, respectively. Westbound traffic volume was approximately 587, 573, and 507 vph in the AM, midday, and PM peak hour, respectively.
3. 86th Street @ Avenue U - eastbound traffic volume was approximately 277, 316, and 378 vehicles per hour in the AM, midday, and PM peak hour, respectively. Westbound traffic volume was approximately 374, 452, and 572 vph in the AM, midday, and PM peak hour, respectively.
4. Ocean Parkway @ Avenue Z - northbound traffic volume was approximately 1665, 1226, and 1458 vehicles per hour in the AM, midday, and PM peak hour, respectively. Southbound traffic volume was approximately 1233, 1151, and 1513 vph in the AM, midday, and PM peak hour, respectively.
5. Bay Parkway (between Cropsey Avenue and Bath Avenue) – southbound traffic volume was approximately 938, 770, and 890 vehicles per hour in the AM, midday, and PM peak hour, respectively. Northbound traffic volume was approximately 852, 838, and 938 vph in the AM, midday, and PM peak hour, respectively.
6. Shore (Belt) Parkway exit and entry ramps at Bay Parkway - each ramp processed approximately 830, 730, and 790 vehicles per hour in the weekday AM, midday, PM, peak hour, respectively.

4.5 Street Capacity & Level of Service (LOS)

The capacity of the roadways is the maximum rate of flow which may pass through a section of roadway under prevailing traffic, roadway and signalization conditions. The capacity of a roadway is determined by several factors including turning movements, signal timing, pedestrian movements, type of vehicle, illegal and/or double parking, grade, roadway conditions, and weather. In determining street capacity within the study area the 2000 Highway Capacity Manual (HCM) methodology was used. The methodology requires the use of official signal timings, street geometry, and other relevant information for performing capacity and LOS analyses.

The traffic flow characteristics are measured in terms of the volume-to-capacity (v/c) ratios and delays. The quality of the flow is expressed in terms of LOS, which is based on an average delay experienced by a vehicle; Table 4-1 traffic conditions for each LOS assignment. When the v/c ratio exceeds 1.0, a facility or intersection operates at or over capacity. In this situation severe congestion occurs in traffic with stop-and-start conditions, and extensive vehicle queuing and delays. Volume-to-capacity ratios of less than 0.85 are considered to be reflective of acceptable traffic conditions, with average delays of 30 seconds or less. The following table shows the level of service criteria as specified in the 2000 HCM Methodology.

The intersections studied were analyzed for roadway capacity, volume-to-capacity (v/c) ratios, vehicular delay, and level-of-service (LOS) for the weekday AM, midday, and PM peak hour; as well as the Saturday peak hour (12:00 – 1:00 PM).

Table 4-1: Signalized Intersection Level of Service (LOS)

Level of Service	Control Delay Per Vehicle	Description of Traffic Condition
A	≤10.0	LOS A describes operations with low control delay, up to 10 s/veh. This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all.
B	>10 to 20	LOS B describes operations with control delay greater than 10 and up to 20 s/veh. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.
C	> 20 to 35	LOS C describes operations with control delay greater than 20 and up to 35 s/veh. These higher delays may result from only fair progression, longer cycle lengths or both. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	> 35 to 55	LOS D describes operations with control delay greater than 35 and up to 55 s/veh. The influence of congestion becomes more noticeable at this level. Longer delays may result from a combination of unfavorable progression, long cycle lengths, and/or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	> 55 to 80	LOS E describes operations with control delay greater than 55 and up to 80 s/veh. These higher delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
F	> 80	LOS F describes operations with delay in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Sources: Highway Capacity Manual, Transportation Research Board;
National Research Council, Washington D.C., 2000;
New York City Department of Transportation;
New York State Department of Transportation.

Note: Control delay is measured in terms of seconds per vehicle.

4.6 Existing Traffic Conditions

Table 4-2 shows the 2002 Existing Conditions including v/c ratios, delays, and level of service (LOS) for the AM, midday, and PM peak hour for the intersections analyzed in the study area. The analysis showed that most intersections operated at an acceptable level-of-service with LOS B or better during the AM, midday, and PM peak periods. However, some intersections experienced LOS D, E, and F for some or all lane groups during some peak hours.

The intersections with overall LOS D (equal to or greater than 45 sec./veh.) or worse are listed below and shown in Figures 4-8, 4-9, and 4-10.

- Kings Highway @ Ocean Parkway (AM)
- Kings Highway @ McDonald Avenue (AM, midday, PM)
- Ocean Parkway @ Avenue W (AM)
- McDonald Avenue @ 86th Street & Avenue X (AM, midday, PM)
- Ocean Parkway @ Avenue X (AM)
- Coney Island Avenue @ Neptune Avenue (PM)
- Coney Island Avenue @ Belt Parkway Entrance/Guider Avenue (AM, midday, PM)
- Brighton Beach @ Coney Island Avenue (AM, midday, PM)
- Ocean Parkway @ Neptune Avenue (AM, midday, PM)
- Bay Parkway @ Cropsey Avenue (PM)

Table 4-2: Traffic Capacity Analysis for Signalized Intersections

(2002 Existing Conditions)

INTERSECTION	Lane Group		AM V/C	AM DELAY	AM LOS	MID V/C	MID DELAY	MID LOS	PM V/C	PM DELAY	PM LOS
Kings Hwy @ Ocean Pkwy	EB	LTR	0.97	78.00	E	0.78	49.60	D	0.81	51.40	D
	WB	LTR	1.05	96.00	F	0.85	56.50	E	0.50	37.50	D
	NB	L	0.24	28.80	C	0.39	39.90	D	0.31	39.70	D
		TR	1.03	60.10	E	0.82	31.70	C	0.64	26.30	C
	SB	L	0.11	44.00	D	0.32	41.70	D	0.16	25.60	C
		TR	0.63	26.10	C	0.69	27.50	C	0.76	29.40	C
Kings Hwy @ McDonald Avenue	EB	LTR	0.33	12.10	B	0.35	10.40	B	0.47	14.30	B
	WB	LTR	0.54	15.60	B	0.64	15.70	B	0.50	14.90	B
	NB	LTR	1.05	90.10	F	1.05	89.10	F	1.05	98.00	F
	SB	LTR	1.05	103.10	F	1.04	88.70	F	1.02	91.80	F
Kings Hwy @ Coney Island Avenue	EB	LTR	0.93	63.60	E	0.66	27.70	C	0.81	46.30	D
	WB	LTR	0.60	35.40	D	0.54	24.10	C	0.63	37.90	D
	NB	L	1.05	77.70	E	0.69	34.70	C	0.36	21.00	C
	NB	TR	0.59	20.70	C	0.59	18.90	B	0.49	18.80	B
	SB	LTR	0.63	22.20	C	0.78	24.90	C	0.71	24.40	C
Kings Hwy @ Stillwell Avenue	EB	LTR	0.24	11.00	B	0.18	8.50	A	0.29	11.50	B
	WB	LTR	0.62	17.90	B	0.49	12.10	B	0.46	14.10	B
	NB	LTR	0.69	42.40	D	0.89	48.00	D	0.67	41.90	D
	SB	LTR	0.73	44.60	D	0.92	51.80	D	0.93	63.20	E
Bay Pkwy @ 86th Street	EB	LTR	0.34	29.10	C	0.41	24.00	C	0.43	30.60	C
	WB	LTR	0.32	28.70	C	0.40	23.80	C	0.42	30.40	C
	NB	LTR	0.60	19.30	B	0.49	13.80	B	0.62	19.80	B
	SB	LTR	0.70	21.90	C	0.53	14.40	B	0.68	21.20	C
84th Street @ 23rd Avenue	WB	LTR	0.31	16.70	B	0.40	18.10	B	0.47	19.20	B
	NB	LT	1.05	82.20	F	1.05	79.30	E	1.05	80.80	F
	SB	TR	0.26	8.50	A	0.22	8.10	A	0.33	9.10	A
Bay 32nd Street @ Benson Avenue	EB	TR	0.28	8.70	A	0.33	9.10	A	0.39	9.80	A
	WB	LT	0.73	26.70	C	0.65	19.30	B	1.05	72.80	E
	SB	LTR	0.39	18.20	B	0.36	17.80	B	0.44	19.10	B
Bay 35th Street @ Bath Avenue	EB	LTR	1.05	78.20	E	0.67	21.50	C	0.83	28.30	C
	WB	LTR	0.41	10.00	A	0.31	8.90	A	0.47	10.60	B
	NB	LTR	0.32	16.90	B	0.26	16.10	B	0.29	16.50	B
86th Street @ Stillwell Avenue	EB	LTR	0.16	12.80	B	0.23	9.90	A	0.22	13.30	B
	WB	LTR	0.27	13.80	B	0.27	10.20	B	0.54	17.40	B
	NB	LTR	0.39	22.50	C	0.49	19.80	B	0.51	24.50	C
	SB	LTR	0.47	24.10	C	0.44	19.30	B	0.53	25.40	C
Bay 48th Street @ Cropsey Avenue	EB	LTR	0.40	10.60	B	0.44	11.10	B	0.42	10.80	B
	WB	LTR	0.45	11.20	B	0.43	11.00	B	0.44	11.10	B
	NB	LTR	0.33	27.10	C	0.46	29.60	C	0.25	25.90	C
Bay 49th Street @ Stillwell Avenue	EB	LR	0.48	17.90	B	0.46	17.50	B	0.42	16.70	B
	NB	T	0.21	7.10	A	0.21	7.10	A	0.20	7.10	A
	SB	T	0.24	7.30	A	0.23	7.20	A	0.23	7.30	A
Harway Avenue @ Stillwell Avenue	EB	LR	0.29	16.40	B	0.21	15.60	B	0.25	15.90	B
	NB	LT	0.37	9.00	A	0.29	8.40	A	0.24	8.00	A
	SB	TR	0.22	7.80	A	0.33	8.60	A	0.20	7.70	A
Bay 54th Street @ Cropsey Avenue	EB	L	0.25	22.40	C	0.09	19.70	B	0.09	20.60	C
		LR	0.12	20.90	C	0.06	19.50	B	0.06	20.30	C
	NB	L	0.37	18.80	B	0.06	9.70	A	0.07	10.70	B
		T	0.41	12.70	B	0.35	11.40	B	0.41	12.70	B
	NB	TR	0.50	13.70	B	0.39	11.80	B	0.45	13.20	B

Table 4-2: Traffic Capacity Analysis for Signalized Intersections
(2002 Existing Conditions)

INTERSECTION	Lane Group		AM			MID			PM		
			V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
West 9th Street @ Avenue T	EB	LT	0.65	18.40	B	0.57	14.60	B	0.92	42.10	D
	WB	TR	0.30	8.80	A	0.32	9.00	A	0.43	10.20	B
	NB	LTR	0.38	17.80	B	0.38	18.00	B	0.34	17.20	B
West 5th Street @ Avenue T	EB	LT	1.05	77.70	E	0.87	34.20	C	1.02	64.60	E
	WB	TR	0.31	8.90	A	0.31	9.00	A	0.46	10.60	B
	NB	LTR	0.28	16.50	B	0.28	16.50	B	0.31	16.90	B
West 7th Street @ Avenue U	EB	LT	0.42	10.20	B	0.43	10.30	B	0.47	10.80	B
	WB	TR	0.39	9.80	A	0.43	10.20	B	0.48	10.90	B
	NB	LTR	0.19	15.30	B	0.22	15.60	B	0.24	15.90	B
West 11th Street @ Avenue U	EB	LT	0.57	15.20	B	0.71	25.30	C	0.47	12.00	B
	WB	TR	0.43	10.40	B	0.48	14.60	B	0.54	12.00	B
	NB	LTR	0.30	16.70	B	0.26	11.90	B	0.35	17.50	B
Ocean Pkwy @ Avenue W	EB	LTR	0.75	60.60	E	0.90	63.60	E	0.74	45.90	D
	WB	LTR	1.05	104.90	F	0.54	40.20	D	0.55	38.50	D
	NB	L	0.16	18.20	B	0.10	22.80	C	0.16	32.20	C
	NB	TR	1.04	55.40	E	0.61	25.70	C	0.66	26.70	C
	SB	L	0.36	48.70	D	0.16	24.70	C	0.37	37.10	D
	SB	TR	0.56	19.00	B	0.61	25.60	C	0.76	29.60	C
McDonald Avenue @ 86th Street & Avenue X	EB	LTR	0.57	53.70	D	0.30	30.70	C	0.23	43.40	D
	WB	LTR	1.05	116.30	F	1.05	95.00	F	1.05	107.60	F
	NB	LTR	0.65	34.10	C	0.74	33.40	C	0.61	33.30	C
	SB	LTR	0.96	74.40	E	1.05	87.60	F	1.05	94.10	F
	NWB	LTR	0.81	47.40	D	0.76	36.90	D	0.84	49.30	D
Avenue X @ West 3rd Street	EB	LTR	0.91	43.10	D	1.05	80.70	F	1.05	75.70	E
	WB	LTR	0.40	10.00	A	0.42	10.20	B	0.44	10.40	B
	NB	LTR	0.30	16.70	B	0.39	17.90	B	0.36	17.40	B
Ocean Pkwy @ Avenue X	EB	LTR	1.05	102.40	F	0.99	85.60	F	1.02	92.50	F
	WB	LTR	1.05	100.90	F	0.89	63.40	E	0.80	52.70	D
	NB	L	0.34	37.90	D	0.27	34.10	C	0.28	36.40	D
	NB	TR	1.05	67.20	E	0.69	27.60	C	0.70	27.70	C
	SB	L	0.16	44.10	D	0.19	29.50	C	0.22	31.30	C
	SB	TR	0.71	28.00	C	0.70	27.90	C	0.72	28.50	C

Table 4-2: Traffic Capacity Analysis for Signalized Intersections

(2002 Existing Conditions)

INTERSECTION	Lane Group		AM			MID			PM		
			V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
Ocean Pkwy @ Avenue Z	EB	LTR	0.90	74.20	E	0.74	51.10	D	0.84	63.30	E
	WB	LTR	1.05	106.50	F	0.91	74.10	E	1.05	100.70	F
	NB	L	0.18	19.30	B	0.25	21.90	C	0.38	30.50	C
	NB	TR	0.94	33.60	C	0.49	20.60	C	0.55	18.80	B
	SB	L	0.50	54.00	D	0.26	20.50	C	0.39	28.60	C
	SB	TR	0.52	18.30	B	0.53	21.20	C	0.58	19.40	B
Shell Road @ Avenue Z	WB	LR	0.45	19.20	B	0.56	21.10	C	0.65	23.80	C
	NB	TR	0.42	10.30	B	0.41	10.20	B	0.43	10.40	B
	SB	LT	0.64	13.50	B	0.68	14.70	B	0.74	16.50	B
Shell Road/West 8th Street @ Neptune Avenue	EB	LTR	0.88	31.20	C	0.54	15.10	B	0.89	32.00	C
	WB	LTR	0.38	14.80	B	0.43	13.30	B	0.46	15.90	B
	NB	LTR	0.23	18.90	B	0.11	15.60	B	0.17	18.20	B
	SB	LTR	0.34	20.00	C	0.38	18.20	B	0.48	21.90	C
Coney Island Avenue @ Neptune Avenue	EB	L	0.91	102.00	F	0.65	32.70	C	1.05	142.60	F
	EB	TR	0.76	53.40	D	0.65	27.30	C	1.05	98.90	F
	WB	L	0.32	38.20	D	0.38	22.40	C	1.05	144.20	F
	WB	TR	1.05	104.80	F	0.67	28.20	C	1.05	101.20	F
	NB	LTR	0.31	10.50	B	0.60	19.50	B	0.55	14.00	B
	SB	LTR	0.44	12.30	B	0.23	14.20	B	0.59	15.00	B
West 12th Street @ Neptune Avenue	EB	TR	0.53	14.60	B	0.31	12.00	B	0.55	14.90	B
	WB	LT	0.47	14.00	B	0.40	13.00	B	0.66	17.50	B
	NB	LR	0.31	23.70	C	0.26	23.20	C	0.26	23.00	C
Cropsey Avenue @ Neptune Avenue & West 17th Street	EB	L	0.37	34.90	C	0.71	42.40	D	0.71	42.70	D
		TR	0.47	13.20	B	0.15	10.10	B	0.21	10.60	B
	WB	L	0.08	22.40	C	0.01	20.90	C	0.07	21.80	C
		TR	0.97	51.00	D	0.64	29.70	C	0.71	31.60	C
	NB	LTR	0.60	29.70	C	0.57	28.70	C	0.79	37.50	D
	SB	L	0.90	65.80	E	1.00	87.50	F	1.05	92.20	F
		T	0.33	24.10	C	0.37	24.70	C	0.42	25.50	C
		R	0.56	14.20	B	0.35	11.50	B	0.39	11.90	B
Mermaid Avenue @ Stillwell Avenue	EB	LR	0.46	14.40	B	0.55	16.20	B	0.33	12.70	B
	NB	LT	0.27	12.00	B	0.35	13.10	B	0.43	14.00	B
	SB	TR	0.16	10.70	B	0.19	10.90	B	0.15	10.70	B

Table 4-2: Traffic Capacity Analysis for Signalized Intersections

(2002 Existing Conditions)

INTERSECTION	Lane Group		AM			MID			PM		
			V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
Surf Avenue @ Stillwell Avenue	EB	LTR	0.43	8.10	A	0.32	7.10	A	0.36	7.50	A
	WB	LTR	0.32	7.10	A	0.24	6.50	A	0.31	7.00	A
	NB	LTR	0.06	28.20	C	0.72	56.70	E	0.25	30.90	C
	SB	LTR	0.50	34.00	C	0.76	45.30	D	0.51	35.00	C
West 8th Street @ Surf Avenue	EB	L	0.13	6.10	A	0.17	6.40	A	0.19	6.70	A
	EB	TR	0.26	6.60	A	0.20	6.20	A	0.21	6.30	A
	WB	L	0.01	5.30	A	0.00	5.20	A	0.07	5.70	A
	WB	TR	0.23	6.40	A	0.15	5.90	A	0.26	6.60	A
	NB	LTR	0.01	27.50	C	0.26	30.70	C	0.44	34.10	C
	SB	L	0.77	54.60	D	0.37	34.90	C	0.49	41.00	D
	SB	TR	0.09	28.30	C	0.42	32.30	C	0.20	29.50	C
West 17th Street @ Mermaid Avenue	EB	LTR	0.57	16.30	B	0.45	14.00	B	0.49	15.10	B
	WB	LTR	0.30	12.20	B	0.29	12.10	B	0.39	13.20	B
	NB	LTR	0.45	14.10	B	0.43	13.90	B	0.58	16.50	B
	SB	LTR	0.22	11.20	B	0.22	11.20	B	0.25	11.40	B
Coney Island Avenue @ Guider Avenue	EB	LTR	1.05	86.70	F	1.05	93.60	F	1.05	91.70	F
	WB	LTR	1.05	88.90	F	1.05	85.70	F	1.05	83.20	F
	NB	LTR	0.44	14.00	B	0.55	15.80	B	0.55	15.80	B
	SB	LTR	0.41	13.90	B	0.34	13.10	B	0.48	15.00	B
Brighton Beach Avenue @ Ocean Parkway	EB	LTR	0.28	41.20	D	0.29	41.90	D	0.36	42.50	D
	WB	LTR	0.43	32.80	C	0.44	27.40	C	0.51	34.20	C
	NB	L	0.01	10.10	B	0.01	14.60	B	0.01	10.10	B
	NB	TR	0.12	21.20	C	0.16	29.80	C	0.19	25.10	C
	SB	L	0.26	13.10	B	0.34	19.70	B	0.39	15.70	B
	SB	TR	0.13	21.30	C	0.19	30.10	C	0.17	24.80	C
Brighton Beach Avenue @ Coney Island Avenue	EB	L	0.83	76.50	E	1.05	106.40	F	0.99	111.20	F
		TR	0.62	44.70	D	0.72	41.10	D	0.49	39.90	D
	WB	LTR	0.77	48.50	D	0.75	36.50	D	0.65	42.00	D
	NB	LTR	0.17	25.00	C	0.43	30.20	C	0.60	35.40	D
	SB	LTR	1.05	96.70	F	1.05	89.90	F	1.05	92.00	F
Neptune Avenue @ Ocean Parkway	EB	LTR	1.05	80.90	F	1.05	82.90	F	1.05	79.70	E
	WB	LTR	1.05	98.70	F	1.05	95.90	F	1.05	93.70	F
	NB	L	0.06	19.20	B	0.12	20.30	C	0.16	23.80	C
	NB	TR	0.28	28.50	C	0.33	30.50	C	0.37	31.10	C
	SB	L	0.43	24.70	C	0.53	30.90	C	0.68	38.20	D
	SB	TR	0.39	30.10	C	0.35	30.8	C	0.5	33.1	C

Table 4-2: Traffic Capacity Analysis for Signalized Intersections

(2002 Existing Conditions)

INTERSECTION	Lane Group		AM			MID			PM		
			V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
Bay Parkway @ Cropsey Avenue	EB	L	0.19	35.30	D	0.19	29.60	C	0.27	44.60	D
		T	0.43	38.70	D	0.43	32.00	C	0.51	40.70	D
		R	0.56	36.40	D	0.69	35.70	D	0.74	44.60	D
	WB	L	0.21	23.30	C	0.19	19.10	B	0.34	25.40	C
		TR	0.41	25.70	C	0.61	25.00	C	1.05	74.40	F
	NB	L	0.11	24.20	C	0.7	38.90	D	1.05	115.60	F
		TR	0.19	16.90	B	0.44	15.30	B	0.53	21.60	C
	SB	L	0.1	24.30	C	0.23	22.40	C	0.30	30.60	C
		TR	0.61	32.30	C	0.74	29.60	C	0.96	54.50	D
Brighton Beach Avenue @ Brighton 11th Street	EB	T	0.45	12.20	B	0.46	14.80	B	0.40	13.80	B
	WB	TR	0.28	9.60	A	0.30	11.90	B	0.23	11.20	B
	SB	LR	0.39	21.80	C	0.27	22.60	C	0.46	26.50	C
Neptune Avenue @ Brighton 10th Street	EB	T	0.55	16.00	B	0.53	15.8	B	0.53	15.6	B
	WB	T	0.43	13.90	B	0.45	14.2	B	0.58	16.5	B
	NB	LR	0.07	20.40	C	0.15	21.4	C	0.06	20.3	C
	SB	L	0.47	24.70	C	0.39	23.5	C	0.45	24.4	C
	SB	R	0.13	21.20	C	0.17	21.7	C	0.11	20.9	C
Neptune/Emmons Avenue @ E 14th St./Shore Blvd	EB	L	0.33	21.00	C	0.35	23.70	C	0.41	27.20	C
		TR	0.32	18.60	B	0.31	20.90	C	0.36	21.60	C
	WB	L	0.79	24.90	C	0.57	17.90	B	0.72	25.10	C
		TR	0.39	8.80	A	0.33	10.40	B	0.46	11.70	B
	NB	L	0.71	39.00	D	0.54	35.60	D	0.48	34.30	C
		T	0.46	30.80	C	0.30	30.50	C	0.39	32.00	C
		R	0.60	25.00	C	0.71	32.40	C	0.74	33.40	C
Brighton Beach Avenue @ Brighton 4th Street	EB	TR	0.12	6.40	A	0.14	6.60	A	0.18	6.80	A
	WB	LT	0.18	6.80	A	0.21	7.00	A	0.37	8.30	A
	SB	LTR	0.24	28.80	C	0.27	29.20	C	0.69	41.70	D
Coney Island Avenue @ Avenue Z	EB	LTR	0.65	44.10	D	0.51	27.1	C	0.56	35.8	D
	WB	LTR	0.64	45.00	D	0.55	27.9	C	0.67	39.3	D
	NB	L	0.18	14.30	B	0.37	20.5	C	0.36	24.3	C
	NB	TR	0.3	14.30	B	0.41	17.6	B	0.38	21.3	C
	SB	L	0.14	10.90	B	0.09	11.8	B	0.16	16.8	B
	SB	TR	0.29	9.30	A	0.32	10.6	B	0.28	12.3	B

: approach with LOS F

Figure 4-8: Intersections with LOS D, E, and F (AM Peak Hour)

Figure 4-9: Intersections with LOS D, E, and F (Midday Peak Hour)

Legend

- LOS D (Intersection Delay >45 sec./veh.)
- LOS E
- LOS F

Figure 4-10: Intersections with LOS D, E, and F (PM Peak Hour)

4.7 Vehicular Speeds

To measure peak hour travel time and vehicular speeds in the study area and to identify locations where traffic delay exists, speed and travel time runs were conducted.

The travel time runs were conducted for each peak period for three consecutive weekdays concurrently with traffic volume data collection. Three travel runs were performed for each link during each peak travel period.

The "floating car" method (a technique whereby a field vehicle travels at speeds under prevailing traffic conditions) was used to measure travel time and speed. Travel time and speed runs were conducted at the following corridors:

1. McDonald Avenue/Shell Road from Kings Highway to Neptune Avenue
2. Ocean Parkway from Kings Highway to Surf Avenue
3. King Highway from Coney Island Avenue to Bay Parkway
4. Cropsey Avenue from Bay Parkway to Neptune Avenue
5. Coney Island Avenue from Kings Highway to Brighton Beach Avenue
6. 86th Street from Bay Parkway to Stillwell Avenue
7. Avenue U from 86th Street to Coney Island Avenue
8. Brighton Beach Avenue from Coney Island Avenue to Ocean Parkway
9. Neptune Avenue from Cropsey Avenue to Coney Island Avenue
10. Bay Parkway from Kings Highway to Shore (Belt) Parkway
11. Surf Avenue from Ocean Parkway to West 37th Street
12. Stillwell Avenue from Surf Avenue to Kings Highway

Congestion occurs on several corridors and intersections particularly during the peak hours. The conditions are attributed to several factors including bus, car, truck, and pedestrian conflicts, as well as illegal curbside and double parking and standing which reduce roadway capacity and result in delays and reduced travel speeds. This is evident along same corridors such as Kings Highway, 86th Street, McDonald Avenue, and Brighton Beach Avenue.

Figure 4-11 shows the corridors where travel time runs were conducted and Table 4-3 summarizes the average travel speeds for each corridor by direction for the various peak hours. Travel speeds throughout the study area for the various peak periods range from 8 mph to 31 mph. The corridors with low speeds, i.e. less than 10 mph during one or more peak hours, are:

- Kings Highway;
- 86th Street;
- Brighton Beach Avenue, and
- Avenue U.

Figure 4-11: Speed Run Corridors

Legend

Speed Run Corridor

Study Area

Table 4-3: Corridor Travel Speeds

(Page 1 of 2)

No.	Corridors	Peak Hour	Direction	Existing Conditions Average Speed
1	McDonald Avenue/Shall Road/West 8th Street from Kings Highway to Surf Avenue	AM	NB	13
			SB	14
		MD	NB	14
			SB	14
		PM	NB	15
			SB	16
2	Ocean Parkway from Kings Highway to Surf Avenue	AM	NB	22
			SB	14
		MD	NB	15
			SB	14
		PM	NB	13
			SB	31
3	King Highway from Coney Island Avenue to Bay Parkway	AM	EB	11
			WB	13
		MD	EB	11
			WB	9
		PM	EB	9
			WB	10
4	Cropsey Avenue from Bay Parkway to Neptune Avenue	AM	EB	12
			WB	20
		MD	EB	13
			WB	18
		PM	EB	13
			WB	20
5	Coney Island Avenue from Kings Highway to Brighton Beach Avenue	AM	NB	18
			SB	15
		MD	NB	13
			SB	14
		PM	NB	14
			SB	20
6	86th Street from Bay Parkway to Stillwell Avenue	AM	EB	11
			WB	15
		MD	EB	12
			WB	9
		PM	EB	14
			WB	10

Table 4-3: Corridor Travel Speeds
(Page 2 of 2)

No.	Corridors	Peak Hour	Direction	Existing Conditions Average Speed
7	Stillwell Avenue from Surf Avenue to Kings Highway	AM	NB	12
			SB	16
		MD	NB	13
			SB	17
		PM	NB	14
			SB	16
8	Surf Avenue from Ocean Parkway to West 37th Street	AM	EB	16
			WB	17
		MD	EB	18
			WB	18
		PM	EB	16
			WB	23
9	Bay Parkway from Kings to Shore (Belt) Parkway	AM	NB	15
			SB	12
		MD	NB	15
			SB	16
		PM	NB	14
			SB	10
10	Neptune Avenue from Cropsey Avenue to Coney Island Avenue	AM	EB	12
			WB	11
		MD	EB	14
			WB	13
		PM	EB	12
			WB	13
11	Brighton Beach from Coney Island Avenue to Ocean Parkway	AM	EB	9
			WB	9
		MD	EB	9
			WB	8
		PM	EB	11
			WB	9
12	Avenue U from 86th Street to Coney Island Avenue	AM	EB	12
			WB	10
		MD	EB	9
			WB	10
		PM	EB	10
			WB	9

4.8 Goods Movement

There are a lot of goods movements along some corridors where commercial activities are concentrated. In general, goods movement occurs along designated truck routes. The designated truck routes in the study area are shown in Figure 4-12. The truck route network comprises two categories of routes:

(a) Through truck routes - routes for use by all trucks and;

(b) Local truck routes - routes for use by trucks with local origins and/or destinations.

There are no through truck routes in the Study area. The local truck routes in the study area are:

- Bay Parkway from Kings Highway to Shore Parkway Service Road
- King Highway from Coney Island Avenue to Bay Parkway
- McDonald Avenue/Shell Road from Kings Highway to Neptune Avenue
- Coney Island Avenue from Kings Highway to Neptune Avenue
- Neptune Avenue from Coney Island Avenue to Cropsey Avenue
- Cropsey Avenue from Bay Parkway to Neptune Avenue
- Avenue U from West 12th Street to Coney Island Avenue
- 25th Avenue from Cropsey Avenue to 86th Street
- 86th Street from 25th Avenue to West 12th Street

Truck traffic on the local truck routes in the study area shows morning and midday peaks, with a sharp drop in volume after 4PM. In general, inbound volumes are highest during the morning peak.

Due to a deficiency in designated loading and unloading areas for commercial vehicles along the major corridors where commercial activities are concentrated, delivery trucks sometimes illegally or double park. This is particularly evident at the following locations:

- Kings Highway between McDonald Avenue and Stillwell Avenue;
- Brighton Beach between Ocean Parkway and Brighton 12th Street;
- 86th Street from Bay Parkway to Stillwell Avenue;
- McDonald Avenue between Avenue X and Kings Highway.

Figure 4-12: Truck Routes

Legend

Local Truck Routes

Study Area